# MotionWorks Enterprise 2.0



# **User Guide**

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# MotionWorks Enterprise 2.0

This user guide focuses on the features and functionality of the MotionWorks Enterprise 2.0 web client, the main tool for users to view and interact with the data provided by the real-time asset tracking MotionWorks Enterprise (MWE) system from Zebra Technologies Corporation.

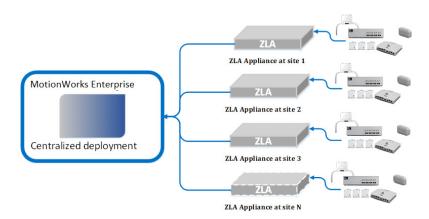
Zebra Technologies offers world-class real-time asset tracking and management software solutions to optimize the flow of goods in complex logistical operations, increasing productivity, lowering operational costs, and improving safety and security. Zebra Technologies uses a wide range of scalable RTLS (Real Time Locating Systems) technologies to generate accurate, on-demand information about the physical location and status of assets.

MWE is a software suite that provides tools for designing, configuring, operating, and troubleshooting RTLS solutions. MWE serves as the central repository for all the real-time location and communication data captured by the RTLS-tracking infrastructure. MWE also provides tools for integrating RTLS data with customers and third-party applications.

Some of the location and telemetry RFID technologies supported by MWE include:

- Passive RFID
- UWB
- Bluetooth Low-Energy
- WiFi
- ISO 24730
- GPS

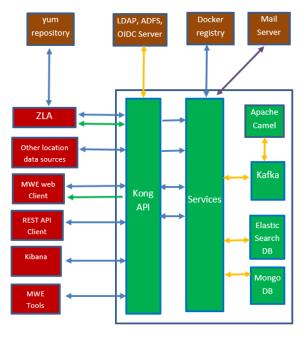
The diagram below provides an overview of some of the RTLS system components and data flow. The over-the-air RF transmissions from tags (RF transmitters) are detected by sensors connected to a network. This connection can be wired or wireless. The data generated by the sensors flow across the network to a Zebra Location Appliance (ZLA) and then to a MWE server. Multiple sites are supported, each with its own ZLA.



A ZLA can collect, process, and filter location and telemetry data from multiple sensing devices and can also run a variety of location algorithms. A ZLA can be a virtual appliance or physical appliance. A physical ZLA is 1U rackmount box installed on-site feeding tag blink and location data to MWE server installed on site or remotely at a data centre.

MWE 2.0 also supports direct communication from passive RFID readers to MWE running locally or in the cloud. No ZLA appliance is required in this case.

The MWE software is installed on a Linux server (Red Hat or CentOS). The diagram below illustrates the various MWE software components hosted on the MWE Linux server and their relation within the MWE software.



#### **MWE Linux Server**

This guide assumes that the MWE software is previously installed and properly configured. Consult the following documents for details on MWE installation and configuration:

- MWE 2.0 Installation Guide
- MWE 2.0 Configuration Guide

# Term List

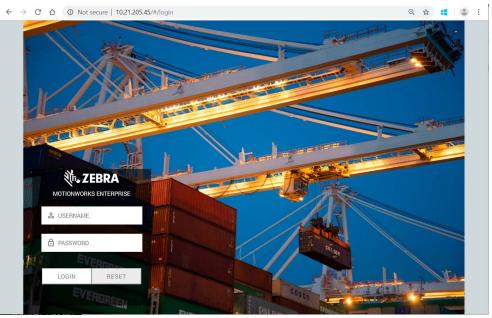
The table below provides a brief overview of the terms used in the MWE documentation:

Term	Definition
Tag	An active or passive RFID transmitter. It can be a WhereNet tag, DART (UWB) tag, GPS tag, EPC (passive RFID) tag, BLE tag.
Resource	An object, equipment, vehicle, etc. whose location and status is to be tracked.
Asset	Synonym with Resource.
Tag ID	A unique tag identifier that is included in every tag transmission.
Resource ID	A unique identifier that identifies the resource being tracked.
Asset ID	Same as Resource ID.
Resource Type	A type or category of resources as defined within the MWE software. Examples of resource types are printer, trailer, container, truck, airplane, etc. Every resource within the MWE software belongs to a resource type.
Tagged Resource	A resource whose Resource ID is associated with a Tag ID in the MWE software.
Unassigned Tag	A tag whose Tag ID is not associated with a Resource ID within the MWE software.
Tag Blink	A tag transmission (one or multiple bursts of electromagnetic waves in the RFID part of the spectrum).
Location Sensor	A device that captures tag blinks and forwards them across the network to a server or ZLA.
ZLA	Zebra Location Appliance. A physical or virtual appliance that receives data from a variety of sensors and runs location algorithms. The resulting coordinates x,y or latitude/longitude are forwarded to the MWE server.

# Launching the MWE Web Client

To launch the client, open a web browser (Chrome, Edge, Firefox) on a client machine or server on the network, and point it to http://MWE\_Server\_Name or https://MWE\_Server\_Name, where MWE\_Server\_Name is the Linux (Red Hat) server name or IP address.

The login page is displays:



Next, enter the login credentials. This could be a local account created and stored in the local MWE SQL database, or it could be a domain account authenticated by an OpenLDAP, Active Directory, or ADFS server. See the MWE Configuration Guide on how to configure authentication modes and login accounts.

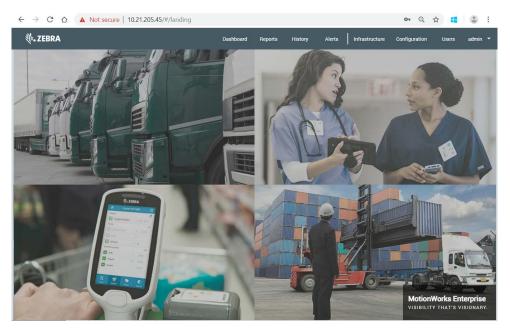


**NOTE:** Depending on the MWE version, you may see some differences between the screens depicted in this document and the screens in your MWE version.

Enter your login credentials. This could be a local account created and stored in the local MWE SQL database, or it could be a domain account authenticated by an OpenLDAP, Active Directory, OIDC, or ADFS server. Please see the MWE Configuration Guide on how to configure authentication modes and login accounts.

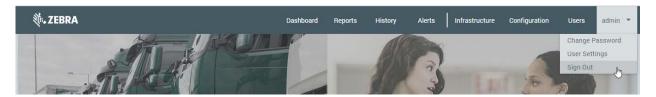
Note that the browser may display a not secure or certificate error or similar warning in the URL bar when using https. This is because the MWE installation script installs a default self-signed certificate on the MWE Linux server. Refer to the MWE Configuration Guide for instructions on installing your own valid certificate on the MWE Linux server.

After logging in, view the landing page with a menu bar at the top of the page containing several items: Dashboard, Reports, History, Alerts, Infrastructure, Configuration, Users, and admin (the name of the account currently logged in).



The menu items that are visible on menu bar depend on the access level granted to your login account. If you have full access, you should see the 8 menu items listed above.

To sign out, click the down arrow in the rightmost (account name) menu item and select Sign Out.

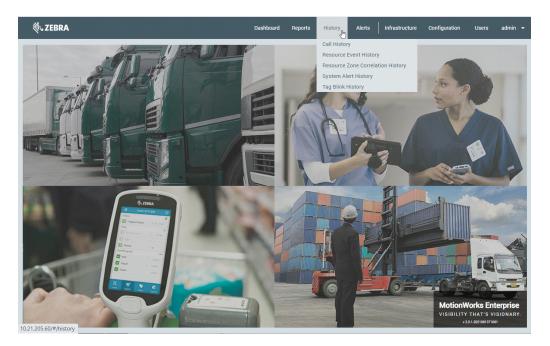


# **UI Basics**

This section provides an overview of the MWE web client user interface. Note that depending on your MWE version, you may see some differences between the screens and menus depicted in this document and those in your MWE version.

#### Menu Items and Reports

Hovering the mouse over a menu item on the menu bar displays a list of available reports under that menu item in alphabetical order, as in the following figure.



The following table lists the reports under each menu item and a brief explanation for each report. These reports will be explained in greater detail later in this guide.

#### Table 2 Menu Items

Menu Item	Report	Description
Dashboard		This tab includes reports that present summary information in graphical form.
	Resources	Graphical summary of number of tracked resources, listed by type, site, zone, and custom properties.
	System Health	Graphical summary of open system alerts per site, including ZLA, sensor, tag, and other alerts.
	Alert Manager	Tool for configuring alerts related to the health of the MWE Linux server. It is meant only for advanced users and system administrators.
	Grafana - System Health	This tool presents pre-defined dashboards showing health and status of the MWE Linux server.
	Kibana - Application History Data	While the MWE web client offers out-of-the box reports that display application historical data, this tool allows direct access to the application historical data in the MWE Elastic Search database.
	Kibana - Application Logs	This page allows access to the different logs generated by MWE microservices. It is typically used for diagnostics and troubleshooting.
	Prometheus	Tool for building queries on the MWE Linux server health. It is meant only for advanced users and system administrators.
Reports		Includes reports (in table form) with status information on tags and resources being tracked at a site. It also includes a report on import data entry operations.
	Import	Includes the import data entry form and shows a history of import transactions done via the MWE web client
	Resources	Displays status information about each resource being tracked at a site.
	Tags	Displays status information about each resource or asset being tracked at a site, regardless of tag association.
History		Reports that provide historical data on tags, resources, locations, events, system alerts, and more. Each report has purging and/or archiving settings that are discussed later in this document.
	Call History	Shows shows every blink from any WhereNet Call Tag. These blinks have TagStatus=2 in the blink packet (as opposed to TagStatus=0 for blinks from regular WhereNet tags).
	Resource Event History	Displays all events generated by the MWE system related to resources being located and tracked, including Zone Change, Resource Alert, Pickup, Dropoff, Shipped, Received.
	Resource Zone Correlation History	Displays a history report that shows when 2 different resources were in the same zone over a specified time window. The report will show every occurrence and dwell time over that time window.

Menu Item	Report	Description
	System Alert History	Keeps a record of every system alert that has been opened and closed.
	Tag Blink History	Keeps track of every single tag blink processed by the system. Data is only kept for the most recent 7 days.
Alerts		This tab includes a single report.
	Alert Notifications Configuration	This report lists the people (from the Contacts report) that will be notified via email when a specified alert is triggered.
	Open System Alerts	Lists all system alerts that are currently open.
Infrastructure		The reports under this tab allow users to monitor and manage location appliances, define sites and site groups, and upload site maps.
	Appliances	Allows users to monitor and manage location appliances.
	Devices (Device Manager)	Allows adding, configuring, and managing devices directly from this page. No ZLA appliance is required for devices added in this page. In MWE 2.0, only passive RFID readers (FX7500, FX9600, ATR) are supported; must be running firmware v.3.7.26 or higher, and must have the R2C (Reader to Cloud) application installed.
	Hardware Devices	Lists all of the hardware installed at a site as part of the location infrastructure. This report gets populated when System Builder (a MWE system design tool) performs a publish operation. Refer to the MWE Configuration Guide for more details.
	Site Manager	This is where users define sites and site groups, and upload site maps.
	WherePorts	Lists all WherePorts defined in System Builder. WherePorts are also listed in the Hardware Devices report, however, this report provides additional information about the configuration of each WherePort.
Configuration		This tab lists reports that are used to configure different aspects of the MWE software. Entries in these reports can be created, modified, or deleted using data entry.

#### Table 2 (Continued)Menu Items

Menu Item	Report	Description
	Contacts	Users can manage the list of contacts to be used in emailing alerts and scheduled reports.
	Resource Alert Settings	This menu item opens a web page where one can define resource alerts (business rules).
	Resource Type Settings	This is where resource types are defined. Examples include car, trailer, printer, or any other resource type. Each resource type has a set of properties and filters that are specified in this report. Individual resource/asset of this resource type can then be entered into the system with unique resource ID and associated with a tag ID. This can be done using data entry in the Resources report (under Reports tab), data import, or via the API.
	System Alert Settings	Lists all available system alerts. This report allows customization of alert messages and the specification of email distribution list for each alert.
	Virtual Tag Settings	Define virtual tags using this setting. Several real tags can be associated with a virtual tag (in the Virtual Tag Assignment Settings report). The tag blink data reported by MWE for a virtual tag is a configurable combination of the data from the real tags associated to that virtual tag.
	WherePort Dissociate	Associating or dissociating tag ID's to or from asset ID's are done using data entry, data import, or the API. Tag dissociation can be done automatically when a tagged asset crosses the field of a WherePort device (a magnetic exciter). In this report, enter the WhererPort ID's that being used to perform this task.
	Zone Group Settings	Displays Zone Groups published by Zone Builder tool and provides data entry to change some zone group parameters.
	Zone Settings	Displays Zones published by Zone Builder tool and provides data entry to change some zone parameters.
Users		This tab includes two sub-tabs or pages, namely, USER GROUPS and USERS. The USER GROUPS page is the place where to add User Groups and specify the permissions for each group. If using a domain server for authentication, the name of domain groups can be added here. The USERS page is where one can create local user accounts (stored in a local MWE database) and assign them to User Groups. Domain login accounts do not need to be added here.
(logged in account)		The last tab shows the name of the account currently logged in to the web client, and includes items to change user settings and to sign out. A local account can also change password here.

#### Table 2(Continued)Menu Items

#### **Report Interface**

All reports under the **Reports**, **History**, **Alerts**, and **Configuration** menu items have a similar user interface. In addition to the main menu bar, there is a report tool bar in lighter gray color, a report/map window, and a filter's column. The following figure shows the **Reports** > **Tags** report.



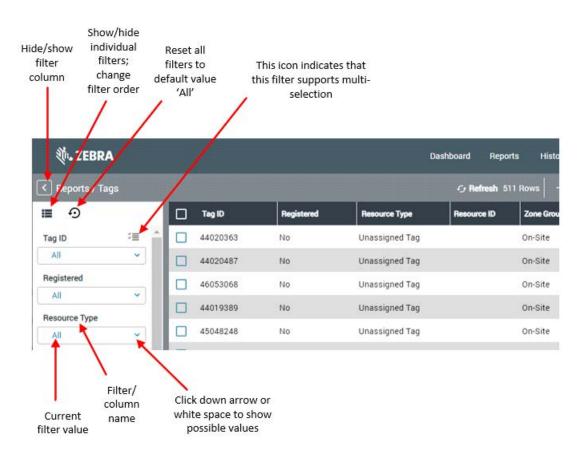
**NOTE:** Depending on what version of MWE you are running, the name and order of menu items shown in the figures below may differ slightly from your version.

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All		44020487	No	Unassigned Tag		On-Site	On-Site	San Jose Office	No	No
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All ~		45048248	No	Unassigned Tag		On-Site	On-Site	San Jose Office	No	No
Resource ID 👘		44020509	No	Unassigned Tag		On-Site	On-Site	San Jose Office	No	No
All 👻		44020483	No	Unassigned Tag		On-Site	On-Site	San Jose Office	No	No
Site, Map, Zone Group, Zone		45048290	No	Unassigned Tag		On-Site	On-Site	San Jose Office	No	No
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ocating		44019675	No	Unassigned Tag		On-Site	On-Site	San Jose Office	No	No
All		44021759	No	Unassigned Tag		On-Site	On-Site	San Jose Office	No	No
All Y		44019513	No	Unassigned Tag		On-Site	On-Site	San Jose Office	No	No
Blinking		44020699	No	Unassigned Tag		On-Site	On-Site	San Jose Office	No	No
All V	_	44020935	No	Unassigned Tag		On-Site	On-Site	San Jose Office	No	No

The following figure provides additional details on the filter's column.

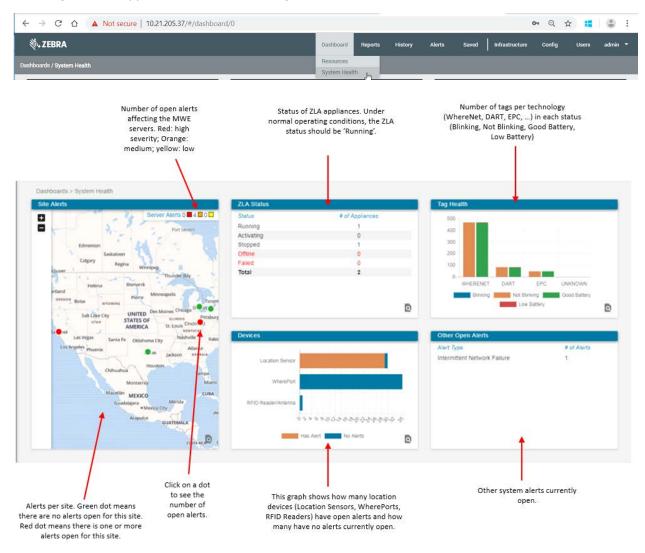
NOTE: Not every column in a report has a filter associated with it.

RA



#### Dashboard

The **Dashboard** > **System** Health page presents a graphical summary of the health of the system, including servers, appliances, sensors, and tags.





**NOTE:** Depending on your MWE version, you may see a different version of this dashboard where the graphs have been replaced by tables, but the meaning of the panels is still the same.

The **Dashboard** > **Resources** page provides several counters related to the location and status of resources being tracked across multiple sites.

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Fixed Receiver	6	6	0									1000					
Forklifts	2	2	0									0	1000	1			
Lifting Tools	4	4	0					_		9				_			
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#### Users

The Users page includes two tabs, namely, User Groups and Users.

The **USER GROUPS** tab is the place where to add User Groups and specify the permissions for each group. Only the administrator user group is created at installation time. If using LDAP/ADFS/OIDC authentication, the name of groups on the LDAP/ADFS/OIDC server can be added here. If using MWE database authentication, newly added groups will exist only on the local MWE SQL database.

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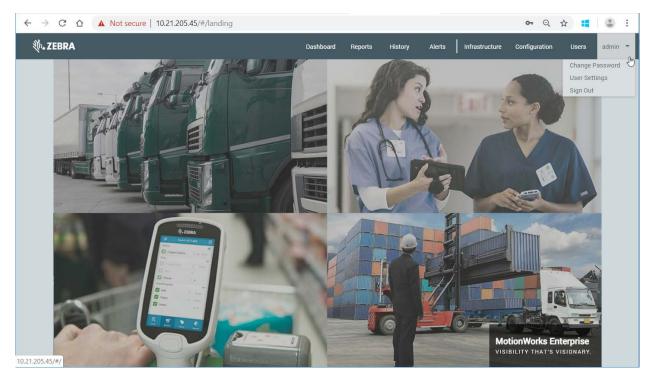
The **USERS** tab is where a user can create local user accounts (stored in the MWE database) and assign them to User Groups. Domain login accounts do not need to be added here.

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It is possible to configure the system to do only LDAP or ADFS or OIDC user authentication, or only MWE local account (in MWE SQL database) authentication, or a mixed mode allowing both MWE local authentication and one of the LDAP/ADFS/OIDC authentication methods. This configuration is done in the **.env** configuration file on the MWE Linux server. Refer to the MWE 2.0 Configuration Guide for details.

#### Login Account Menu

The last item on the menu bar has the name of the login account currently logged into the web client. In the example below, it is **admin**:



In this example, a local user (a login account stored in the local MWE database) can change their password. The **Change Password** menu item is not enabled for domain accounts, which are controlled by a domain controller on the network.

The **User Settings** item provides web client settings that are applied only to the account currently logged in. Lastly, the **Sign Out** item allows a user to sign out.

### **Prerequisites**

The MWE Installation Guide and MWE Configuration Guide explain the MWE software installation and configuration steps that must be completed before a user launches and uses the MWE web client.

The main installation and configuration procedures are listed below:

#### **MWE Installation Procedures**

- 1. Install MWE software on Windows server.
- 2. If deployment includes ZLA appliances:
  - a. Register ZLA appliances with MWE Linux server.
  - **b.** Upgrade ZLA appliance firmware.
- **3.** Upgrade sensor (if any) firmware.
- 4. Upgrade MWE software.

#### **MWE Configuration Procedures**

- 1. Add Site Groups, Sites, and load site maps in the Infrastructure > Site Manager report.
- 2. Calibrate maps (define x,y coordinate system) in the Site Manager report.
- 3. If deployment includes ZLA appliances:
  - a. Register ZLA appliances with MWE Linux server, if not done at installation time.
  - b. Associate each ZLA appliance with a site.
  - c. Use System Builder tool to add location sensor devices and define location algorithms.
- 4. Define zones on top of each map. This is done in the Configure Zones tab in the Site Manager report.
- **5.** Configure authentication mode: local MWE database, LDAP, ADFS, OIDC, or a combination of these. This is done in the .env configuration file on the MWE Linux server.
- 6. Add LDAP/ADFS/OIDC User Groups to MWE for LDAP/ADFS/OIDC authentication
- 7. Create local User Groups and Users, and define permissions

Once the above steps are complete, a user can use the MWE web client to view and enter data about tags and resources being tracked by the RTLS (Real Time Location System) and perform many other tasks as listed in the following section.

## Web Client Common Tasks

This document explains the most common tasks performed with the web client. The tasks listed below are explained in various sections of this guide.

- Launch MWE web client
- Navigate the MWE web client UI
- · View sites on a world map where tags and assets are being tracked
- View site maps
- · View appliances installed at each site, and their status
- Define location filters (rate filter, median filter, ...) per appliance
- View tags status and current location
- View tag blink history
- View tag data in reports and on maps
- Define resource types
- Define location filters (rate filters, median filter, ....) per resource type
- Associate resource ID's to tag ID's
- View resource status, current location, and location history in reports and on maps
- Customize reports (columns displayed, column names, column order, filter data)
- · Customize report filters (filters displayed, filter names, filter order)
- Save customized reports
- Export reports (CSV and HTML formats)
- Import data
- Define business rules alerts (resource alerts, pick-up/drop-off alerts)
- · Configure automatic email notification or resource alerts
- Check system health
- Configure automatic email notification of system alerts
- Configure tag low battery alert
- View alert history and alert notification history
- Enable/disable system alerts
- View available system events (zone change, object association, alerts, etc)
- Specify system events to be stored

• View history of system events

# **Viewing Sites and Site Maps**

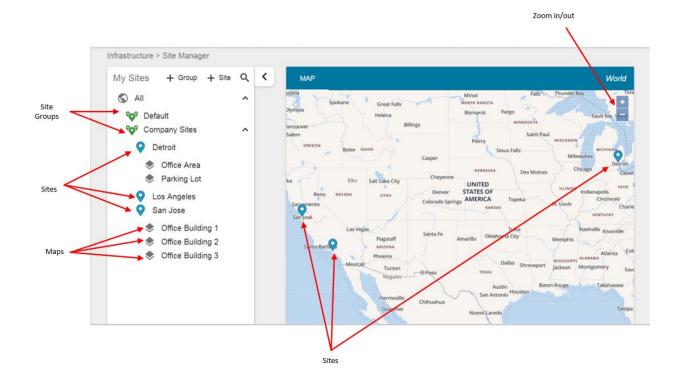
The sites and site maps where asset locations are being tracked can be viewed in the **Infrastructure** > **Site Manager** report, as shown in the following figure. After installing the MWE software, only the Default site group will be present. Refer to the MWE Configuration Guide for additional information on how to add site groups, sites, and upload site maps.

Clicking on a site group in the tree-view, such as Company Sites in the example below, displays a map in the map window containing all the sites under that site group. In our example the sites under the **Company** Sites group are Detroit, Los Angeles, and San Jose.

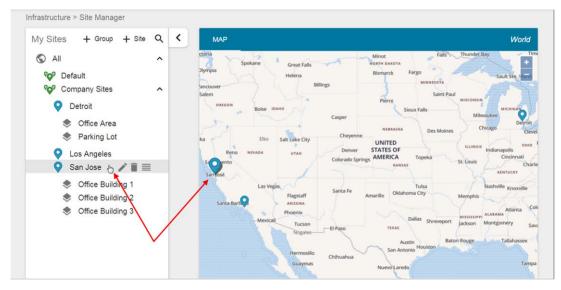




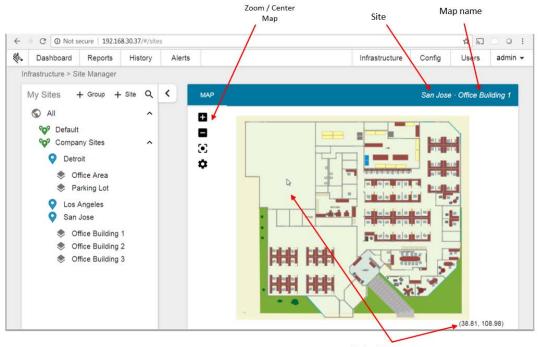
**NOTE:** Depending on your MWE version, you may see a different color scheme than the figures below show, but the meaning of the items is still the same.



Hovering over a site name in the tree view using the mouse causes the corresponding blue pin on the map to be highlighted by increasing in size:



Clicking on a map name in the tree view displays the corresponding site map in the map window:



x,y coordinates for mouse position on the map

# **Managing ZLA Appliances**

The status of the ZLA (Zebra Location Appliance) device deployed at multiple sites can be seen in the **Infrastructure** > **Appliances** report. This report also makes several tasks available for managing ZLAs.

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Refer to the MWE Installation Guide and MWE Configuration Guide for additional details on this report.

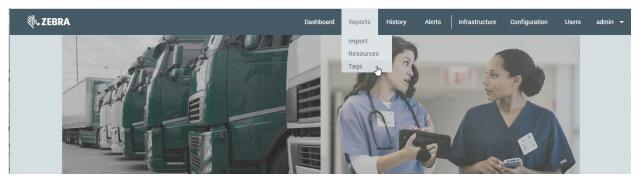
# **Viewing Tag Status and Location**

The status and location of tags blinking across multiple sites can be viewed in the **Reports** > Tags report. The data is displayed in table form on a map, and can be filtered, sorted, exported, and more. All supported tag types are seen here, regardless of technology, such as WhereNet tag, DART (UWB) tags, passive RFID (EPC) tags, GPS tags, and BLE receivers.

The information displayed for each tag ID may include x and y coordinates, latitude and longitude, zone and site where the tag is currently located, battery status, last time the tag blinked and last time it located, resource ID (if any) associated with the tag, telemetry data included in the tag transmission (temperature, speed, etc), and more.

Any tag blink (transmission) captured by a sensor feeding data to the MWE software causes the tag ID to be displayed in the Tags report. It is also possible to manually add a tag to this report before that tag has blinked; when the tag blinks, the data in the Tags report is automatically updated.

#### **Open The Tags Report**



Open the report by selecting Tags in the Reports tab:

See UI Basics on page 6 for the meaning of each tool button on the report toolbar.



**NOTE:** Depending on your MWE version, you may see slight differences in the report menu bar and filter column between what the figures show and your MWE version.

### **Select a View**

Select different views, such as **Report View, Report & Map Vertical**, and **Report & Map** Horizontal by using the column filter. The column filter can be hidden, as shown in the following figures.

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#### **View Tag Data**

When the Tags report is initially opened, the report window, the map window, and the filter column are displayed.

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Scroll right and left in the report windows to view all the report columns, including the site and zone where each tag is being located.

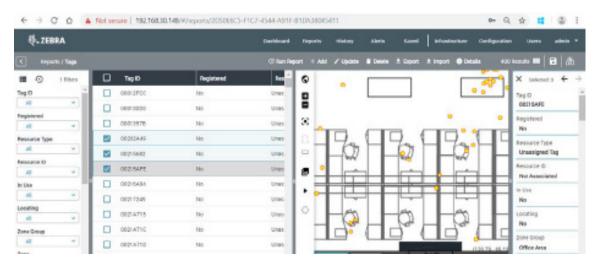
The map window displays a wide area map, each blue pin corresponds to a site where tags are being located.

When one or more tags are selected in the report window, the following occurs:

- A checkmark appears in the square checkbox in the first column for each selected tag.
- Each selected line is highlighted with a light blue background.
- If map autozoom is enabled, the map window automatically zooms into a smaller area containing the selected tags. See Map Autozoom for additional details.
- If map autozoom is not enabled, the map window does not show the full map for the site containing the selected tags, and the map window does not automatically zoom in. See Map Autozoom for details.

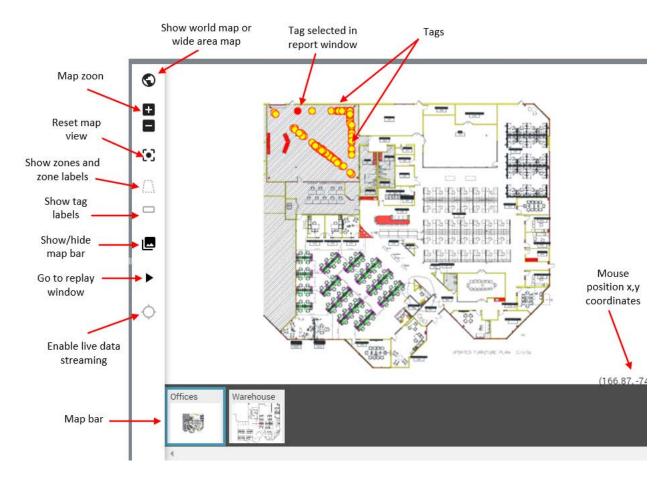
#### The Details Column

If one or more tags or resources are selected in a report window or in the map window, click **Details** on the report toolbar, to view a column on the right side of the web client window displaying information for the selected items.



The information displayed in the **Details** column is the same as in the lines in the report displayed in vertical form. The right and left arrows at the top right corner of the **Details** column allow the user to toggle between the selected items. The **Details** column can be closed by clicking the **x** at the top left corner of the column, or by deselecting the items previously selected in the report or on the map.

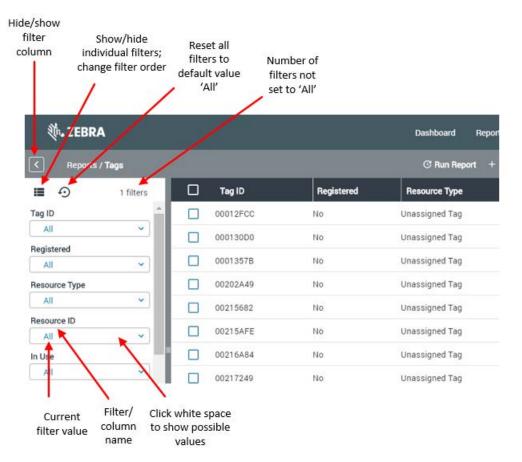
# **Map Window**



The following figure lists the features and buttons on the map window.

# **Report Filters**

The reports under the **Reports**, **History**, **Alerts**, and **Configuration** items on the main menu bar include a filter column that allows filtering data in the report based on multiple columns or fields. Not every column in a report has a filter associated with it.



When a value is selected or typed in a filter box, the content of the report is automatically updated to match the filter value.

The filter column can be customized to show a subset of available filters and change the order of the list in the filter column, as shown in the following figure.

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# **Customizing a Report**

A report under the **Reports**, **History**, **Alerts**, and **Configuration** menu items can be customized in several ways. Users can choose to display the data only in table form (report window), or to display both the report window and the map window horizontally or vertically, and one may choose to show or hide the filter column.

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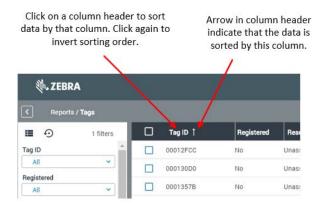
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Additionally, select which columns to show in a report and the order in which these columns are displayed.

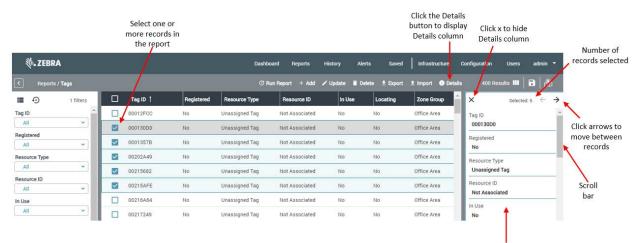
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To sort the report records by a column, click the column header; an arrow displays showing the sort order (ascending or descending). To change the sorting order, click the column header again.



The **Details** tool-button allows displaying the horizontal records/lines in the report in a vertical format, as shown in the figure below.



Details column

The figures below show some other examples of possible report customization.

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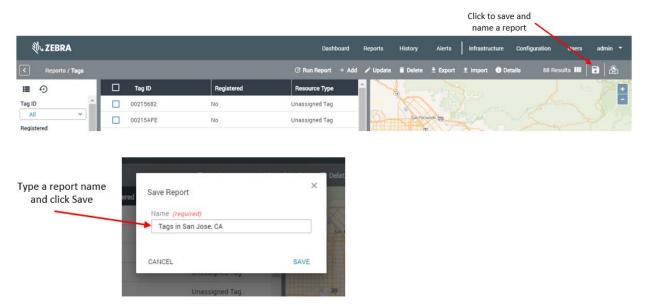
# MotionWorks Enterprise 2.0

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	0001357B	No	Unassigned Tag	Not Associated	No	No	Office Area	Office 2	Zone Office 3
Site Name ✓ San Jose ✓	00202A49	No	Unassigned Tag	Not Associated	No	No	Office Area	Office 2	Site Name
Pinger Device ID	00215682	No	Unassigned Tag	Not Associated	No	No	Office Area	Office 2	San Jose
	00215AFE	No	Unassigned Tag	Not Associated	No	No	Office Area	Office 3	Pinger Device ID
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0021A715           0021A716           0021A710           0021A710           0021A710           0021A710           0021A710           0021A710           0021A710           0021A710									

Use the browser zoom level to adjust the font size and number of records displayed in the report window.

# Saving a Custom Report

Once a customized report with a set of filters and filter values, a set of columns and column order, sorting column and sorting order is generated, it can be saved and named as illustrated below.



Click the **Save** button, to view a new menu item named **Saved** on the main menu bar. All saved reports are placed under the **Saved** menu item.

			New 'Saved' for saved			All sav under				
			Dashboard	Reports Histor	y Alerts	Saved 1	Infrastructure	Configuration	Users	admin 🔻
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	Tag ID	Registered	Resource Typ	e Re			Har.	A	m.	1
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	00215AFE	No	Unassigned Ta	ig Not		o V	tal			mention
	00216A84	No	Unassigned Ta	ig Not		(19)		La Cañada		



**NOTE:** In the Details column, the items selected in the report (the check marks in squares in the first column), and the view mode (report only, report and map vertical, etc.) are not saved as part of a saved report.

To delete a saved report, open the report and click the trashcan icon on the report toolbar, as shown below.

	Name of saved report currently opened					Click to delete saved report currently opened				
्रीः <b>,</b> ZEBRA				Dashboard Reports	History	Alerts	Saved Infras	tructure	Configuration	Users admin 🔻
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<b>≣</b> ⊙		Tag ID	Registered	Resource Type	Re	- X		7	1	S. (1
Tag ID	<b>^</b>	00215682	No	Unassigned Tag	Not	2	San Fernando gag	al a		
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Registered		00216A84	No	Unassigned Tag	Not		(m)	450	22	
Resnume Type		00217249	No	Unassigned Tag	Not				La Cañada Flintridge	<u> </u>



**NOTE:** Depending on your MWE version, you may see some differences between the screens depicted in this document and the screens in your MWE version.

#### **Exporting a Report**

To export the content of a report, click the **Export** tool-button on the report tool bar:

			Click Export export repor		
ð, zebra			Dashboard Reports	History	Alerts Saved   Infrastructure Configuration Users admin 👻
K Reports / Tags			C Run Report + Ad	d 🖍 Update	te 🗑 Delete ᆂ Export ᆂ Import 🌒 Details 🛛 88 Results 💷 🛛 🔀
■ ⊙	Tag ID	Registered	Resource Type	Re	🔆 🛓 Export CSV 🔉
Tag ID	00215682	No	Unassigned Tag	Not	🛓 🛓 Export HTML
Ali	00215AFE	No	Unassigned Tag	Not	A CONTRACTOR
Registered	00216A84	No	Unassigned Tag	Not	
Resource Type	00217249	No	Unassigned Tag	Not	La Cañada Flintridge Austra
All	0021A715	No	Unassigned Tag	Not	Serra Madre

The data can be exported in CSV format or HTML format. A file is downloaded to the Downloads folder on the computer hosting the web client. The file name maintains the format reportName\_date\_time.

File Edit View Tools Help						
Organize   Include in library	Share with 🔻	Slide show	New folder			
🚖 Favorites	Name					
🔰 Downloads	Tags_201	.8-08-17_110021	.html			
E Desktop	Tags_2018-08-17_110001.csv					
- · · · · · · · · · · · · · · · · · · ·						

The report filter values are included at the top of the exported file to inform the user opening the file of the filter values that were applied when generating the report data.

## **Data Import**

When in need to enter large amounts of data into MWE, rather than entering one item at a time using data entry, you can use data import transactions. Data Import is available via the **Import** report. To open this report, select **Reports** > **Import** from the MWE web client menu bar:



This report, shown in the figure below, both allows several different data import operations and shows a history of data import operations.

All imported Fie Name Report Action Imported By Imported Date 1 Elapsed Time	领。ZEBR/	4			Dashboard Reports	History	Alerts Sa	ved Infrastructure	Configuration	u Users a	admin
eport All   Please select an option Please select an o	< Report	s / Import							C	Run Report  👲 i	Export
All           All           All           All           Imported By           All           Imported File Name       Report         Action       Imported By         Inported Date	∎ • <b>0</b>		Report	Act	ion		Select File				
All v All v ported By All v ported Date No Results Import Results Import Results Import d Date 1 Elapsed Time	aport		Please select an option	× )	Please select an option				+		
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Custom (8/16/19, 12:00:00 🗸	mported Date		No Results								
Group 2 1 2 00 00 1.2	custom (8/16/19, 1)	2:00:00									

From the **Report** dropdown list, select a report to import data into. Available reports are: Resource Type Settings, Resources, and Tags.

Reports / Import									C Run Report	± Export
<b>■</b> •		Report		Action		5	Select File			
Report		Please select an option	~	Please selec	t an option			+		
All	~	Resource Type Settings								
Action		Resources								
All	~	Tags								
Imported by		Import Results								
All	~	Imported File Name	Report		Action		Imported by	Imported Date ↓	E	lapsed Time
Imported Date		No Results								
Today	~									
		ш								

The **Action** dropdown list shows the types of data entry operations available for this report. Data entry operations include adding new resources to the report, modifying existing resources, or deleting resources from the report.

Reports / Import							C Aun A	eport 🛓 Export
<b>■</b> •		Report		Action		Select File		
Report		Resources	~	Please select a	n option 🔷 🗸		+	
All	~	Progress		Add Resource Delete Resource				
All	~			Update Resource				
Imported by		Import Results						
All	~	Imported File Name	Report		Action	Imported by	Imported Date \downarrow	Elapsed Time
Imported Date Today	~	No Results						

Once an action or data entry operation has been selected, use the **Select File** field to browse to and select a properly formatted file. Clicking the **Sample File** button will download a sample file that can be used as a template to build a properly formatted import file for the selected data entry operation.

### **Report Auto-refresh**

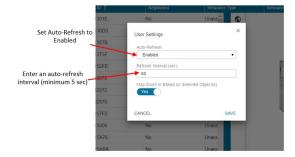
The data in a report is automatically refreshed every time the report is opened. Once the report is open, the data can be manually refreshed by clicking the **Run Report** tool button.

Click Run F	Report button to refree report data	sh	
्री. ZEBRA		Dashboard	Reports History Alerts Saved Infrastructure Configuration Users admin 🔻
< Reports / Tags		C Run R	teport + Add 🖍 Update 🖬 Delete 🗄 Export 🛨 Import 🌒 Details 🛛 88 Results 💷 🔒 👰
<b>■</b> •	🗌 Tag ID	Registered	Resource Type
Tag ID	00215682	No	Unassigned Tag
All	00215AFE	No	Unassigned Tag
Registered All	00216A84	No	Unassigned Tag

Users can also enable auto-refresh. This feature is disabled by default, as frequent auto-refresh queries by multiple clients can place an unnecessary load on the MWE database.

To enable report auto-refresh, select **User Settings** under the last menu item on the main menu bar (the menu showing the name of the account currently logged into the web client) and set **Auto-Refresh** to **Enabled**. Enter a refresh interval in seconds. Try to make this interval as large as the scenario allows. The minimum value supported by MWE is 5 seconds.

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Reports / Tags		C Run Rep	oort + Add 🖍 Update	🗋 Delete  🛓	Export 🛨 Import 🕕 Deta	ills 88 Res Change	Password
<b>■</b> •	🗌 Tag ID	Registered	Resource Type	Salt Million		Sign Ou	
Tag ID	00215682	No	Unassigned Tag		0a)		-
All	002154EE	No	Linaceioned Tao			La Cañada	



# Live Data Streaming

The report auto-refresh feature can be set to a minimum refresh interval of 1 second. Each refresh performs a full query database tables to update all of the fields in the report. Therefore, having many web clients performing frequent queries can place an unnecessary load on the system.

An alternative is to enable live data streaming. This opens a web socket connection between the web client and the MWE server allowing tag blink (x, y, z) coordinates to be forwarded immediately from the server to the client in real time. In this case, the web client refreshes the display every second, without the database load generated by auto-refresh.



**NOTE:** Live data streaming updates the x, y, z coordinates of tags in the report and on the map, however, it does not update any other fields in the report. The next manual or automatic report refresh updates all fields in the report.

To enable live data streaming, click the **Real Time** button on the map's toolbar. The button changes color from light gray to dark gray. To disable live data streaming, click the button again.

Reports / Tags			C Run Report	t + Add 🖍 Update	Delete	± Export	± Import 0	Details 76 Res	ults 🎟   🖬   🖧
1 filters		Tag ID	Registered	Resource Type	0				
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All 👻		002211CF	No	Unassigned Tag	<u>م</u>	2	21	T 83	13
source Type		00240037	No	Unassigned Tag	<u>[]</u>		ALC: NO	2 8 0000	
All Y		00240057	No	Unassigned Tag		54			
source ID		00240037	10			-	15		
All 👻		00241F5F	No	Unassigned Tag	<b>e</b>			EL L	0
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## Map Autozoom

When map autozoom is enabled, selecting one or more tags in the **Tags** report causes the map to automatically zoom in or zoom out to display an area that includes all of the selected tags. This area is typically a small part of the whole map, large enough to include the selected tags and neighboring area. The same is true for other reports that include the map window, such as the **Resources** report.

Map autozoom is enabled by default. To disable it, select **User Settings** under the item on the menu bar (the item showing the name of the account currently logged into the web client) and set the **Map Zoom** switch to no/yes.

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्रीन <b>. ZEBRA</b>		Da	shboard Reports	History Alerts	Saved Infrastructure	Configuration Users admin 🔻
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Auto-Refresh						
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Refresh Interval (sec)						
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Map Zoom in Based on Selected Object(s)						
Yes						
CANCEL	SAVE					

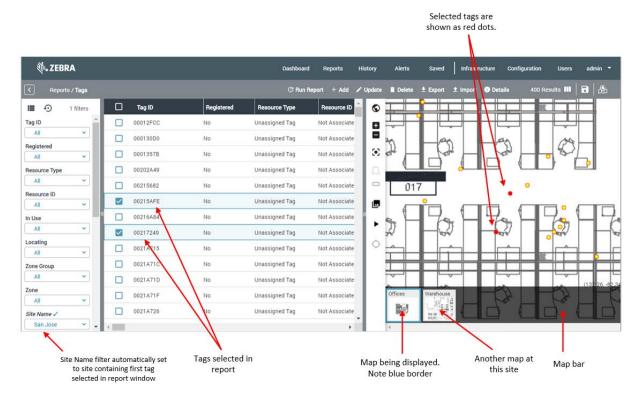
When a user selects one or more tags in the **Tags** report, or one or more resources in the **Resources** report, the map window responds in one of two ways:

- If Map Zoom is set to Yes, the map window automatically zooms into an area containing the selected tags or resources.
- If Map Zoom is set to No, the full map for the site containing the selected tags or resources displays in the map window. The map window does not automatically zoom in.

Upon initially launching the Tags report, observe a wide area map showing all of the sites that contain tags listed in the report.

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Registered	~		0001357B	No	Unassigned	Гag		Santa	Cruz	at and	1			
Resource Type			00202A49	No	Unassigned "	Гаg		Mor	terey		Fresno	CALIFORNIA		
All	~		00215682	No	Unassigned 1	Faq			and and			Visalia		
Resource ID All	-		00215AFE	No	Unassigned 1	Гаg				7				
In Use	-		00216A84	No	Unassigned *	Гаg				3-		-V V		
All	~		00217249	No	Unassigned 1	Гаg			3	an Luis Obisp	0	Bakersfield	1	
Locating	~		0021A715	No	Unassigned 1	Гag				Santa Ma	iria	19th		Barstow
Zone Group			0021A71C	No	Unassigned 1	Гag					Santa Bar		ancaster V	ictorville
All	*		0021A71D	No	Unassigned 1	Гаg							San	Bernardino
Zone	~		0021A71F	No	Unassigned *	Гag							Irvine	Palm Spr
Site Name	_		0021A726	No	Unassigned 1	Гаg								C)
All	<b>v</b> .	4									10	24	< 00	eanside

If map autozoom is enabled and two tags are selected in the report window, the map automatically zooms into an area including the two selected tags, as shown in the following figure.



If map autozoom is disabled, then the full map for the site containing the selected tags is displayed in the map window. The map window does not automatically zoom in:

领• ZEB	RA			Dashboard	i Reports	History	Alerts	Saved	Infrastructure	e Configura	tion Users	
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<b>■</b> •	1 filters	Tag ID	Registered	Resource Type	Resource ID	ŝ						
ig ID	<b>^</b>	00012FCC	No	Unassigned Tag	Not Associate		T	0 20		7=1	-	
All	×	000130D0	No	Unassigned Tag	Not Associate	12.			-	~ 7		1000
egistered All	~	0001357B	No	Unassigned Tag	Not Associate	$\odot$		10		<b>2</b> 8 3		No 12
esource Type		00202A49	No	Unassigned Tag	Not Associate	$\Box$	ł				o taita	
All	~	00215682	No	Unassigned Tag	Not Associate			8				}
All	~	00215AFE	No	Unassigned Tag	Not Associate							Contraction of the local distribution of the
Use		00216A84	No	Unassigned Tag	Not Associate				112	A FREE	SEE 1	
All	<b>~</b> ]	00217249	No	Unassigned Tag	Not Associate	11			1,11	N.	Contents 1 2	100
All	~	0021A715	No	Unassigned Tag	Not Associate	¢		T.	l for a			2
one Group		0021A71C	No	Unassigned Tag	Not Associate					1		
All	<b>~</b>	0021A71D	No	Unassigned Tag	Not Associate				Caller of the	A COL		
All	~	0021A71F	No	Unassigned Tag	Not Associate		Offices	Warehouse	a			l
te Name 🗸		0021A726	No	Unassigned Tag	Not Associate				- 11A - 1			
San Jose	<b>~</b> •				•		4	- mid/l (a)				1

In either case, if the **Site Name** filter is set to **All**, the map window displays a wide area map with all of the sites:

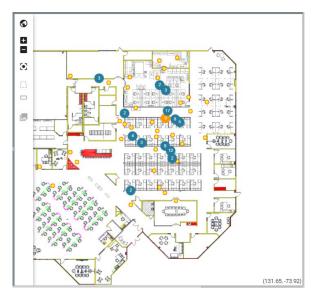
领• ZEBRA				Dashboard	d Reports His	story Alerts Saved	Infrastructure Config	ıration Users admin <del>-</del>
< Reports / 1	Tags			C Run R	eport + Add 🖌 U	pdate 🗎 Delete 生 Export	ᆂ Import 🕕 Details	2000 Results 💷 🖥 🔀
<b>■</b> •		🗌 Tag ID	Registered	Resource Type	Resource ID 🚔	Stockt	ton	
Registered	-	00012FCC	No	Unassigned Tag	Not Associate	Oakland M	Iodesto	- /
All	-	000130D0	No	Unassigned Tag	Not Associate	San José	Merced	Bishop
Resource Type	~	0001357B	No	Unassigned Tag	Not Associate	Santa Cruz	***	2714 XA
Resource ID		00202A49	No	Unassigned Tag	Not Associate	Monterey	Fresno c	ALIFORNIA
All	×	00215682	No	Unassigned Tag	Not Associate	1 top	Visalia	R. C.
In Use All	~	00215AFE	No	Unassigned Tag	Not Associate	115	1/6	
Locating		00216A84	No	Unassigned Tag	Not Associate	19	the the	
All	×	00217249	No	Unassigned Tag	Not Associate	S	San Luis Obispo Bake	stield
Zone Group	~	0021A715	No	Unassigned Tag	Not Associate		Santa Maria	Barstow
Zone		0021A71C	No	Unassigned Tag	Not Associate		Santa Barbara	Victorville
All	~	0021A71D	No	Unassigned Tag	Not Associate			San Bernardino
Site Name	~	0021A71F	No	Unassigned Tag	Not Associate			Palm Spr Irvine
Pinger Device ID		0021A726	No	Unassigned Tag	Not Associate			Oceanside
All	<b>*</b> •	<						(

Each site on this map is represented by a blue pin. The site containing the selected tags is highlighted with a larger sized blue pin. Clicking on a blue pin on the map sets the **Site Name** filter and the map window only displays the maps for that specific site.

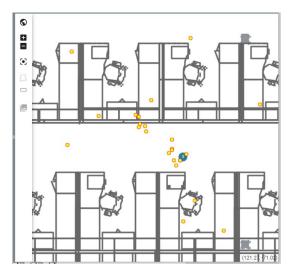
# **Map Data Clustering**

A tag or resource is represented on the map window by a yellow dot with a red border. This dot turns red when the tag or resource is selected on the map or in the report.

When two or more tags are physically in close proximity, they are clustered and represented by a larger blue circle as shown in the following figure. The number on the circle corresponds to the number of tags in that cluster.



Zooming in shows the individual tags in a cluster.



## **Defining a Resource Type**

The main purpose of the MWE software and the underlying RTLS system is to track the location and status of assets/resources. Tags (active/passive RFID transmitters) tracked by the RTLS system are physically attached to resources. Therefore, each tag ID must be associated with a unique resource ID within the MWE software.

MWE offers multiple ways of associating/dissociating tags with/from resources, including data entry, API calls, scanners, applications installed on top of MWE, and mobile applications. In the following sections outline the data entry operations available in the MWE web client to associate/dissociate tags with resources.

Create a Resource Type, which represents a category or type of resources. For example, a Resource Type could be printer, trailer, or container.

To create a Resource Type:

1. Go to the **Configuration** > **Resource Type Settings** report, click the **+Add** tool button and select **+Add Resource Type**.

刹ぃ ZEBRA			Da	ashboard Reports Hi	istory Ale	erts Infrastructure C	onfiguration Users	admin 👻
Configuration / Resource Type Settin	ngs			fy Refresh 7 Rows	+ Add 🧪	Edit 📋 Delete 🛛 🛓 Export	Details	•
<b>∎</b> • <b>⊙</b>		Name	Display Name	Description	+ Add Res	ource Types to Dissociation	Auto Dissociation By Zone	Update Mod
Category		DF	Unassigned Tag	Unassigned Tag	U	No	No	None
All 👻		HREF	Locate Health Tag	Locate Health Tag		No	No	None
Grouping		REF	Reference Tag	Reference Tag		No	No	None
All		WPH	WherePort Health Tag	WherePort Health Tag		No	No	None
		WIT	Wireless Time Tan	Wireless Time Tan		No	No	None

2. Enter the necessary information in the Add Resource Type data entry window:

Ê	Identity	Identity	
	2009-00-00-00-0	Name *	
Ê	Filters	Name	
2	Attribute	Display Name *	
	Icon	Display Name	
	Configuration	Description	
	Parent Children	Description	
_	Children	Expiration Time in seconds	
		Expiration Time seconds	
		Auto Dissociation	
		No 🗸	
		Enable auto dissociation in dissociation zone	
		Filters	-

The meaning of the various fields in the Add Resource Type data entry form is given in the table below. Fields with an asterisk (\*) next to its name are mandatory.

Section	Field Name	Description
Identity	Name	The name of the field using internally by the application. Also used in Data Import operations.
	Display Name	Field name shown in report columns, filters, and data entry operations. By default, Display Name is set equal to Name, and it is recommended to leave it this way.
	Description	Optional description field.
	Expiration Time	If a tag of this resource type does not blink in the specified period, MWE will trigger a Tag No Blink alert.
	Auto Dissociation	If set to No, you will not allow to associate a resource ID with a tag ID that is already associated with another resource ID.
		If set to Yes, the tag will be automatically dissociated from its current resource ID when you attempt to associate it with a new resource ID.
	Enable Auto Dissociation in Dissociation Zone	If this checkbox is checked, it is possible to automatically dissociate the tag when it blinks in a zone defined as a dissociation zone in the Site Manager à Configure Zones page.
Filters	TagOffset	Click on the information icon next to the filter name to see a brief description. See more details in the Resource Type Filters section later in this document.
	Move/Median	Click on the information icon next to the filter name to see a brief description. See more details in the Resource Type Filters section later in this document.
	Rate	Click on the information icon next to the filter name to see a brief description. See more details in the Resource Type Filters section later in this document.
	ZoneLockDown	Click on the information icon next to the filter name to see a brief description. See more details in the Resource Type Filters section later in this document.
	ZoneChange	Click on the information icon next to the filter name to see a brief description. See more details in the Resource Type Filters section later in this document.

 Table 3
 Add Resource Type Field Definitions

Section	Field Name	Description
Attributes	Attribute names defined by user	Attributes can be of two types: Free Text and Lookup. Free Text fields allow a user to type any string. For Lookup fields the user must select from a dropdown list of pre-defined values.
		When selecting a resource type in the Resource Type filter in the Resources report, you will see that a set of additional attribute columns and filters is displayed in the report.
Icon Configuration		Load and select an icon or figure to represent this resource type on maps displayed by MWE.
Parent Children		Here one can associate the resource type with a parent resource type such that the children resource types will inherit the same x,y reported by MWE for the parent resource type.
		See more details in the section Resource Parent-Child Grouping later in this document.

#### Table 3 Add Resource Type Field Definitions

1. Once the Add User Resource data is added to the entry form, click the Save button to save the information and create the resource type.

The following figure shows a newly added resource type named **Printer**.

्रीः- ZEBRA			Dashboard	Reports History	Alerts Infrastruct	ure Configuration	Users admin 🗸
Configuration / Resource Type Settin	ngs		ତ R	efresh 7 Rows + Add	🖍 Edit 📋 Delete 📗	🛓 Export 🛛 🕕 Details	s   III   🗟   &
<b>■</b> • 0		Name	Display Name	Description	Parent Type	Auto Dissociation	Auto Dissociation By Zone
Category		DF	Unassigned Tag	Unassigned Tag		No	No
All		HREF	Locate Health Tag	Locate Health Tag		No	No
Grouping		REF	Reference Tag	Reference Tag		No	No
		WPH	WherePort Health Tag	WherePort Health Tag		No	No
		WLT	Wireless Time Tag	Wireless Time Tag		No	No
		RFID	RFID Resource Default Type	create resource type for		No	No
		Printer	Printer			No	No
			\$				

2. If you would like to make changes to the resource type definition, select the resource type in the report, click the Edit tool button, and select Edit Resource Type to open the Edit Resource Type data entry form:

<b>戦 ZEBRA</b>			Dashboard	Reports History	Alerts   Infrastructu	re Configuration	Users admin <del>-</del>
Configuration / Resource Type Setti	ngs		⊖ R	efresh 7 Rows + Add	🖋 Edit 🧻 Delete 🔤	Export 🛛 🚯 Details	.     🖬   🏖
<b>≣</b> • <b>0</b>		Name	Display Name	Description	🖍 Edit Resource Type	S Auto Dissociation	Auto Dissociation By A
Category		DF	Unassigned Tag	Unassigned Tag	0	No	No
All		HREF	Locate Health Tag	Locate Health Tag		No	No
Grouping All		REF	Reference Tag	Reference Tag		No	No
All		WPH	WherePort Health Tag	WherePort Health Tag		No	No
		WLT	Wireless Time Tag	Wireless Time Tag		No	No
		RFID	RFID Resource Default Type	create resource type for		No	No
		Printer	Printer			No	No

3. After making the desired changes, click **Save** to save your changes.

The next step after defining a resource type is to associate a resource having a unique resource ID with a tag ID being tracked by the system.

# Associating a Tag ID with a Resource ID

To associate a tag ID with a particular resource/asset, open the **Reports** > **Resources** report, click + **Add** on the report menu bar as shown in the figure below:

🎨 ZEBRA					Dashboard	Report	ls His	tory	Alerts	Infrastru	ucture (	Configuration	Users	٨	lex 👻
Reports / Resources					01	iefresh (	5 Rows	+ Add	🖋 Edit	🔋 Delete	± Expor	t 🛛 💿 Details		•	
<b>≣</b> •	1 filters	Resource ID	Resource Type-/	Site Name	Tag ID (	0	6	0							
Resource ID	18 A	ZQ003	Printer	ZEBRA HEALTH	18555003				1						
All	*	Abcdef	Printer	Default	4D4530303030414243								(114.7,108		
Resource Type 🖌		DartResource002.	Printer	Default	00241EFA	3			dis.		4		3		
Printer	×	V047959644	Drinter	Defende	404640604100000600	n					1 1	61	na l		

#### The Add Resource data entry form opens:

Identity	Identity	8
	Resource ID *	
Tags	Resource ID	
Zone	Resource Type *	
	Select a Resource Type 🗸	
Attributes	Comment	
	Comment	
	Tags	
	Tag ID Tag Source	
	Tag ID Select Tag Sourc 💙 🧻	
	ADD TAG	
	Zone	8
	Select Zone	
	Choose	

The meaning of the various fields in the Add Resource data entry form is given in the table below. Fields with an asterisk (\*) next to its name are mandatory.

#### Table 4

Section	Field Name	Description
Identity		
	Resource ID	A unique alphanumeric resource ID
	Resource Type	Select from the list of previously defined resource types
	Comment	Optional comment field
Tags		•

Table 4	4
---------	---

Section	Field Name	Description
	Tag ID	A unique tag ID value. It can be an integer or an alphanumeric string depending on the type of tag technology selected in the Tag Source dropdown list.
	Tag Source	The type of tag technology. Options include WhereNet, Dart (UWB), EPC, MPACT (BLE), MSE, and Unknown
Zone		When a tag blinks, its location (x,y coordinates and zone) will be automatically updated by the system. But here you can specify an initial zone before the tag is heard by the system.
Attributes		If attributes have been defined for the resource type selected in the Resource Type list, then a set of corresponding fields will be displayed here. For free text attributes, you can type any string. For lookup attributes, you can select a value from a list of predefined values.

Click Save to save the information. The newly created record will be shown in the report:

्रीः <b>,</b> ZEBRA					Dashboard	Reports	History	Alerts	Infrastruct	ure Con	figuration U	sers Alex <sup>.</sup>	-
Reports / Resources					Ģ	Refresh 4 Ro	ws + Add	l 🧪 Edit	🗍 Delete	± Export	1 Details	■   🖬   🏖	
≡ •	1 filters	Resource ID	Tag ID	Resource Type√	Zone	^	S						
Resource ID	*	ZQ 001	112233	Printer			Ð						
All	~	KSA2353644	4D454B53413233353336	Printer									
Resource Type 🗸		DartResource00241EFA	00241EFA	Printer			S 🕇						9
Printer	~											To d	170

Several fields in this report, such as Zone, x, y, latitude, longitude, etc, will be automatically updated whenever the tag blinks.

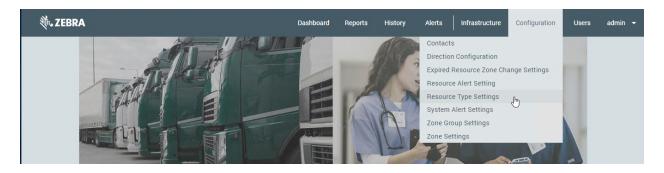
To change/update the tag ID, resource ID, or resource type, select the item in the report and click the **Edit** tool button.

🎨 ZEBRA						Dashboard	Reports	History	Alerts	Infrastr	ucture Co	onfiguration	Users	Alex 👻
< Reports / Resources							Refresh 4 Rov		d /Edit	🖥 Delete	≜ Export	<ul> <li>Details</li> </ul>	8	
<b>≣</b> •	1 filte	rs.	Resource ID	Tag ID	Resource Type-/	Zone	^	0		k.				
Resource ID	:=	÷.	ZQ 001	112233	Printer		_	•						
All	~		KSA2353644	4D454B53413233353336	Printer									
Resource Type 🗸			DartResource00241EFA	00241EFA	Printer			3		1		- Frank		3
Printer	Ÿ		Abcdef	4D453030303041424344	Printer			Δ.			•	A BASE	A Lister	-10 c-1-10

# **Resource Type Filters**

Different tag blink data filters are available within MWE. Specifically, it is possible to define filters per resource type, by defining a set of filters that apply only to tags associated with a particular resource type, and defining another set of filters that is only applicable to tags associated with another resource type. These filters include median filters, zone lockdown filters, time based rate filters, and distance based time filters. Configuration of these filters is done via the MWE web client.

Within MWE, these filters are applied to incoming tag blinks in the following order: Median filter > Zone Lockdown filter > Rate filters. All filters are disabled by default.



To configure filters for a resource type, open the Resource Type Settings report:

Select the resource type and click Edit on the menu bar:

🚯 Zebra MotionWorks	Enterprise	×	+					0	-		×
← → C ▲ N	lot secure	10.21	205.60/#/report	ts/resource-types				07	Q 1		1
🐌 ZEBRA				Dash	board Reports H	istory Alerts	Infrastructure Cont	iguration	Users	adn	nin 👻
Configuration / Resou	rce Type Settin	<b>9</b> 8			G Refresh 7 Rows	+Add /Edit	🖥 Delete 👲 Export	<ul> <li>Details</li> </ul>		•	ß
∎ •9			Name †	Display Name	Description	Parent	Auto Dissociation	Auto D Zone	issociation	By	Update
Category			DF	Unassigned Tag	Unassigned Tag	/	No	No		N	lone
All	*		HREF	Locate Health Tag	Locate Health Tag	1	No	No		N	lone
Grouping	-		Printer	Printer	Printer Device		No	No		N	lone
All	~		REF	Reference Tag	Reference Tag		No	No		N	lone

In the Edit Resource Type data entry form, scroll down to the Filters section:

Identity	Filters				8
Filters	TagOffset 🛈 🔲	Move/Median	i 🗆	Rate (i)	
Tillers	× 0	Radius	20	Radius	0
Attribute	У	Move Count	3	Max Time Threshold(sec)	0
lcon	z 0	Move Median	1	Min Time	
Configuration		Median Count	3	Threshold(sec)	0
Parent		Median Count Z	3		
Children				0	_
	ZoneLockDown ()		oneChange	(i)	
	Count	3 N	lum Blinks		3

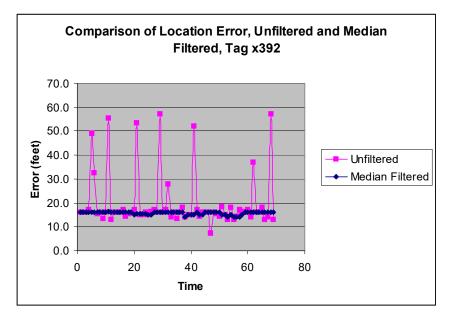
### **Tag Offset Filter**

The tag location reported by sensors/readers is shifted by this filter by the specified x,y,z offset values. This is useful when tags sit close to the boundary of two zones and it is desirable to report tags in the center of a zone.

### **Median Filter**

The location of tags (assets) in a facility measured or calculated by an RFID RTLS system is subject to occasional movement caused, for example, by the reflection of the radio signal transmitted by the tag. Depending on the density of the RF obstructions in the environment, this movement, called jitter, may become objectionable. A median filter is available in MWE to reduce or eliminate this jitter.

When enabled, the median filter reports the median X, Y, and Z values of the last Median Count tag locations. Thus, if a location is received that is significantly different from previous locations, the median filter will ignore that value and report the median value from history. The table below provides an example of a median filter applied to the Y dimension; note how the occasional jitter is eliminated from the reported value.



The following table shows filter examples with three different values of a median filter parameter named Median Count.

Table 5	Median Count Variables	

Tag Blink	Asset Location (X,Y)	Reported Location "Median Count"=3	Reported Location "Median Count"=5	Reported Location "Median Count"=7
1	(25, 93)	?1	?1	?1
2	(25,93)	(25, 93)	? <sup>1</sup>	?1
3	(25,93)	(25, 93)	(25, 93)	?1
4	(25,93)	(25, 93)	(25, 93)	?1
5	(20, 85) <sup>2</sup>	(25, 93)	(25, 93)	(25, 93)
<sup>1</sup> Dependent on previous location. <sup>2</sup> Position change caused by location jitter.				

Table 5 Wedian Count variables	Table 5	Median Count Variables
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Tag Blink	Asset Location (X,Y)	Reported Location "Median Count"=3	Reported Location "Median Count"=5	Reported Location "Median Count"=7
6	(20, 85) <sup>2</sup>	(20, 85) <sup>2</sup>	(25, 93)	(25, 93)
7	(25, 93)	(20, 85) <sup>2</sup>	(25, 93)	(25, 93)
8	(25, 93)	(25, 93)	(25, 93)	(25, 93)
<sup>1</sup> Dependent on previous location. <sup>2</sup> Position change caused by location jitter.				



**NOTE:** Observe that wo successive occurrences of location jitter were successfully filtered by the Median Count=5 and Median Count=7 filter settings, but not the Median Count=3 setting.

A potential drawback of filtering is that the reported tag location lags the actual tag location when the tag (asset) is moving. The amount of latency is the number of extra tag blinks required at the new location before the median filter outputs the updated position; it is dependent on the filtering parameter Median Count chosen. For this median filter more than  $\frac{1}{2}$  of the Median Count samples must represent the actual location of a moving tag will be reported integer (Median Count/2)+1 samples after movement has stopped. This latency is of no consequence when the assets are stationary; however it is of concern when assets are repositioned. The median count for the (X, Y) values can be specified independently from the Z value.

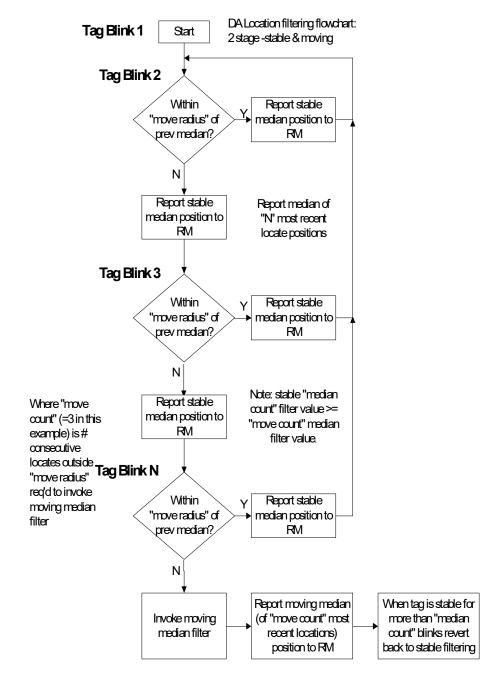
The level of filtering for different values of Median Count is shown in the following table.

Filter Value Median Count	Latency (Number of extra blinks before accurate report)	Number of Jitter Blinks Ignored
3	1	1
5	2	2
7	3	3
9	4	4

#### Table 6 Filtering Levels for Median Count Values

To reduce the latency in tracking moving assets, a second filter is invoked when the asset is measured to be moving. The moving filter value Move Count is specified to be less than the value of the stationary parameter Median Count in order to provide faster response time.

The tag (asset) is declared to be moving if the average of the most recent Move Count consecutive blinks is located at least Move Radius (ft) distance away from the current median. The moving filter is invoked for a tag that moved to a new position, but not if only the jitter has increased. The tag location will be filtered using value Move Median until Median Count values are found within Move Radius of the median. When the moving filter is initially invoked, it is loaded with the most recent Move Count values from the history table see below.



Variable	Description	
Median Count	The number of recent blinks used to compute the median for the X and Y coordinates. This value must be an odd integer between 1 and 21.	
Median Count Z	The number of recent blinks used to compute the median for the Z coordinate. This value must be an odd integer between 1 and 21.	
Move Radius (ft)	The minimum distance from the latest blink to the current median. This can be from 0 to 50,000 ft.	
Move Count	The number of consecutive blinks that must be outside the Move Radius. This can be between 1 and 5.	
Move Median	The new median count to use once a move is detected. All but the last Move Median history samples are thrown out when a move is detected. The samples then accumulate until there are Median Count samples. The Move Median value should be less than the Median Count and must be an odd integer between 1 and 21.	
Enable Filters	When set to Y, the median and move filters will be applied to the $(X,Y,Z)$ from the locate packet. When set to N, the raw $(X,Y,Z)$ are used.	

Table 7	Median and Move Type Definitions
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The recommended configuration of the median filter is dependent on the RF obstructions at site. Higher levels of obstructions will produce more jitter and require heavier filtering. The recommended filtering levels are provided below:

Table 8 Obstruction Classific
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Obstruction Classification	Stable filter N	Moving filter M	Moving radius R	Consecutive blinks C
Unobstructed	3 <sup>1</sup>	N/A	N/A	N/A
Minimally Obstructed	3, 5 <sup>1</sup>	3 <sup>1</sup>	20 ft (6.1 m)	2
Significantly Obstructed	5, 7 <sup>1</sup> , 9 <sup>1</sup>	3, 5 <sup>1</sup>	45 ft (13.7 m)	2, 3 <sup>1</sup>
<sup>1</sup> Optional value indicated for additional filtering if desired.				

Every time the locate system computes the location of a tag it will arrive at a slightly different result. The median filters described above do a good job at removed infrequent pops in the location. The tag location will still vary slightly even if the actual asset is not moving at all.

## Zone Lockdown Filter

In some applications it is known that once an asset enters a zone it does not move at all. For these special cases, the reported (X,Y) location can be locked-down after an asset enters a zone. The zone lockdown filter has the following configuration parameters:

Table 9Zone Lockdown Types

Zone Lockdown	Description
Zone Lockdown	When set to Y the zone lockdown filter is enabled.
Zone Lockdown Delay Count	The number of blinks to wait upon entering a zone before locking down the $(X,Y)$ location. All further blinks in this zone will have this same $(X,Y)$ until the asset exists the zone.

A special case occurs for the On-Site zone. Zone Lockdown occurs for this zone.

## **Rate Filter**

The purpose of the Rate Filter is to decrease the blink rate processed by the MWE database, and decrease the processing of redundant blinks.

The Rate Filter configuration parameters are explained in the following table. There are two types of rate filters supported:

- Time based rate filter, configured with the parameter Min Time Threshold.
- Distance based rate filter, configured with the parameter **Report when move X feet and Max Time Threshold (sec)**.

#### Table 10TIme-based Rate Filter

		Time based rate filter
Parameter	Possible Values	Comments
Minimum Time Threshold (sec)	Null, 0, or integer larger than 0	This filter calculates the time elapsed between the incoming blink and the most recent blink reported to the database for each tag ID. If this time period is larger than the minimum value specified in this parameter, the filter reports the blink to the database. Otherwise the filter does not report the blink to the database.
		This filter is applied to both locate and no-locate (null $x,y$ ) blinks.
		If this parameter is set to Null or 0, no minimum time filtering is applied.

	L	Distance-based rate filter
Parameter	Possible Values	Comments
Report when move X feet	Null, 0, or integer larger than 0	This filter calculates the distance between the incoming blink and the previous blink received by the filter for each tag ID. If this distance is larger than the minimum distance specified in this parameter, the filter reports the blink to the database. Otherwise the filter does not report the blink to the database.
		If the incoming blink is a no-locate blink (null x,y), no distance calculation is performed and the blink is not reported to the database.
		If the incoming blink is a locate blink (non-null x,y), the distance is calculated using this blink and the previous locate blink received by the filter.
		If this parameter is set to Null or 0, no minimum distance filtering is applied.
Maximum Time Threshold (sec)	Null, 0, or integer larger than 0	This parameter can be used to work in conjunction with the Report when move X feet parameter.
		If the filter has not reported any blinks for a given tag ID in a period of time equal to the value specified in this parameter, the filter reports the next blink from this tag ID even if the tag has not moved a distance larger than the distance specified in Report when move X feet. This allows the filter to periodically report blinks to the database for tags that are blinking but are not moving.
		This filter reports the first blink received after Max Time Threshold has been exceeded to the database regardless of whether the blink is a locate or no-locate (null $x,y$ ) blink.
		If this parameter is set to Null or 0, it will be disabled. That is, a tag that is blinking but not moving is never reported to the database.

Table 11	Distance-based Rate Filter
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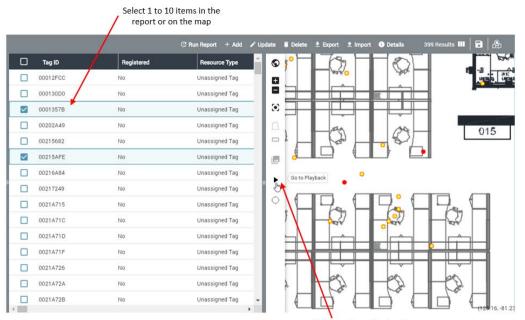


**NOTE:** Rate filters are not applied to low battery blinks, that is, blinks where the low battery bit in the tag transmission is set to 1.

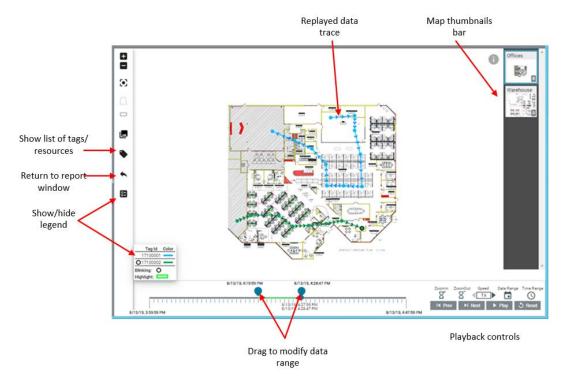
# **Viewing and Replaying Location History**

The blink history (every blink) of a tag can be viewed in the Tag Blink History report, and the zone history (zone changes) of a tag can be viewed in the Resource Event History report, setting the Event filter to Zone Change.

Additionally, the Resource Event History, Tag Blink History, Tags and Resources reports in the MWE web client allow replay of historical data on a map window, showing a trace of the historical path. Select from one to ten tags in the report and click the button on the map tool bar to switch to the replay window. Click the button on the playback window to go back to the regular map window. Users are then prompted to select a date range when the replay window opens. The date and time range, and replay speed controls are found on the lower right corner of the playback window.

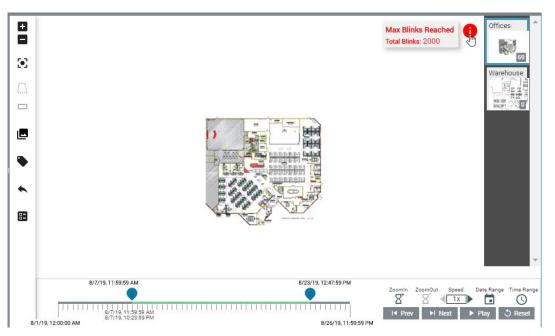


Click the Go to Playback button to open playback window



The figure below displays the playback window with data replayed for two selected tags:

Between one and 10 tags or resources can be selected at a time to playback their data. Additionally, a maximum of 2000 data points can be replayed at a time. Placing the mouse over the **i** icon on the top right corner of the playback window displays the number of data points being replayed



# **Viewing Zones**

Zones and Zones Groups are defined in the Infrastructure menu > Site Manager report > Configure Zones tab in the MWE web client. Refer to the MWE Configuration Guide for details.

Zones defined for all sites and maps can be viewed in the **Configuration**  $\rightarrow$  **Zone Settings** report using the MWE web client.

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Configuration / Zone Settings						← <b>Refresh</b> 0			;   <b>111</b>	- 8
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			24	Demo East	General A	d.							
			25	Demo Room	General A	u i							
			26	Demo West	General A	d.							
			27	East Cubes	Cubicles	-							
	*	.4.			•								(73.93, 65.9

The report allows filtering on Site Name and Zone Group.

Zones and their names can be viewed on the map by clicking the **Show/Hide Zones** button on the map toolbar.

			Click again to hide zones
			© Pun Report → Update 🙏 Export 🕕 Details 28 Results III 🖬
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11	Main Parking		. /
12	Office 10		ā /
13	Office 2	Offices	×.
14	Office 3	Offices	(114.7.109.8)
15	Office 4	Offices	
16	Office 5	Offices	
17	Pond	Parking	anguna and an
18	Office1	34 Offices	
19	Office 2	34 Offices	
20	Office 3	34 Offices	
21	Office 4	34 Offices	
22	Office 5	34 Offices	a series of the
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27	East Cubes	Cubicles 👻	
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The **Show/Hide Zones** button on the map toolbar is available in all reports that include the map window, such as the **Tags** report and the **Resources** report.

## **Business Rules Alerts**

A business rules engine is provided in MWE 2.0, based on the wso2 Siddhi engine. The engine allows defining conditions based on the location and status of tags and resources such that the system can trigger alerts and take various actions when the conditions are met. These alerts are referred to as Business Rules Alerts or Resource Alerts. To create and manage such alerts, go to the **Configuration** > **Resource Alert Settings** link:



The login page is displayed:

← → C ☆ ▲ Not se	cure   192.168.30.149/business-rules/login?referre	er=%2Fbus	Q ☆	4	٩	:
WSO2 Business Rules Manager						î
	Login					
	Username					
	Password					
	Remember Me					
	Kemember we					-
	LOGIN					
	After a successful sign in, we use a cookie in your browser to track your session. You can refer our <b>Cookie Policy</b> for more details.					-

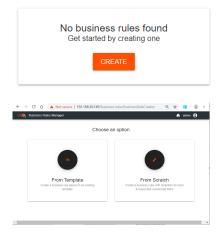
The default login is admin / admin.

Two templates are provided: Resource Alerts and Pickup/Dropoff:





**NOTE:** The business rules template in MWE 2.0 are customized versions of the generic templates provided by the underlying Siddhi rules engine. Before users reach the page shown in the following figure, the two extra dialog windows are shown. Click **Create** and **From Template**.



### **Resource Alerts**

Condition definition:

A resource or resource type enters/leaves a zone or set of zones, and/or resource parameters are equal to or different from specified values, and the condition is met for a specified length of time.

System response when condition is met:

- Triggers an alert, which can be seen in Event History report in the MWE web client
- Triggers a Resource Alert event that can be used by MWE or other applications
- · Automatically changes any resource custom parameters to specified values
- · Sends email notification to a specified list of email addresses
- Generated events can be seen in the Event History report in the MWE web client.

To open the Resource Alert template, click **Resource Alert Configuration**.

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nplate Group	
RC	
Resource Alert Configuration	
	RC Resource Alert Configuration

Then click on Rule Template and MWEResourceAlertTemplate.

WSO2 Business Rules Manager		n admin Θ	WSO2 Business Rules Manager	🔒 ədmin 😝
	Resource Alert Configuration		Resource Alert Configuration	
	Rule Template – Pause sat Anne template		MWEResourceAlertTemplate	

#### The Resource Alert template opens.

WSO2 Business Rules Manager		🔒 admin 😝
	Resource Alert Configuration	
	Rule Template	
	MWEResourceAlertTemplate 👻	
	During out and t	
	Business rule name *	
	Rulename *	
	The name of the rule	
	Resource Type Operator	
	=	
	Select an operator (== or !=) to compare Resource Type values	
	Resource Type Value * N/A	
	Type the Resource Type value to be used in the comparison. Use N/A to not evaluate this condition	
	Resource Id Operator	
	= <b>*</b>	
	Select an operator (== or !=) to compare Resource ID values	
	Resource Id Value*	
	Type the Resource ID value to be used in the comparison. Use N/A to not evaluate this condition.	
	Site Name Operator	
	= <b>v</b>	
	Select an operator (== or !=) to compare Site Name values.	
4	Site Name Value *	

When using the above template to define a Resource Alert:

- Enter a name for the resource alert in the 'Business rule name' field.
- Due to technical reasons underlying the generic template used in MWE 2.0, enter the same rule name in the Rulename field. This extra field is eliminated in the next MWE release.
- In this template, for each field to be evaluated, you first need to choose an operator: equal to (==) or different from (!=)

• After the operator is chose, type in the value of the field to be used in the evaluation. There is no dropdown list of possible values in this version of the template. Users must type in the desired value. For example, to know the possible values for the Resource Type Value field, users must look at the **Type** column in the **Resource Type Settings** report in the web client and choose one value to be used.

A Reports / Resource Type Sett	C Run Report + Add	
<b>■</b> • 0	Category	Type Par
Category	User Defined	Blink Sender Tag
All	User Defined	Cart
Grouping All	User Defined	Demo
	User Defined	EPC Auto-associate
	User Defined	Fixed Beacon
	User Defined	Fixed Receiver
	User Defined	Forklifts
	User Defined	Lifting Tools
	System	Locate Health Tag
	User Defined	Mobile BLE Beacons
	User Defined	Other Tools
	User Defined	Passive Tag
	User Defined	Personnel
	User Defined	Printer
	System	Reference Tag

- The value N/A in a field means do not evaluate/compare this field. This is equivalent to say accept all values.
- A single value can be typed in every field. Lists of values are not allowed.
- For each of the custom property value fields, you can specify a value to be used in the evaluation, and also a value to be applied when the alert is triggered
- Leave the default N/A value for Third-Party Kafka Broker and Third-Party Kafka Topic fields.
- The Emails field is the only field that accepts a list of items. Enter a comma separated list of email addresses to notify when the alert is triggered.



**NOTE:** For the rules engine to send email notifications, the configuration file etc/zebra/mwe/conf/camel/general.properties on the MWE Linux server needs to be updated with appropriate information about the email server. Refer to details in the Configuring Email Notifications section in the MWE 2.0 Configuration Guide.

• Click **Save** to save the resource alert definition without deploying it. Click **Save** and **Deploy** to save it and enable it at the same time. Users are taken to a page displaying a list of defined resource alerts, where users can edit, delete, deploy/cancel, and view deployment status for each alert.

WSO2 Busir	ness Rules Manager									admin	0
		Busine	ss Ri	ule	s				•		
	Business Rule	Status	Actio	15					<b>•</b>		
	Res Alert 02	Saved			0	/	Î	C			
	Res Alert 01	Deployed			0	/	Î	•			

- Click the orange + icon to add a new alert. Logout using the icon on the top right of the window.
- Resource Alerts that have been triggered can be viewed in the **History** > **Event History** report in the MWE web client.

### **Pickup/Dropoff**

Pickup Condition definition:

Two resources from specified resource types blink within a specified time and a within a specified distance from each other and keep doing so for a specified length of time.

System response:

- The system considers the two resources to be paired and traveling together, and generates a Pickup event that can be used by MWE or other applications. If the pairing happens in a specified Dock Zone, a Received event is generated.
- · Generated events can be seen in the Event History report in the MWE web client.

Dropoff Condition definition:

Two resources previously paired stop blinking together (that is, within the specified time and distance defined in the Pickup condition) for a specified length of time.

System response:

- The two resources previously paired are now considered unpaired and moving independently. The system generates a Dropoff event that can be used by MWE or other applications. If the unpairing happens in a specified Dock Zone, a Shipped event is generated.
- Generated events can be seen in the Event History report in the MWE web client.

To open the Pickup/Dropoff template:

1. Click Pickup Dropoff Configuration.



2. Click on Rule Template and MWEPickupDropoffTemplate:



The **Pickup Dropoff** template opens:

WSO2 Business Rules Manager		🔒 admin 😫
	Pickup Dropoff Configuration	
	Rule Template	
	MWEPickupDropoffTemplate	
	Business rule name *	
	kafkaServer*	
	karka:9092	
	Kafka Server host and port	
	timeThreshold *	
	10	
	minimum time in seconds between two tag blinks to verify if they are together	
	distanceThreshold * 10	
	TU minimum distance in feet between two tag blinks to verify if they are	
	together	
	distanceThresholdTogether* 300	
	minimum distance in feet that two tags have been together to assume that they are moving together	
	timeToAssumeNotTogether *	
	10	
	minimum time in seconds when two tags that were together, do not blink anymore togather, then it is assumed that they are no longer together	
	BASE01,BASE02,BASE03 list of resource types that qualify as base tags	
	iist of resource types that quality as base tags	
•	Neversion Active 7	•

## **Resource Parent-Child Grouping**

In use cases where pallets are being located and tracked within a warehouse or manufacturing plant by the MWE system, each pallet has a tag physically attached to it so that MWE can locate it. The tag can be active or passive RFID tag. A user would then place several boxes on the pallet. The boxes may have tags attached to them so that MWE can detect their presence independently, or they may just have optical bar code labels and therefore MWE cannot detect them directly. However, while the boxes are on the pallet, users might want the boxes to inherit the location of the pallet so MWE can report the location of the boxes as the same as the location of the pallet.

For similar use cases, MWE offers the **Resource Parent-Child Grouping** functionality, where one parent resource ID (the pallet ID) can be associated with multiple child resource ID's (boxes ID's) so that each child resource will inherit the location of the parent resource.

To enable and configure this functionality, follow the steps below. For example, there are two different cases, when the child resources do not have tags physically attached to them (only optical bar code or similar labels) and when they do.



**NOTE:** If the child resources have tags, the tag type and location technology used for locating child resources can be the same or different from the ones used for locating parent resources. It is not relevant to the Resource Parent-Child functionality.

### **Child Resources with No Tags**

In the **Resource Type Settings** report in the MWE web client, use data entry to create a resource type that will be a parent resource type.

Create it as you would create a regular resource type; see Defining a Resource Type on page 40 for more information. In the example here, this would be a resource type named **Pallet**.

In the same report, use data entry to create a resource type that will be a child resource type.

In the example, this would be a resource type named Box. In the data entry form you must select the parent resource type in the **Parent Type** field. In the example, select **Pallet**.

Edit	Resource Ty	pe		
Ê	Identity	+ Add Resource Type Attributes		•
Ê	Filters	Icon Configuration		
2	Attribute			
	Icon Configuration Parent	Select Icon		
	Children	Parent Children		
		Parent Type Pallet	_	
		Group Update Mode		
			R	
		SAVE CANCEL		Ŧ

In this example, you should already have in the Resource Type Settings report a resource type named Pallet and a resource type named Box with Parent Type = Pallet, as shown in the following figure.

C Reports / Resource C	Type Settir	ngs			C Run Report	: + Add 🖍 Update 🔳 D	elete 🛓 Export 🛓 Import	Details 8 Results	. 💷   🖬   🏖
<b>■</b> •		Category 丨	Туре	Parent Type	Median/Move Filter	Median Count	Median Count Z	Move Radius (ft)	Move Count
Category		User Defined	EPC Auto-associate		Disabled	3	3	30	3
All   RFID Printing Enabled?		User Defined	Pallet		Disabled	3	3	20	3
All v		User Defined	Box	Pallet	Disabled	3	3	20	3 _fm
Grouping		System	Unassigned Tag		Disabled	3	3	20	3
All		System	Locate Health Tag		Enabled	3	3	30	3
		System	Reference Tag		Disabled	3	3	20	3
		System	Wireless Time Tag		Disabled	3	3	20	3
		System	WherePort Health Tag		Disabled	3	3	20	3

In the **Resources** report, add Pallet resource ID's and Box resource ID's as you would normally do. See Associating a Tag ID with a Resource ID.

- Each pallet has a tag physically attached to it, enter the tag ID for each pallet ID. Each pallet may have some label that identifies it, and you could use the content of such label as the pallet or resource ID. Otherwise, use the tag ID also as the pallet ID, as in the following figure.
- Boxes in this example do not have RFID tags attached to them, but only an optical bar code label. You can enter the optical bar code as the box's resource ID and, optionally, also as its virtual tag ID.

$\leftrightarrow$ $\rightarrow$ $G$ $\triangle$		Not secure	10.21.205.108/#/re	eports/CC	FB7CAD-8C25	-11D5-9066-0	0105A6AE011					०, २ 🕁 🚦	Θ Ο
्री⊶ ZEBRA							Dashi	board Reports	History	Alerts I	nfrastructure	Configuration Users	admin 🔻
Reports / Resource	ces						C Run Report	+ Add 🖍 Update	🗑 Delete 🛛	≛Export ±li	nport 🕕 Del	tails 8 Results 📕	8
<b>Ⅲ</b> •		Resource ID	Resource Type	Zone	Zone Dwell	Zone Group	Zone Group Dwell	Site Name	Tag ID	Resour	ce Custom1	Resource Custom2	Resource C
Hesource ID	^ D	17555001	Pallet					Un-assigned	17555001				
All		17555002	Pallet					Un-assigned	17555002				
Resource Type		006205000	Box					Un-assigned					
Zone		006205001	Box					Un-assigned					
All 👻		006205002	Box					Un-assigned					
Zone Dwell		006205003	Box					Un-assigned					
Zone Group		006205005	Box					Un-assigned					
All		006205006	Box					Un-assigned					
Zone Group Dwell MIN All Site Name													
All													

Associate a Pallet ID with one or more Box ID's. This is done using a Zebra mobile application that runs on TC5x mobile device. The application allows you to scan the resource ID of the parent asset ( identifying label attached to a pallet) and then scan the resource ID's of one or more child assets (the optical barcode on the boxes). The mobile application also allows scanning tag ID's instead of resource ID's. The following figure shows a screenshot of the mobile application.

ö		\$ \$	● 👻 🖬 1	1:58 a. m.
≡	Objec	t Master		1
Object Ma	ster (Resour	ce ld)	-	×
Resource T	ype Not	scanned		
Object c	hild (Res	ource Id)		
	٢	No items fo	und	
		SUBMIT		
	$\triangleleft$	0		

MWE then reports the location of each child resource ID to be the same as the location of the parent resource ID associated in the mobile app.

### **Child Resources with Tags**

When the child resources (boxes in the example provided) have tags physically attached to them so that MWE can detect their presence, there are two options for associating a parent resource ID with one or more child resource ID's:

- Option One: Follow exactly the steps listed above for child resources without tags. The parent ID child ID's association is done using a mobile app as explained above. After the association is done, MWE will ignore the tag blinks from the children tags and have the child assets inherit the location of the parent asset.
- Option Two: Follow the steps listed above for child resources without tags, but the parent ID child ID's
  association is done automatically when a parent resource and one or more child resources stay in the
  same zone (pre-configured as 'resource association zone') for a configurable length of time (resource
  association time). After the association is done, MWE ignores the tag blinks from the children tags and
  have the child assets inherit the location of the parent asset.

The following steps explain how to make a zone into a resource association zone and how to specify the resource association time referred to above.

- Use the Zone Builder tool to define one or more zones in MWE that are intended to be resource association zones. Define them similarly to any normal zone. Refer to the MWE Configuration Guide for additional details on Zone Builder.
- 2. Publish the zones when complete.



**NOTE:** A physical zone being used as a resource association zone should have location sensors with sensitivity adjusted to hear only tags within the zone. Alternatively, a Faraday cage can be used to block RFID transmissions going in or out of the room. The location sensors inside the association zone can be configured to locate tags inside the association zone using a presence algorithm or any other location algorithm.

 Connect a Putty or Terminal window to the MWE Linux server and use the vi or similar command to edit the autofamily.properties configuration file located in the /etc/zebra/mwe/conf/autofamily-svc/ directory.

The contents of this file are shown below.

# REPORTSVC SETTINGS
report-service-url=http://reportsvc:8081
resources-url=/report-service/v1/resources/
tags-url=/report-service/tags?objectId=
X-Consumer-Username=admin
X-Consumer-Groups=administrator

**# KAFKA SETTINGS** app-id-faraday=faradayCage app-id-parent-child=parentChildBlink bootstrap-server=kafka bootstrap-server-port=9092 window-time=5000 window-type=fixed cache-max-bytes-buffering=1000000 max-poll-records=10000 commit-interval-ms=100 auto-offset-reset=latest faraday-zone=NEW ZONE 11,NEW ZONE 12,NEW ZONE 13,NEW ZONE 4 input-topic-faraday=mwe.resource.locate input-topic-parent-child=mwe.resource.locate output-topic-parent-child=tagBlink path-logs-faraday=/log/kafka-faraday-cage.log filename-logs-parent-child=/log/kafka-parent-child.log

Ensure that only the following lines are modified:

- faraday-zone: enter a comma separated list of the names of the zones that you would like to be
  resource association zones, as in the default list shown above (NEW ZONE 11, ...).
- window-time: the default is 5000 ms = 5 seconds. When a location sensor inside the association zones hears the first tag blink, MWE will open a 5 second time window and group all tag blinks detected in the association zone during that time. There should be only one parent ID tag heard in that time window, and there can be one or multiple child ID tags. MWE will automatically associate the parent ID and all child ID's detected during the time window. Note that if more than one parent ID is detected during the 5 second window, MWE will not perform any parent child association. Once a 5 second window is closed, another 5 second window will open when the next tag blink is detected inside the association zone. Feel free to change the default value of 5000 ms as needed.

For the changes above to take effect, run the following commands in the Putty window:

- # cd /root/mwe
- # docker-compose up -d mwe-rescorrelationsvc
- # docker-compose up -d mwe-autofamily-svc

At this point, MWE reports the location of each child resource ID to be the same as the location of the parent resource ID associated in the association zone.

The **Resource Grouping** report in the MWE web client displays all of the parent-child associations (or groupings) that are currently active.

## **Releasing Child Resources**

To release the child resources from inheriting the parent resource location, complete one of the following:

- Associate the child resources with a different parent resource, using either the mobile application or a
  resource association zone. In this case, the child resources stop inheriting the location of the previous
  parent resource and will start inheriting the location of the new parent resource
- In the **Resources** report in the web client, select a parent resource, open the **Update User Resource** data entry, and set **OK to Delete Relations on Type Update?** to **Yes** as shown in the following figure. Then click **Save**. This releases all child resources that are associated with this parent resource.

Resource ID	
17555001	
Resource Type	
Pallet	•
Fag ID	
17555001	
)K to Delete Relations on Type Update?	
OK to Delete Relations on Type Update? Yes	•
	e

• In the **Resources** report in the web client, select a child resource, open the **Update User Resource** data entry, and set **OK to Delete Relations on Type Update?** to **Yes** as shown in the following figure. Then click **Save**. This releases the specified child resource from the parent resource that it had previously been associated with.

Update User Resource	×
Resource ID	
ZQ-001	
Resource Type	
Box	•
Tag ID	
17100001	
Comment	
Comment1	
OK to Delete Relations on Type Update?	•
Warning: Changing Resource type will remove all Resource Relations for the Resource id.	
CANCEL SAV	/E

#### **Dynamic Locate Fusion**

Resource Parent-Child Grouping allows assets (child assets) that only have an optical barcode label attached to inherit the location of another asset (the parent asset) having an active RFID tag attached to it and being located and tracked by the MWE system. The association between parent and child assets is done manually using a mobile application or automatically in a specially configured **resource association zone**. Dissociating child and parent assets requires the usage of a mobile application or data entry form in the web client.

Similar to Resource Parent-Child functionality, Dynamic Locate Fusion functionality allows a set of items to inherit the location of another item that is being located and tracked by the MWE system, however, the association and dissociation happens anywhere automatically when specified conditions are met. In this case, the set of items inheriting the location must have some type of low-cost RFID tag attached to them, such as a passive RFID tags or BLE beacons.

For example, a forklift at a manufacturing plant is constantly moving pallets loaded with boxes around the site. The forklift is fitted with an active RFID tag, such as a WhereNet tag or a Dart tag, that allows MWE to locate the forklift anywhere within the site using WhereLAN or Dart sensors installed across the site. The manager at the plant would also like to be able to locate the boxes being moved around, but it is either too expensive or impractical to attach a WhereNet tag or Dart tag to each box.

The Dynamic Fusion functionality offers a solution for this use case. Attach a low-cost tag such as a passive RFID tag to each box and install a tag scanner such as a passive RFID reader on the forklift. When the forklift gets close enough to a box or to a pallet loaded with boxes, the passive RFID reader will scan all the tags on the boxes and wirelessly send this information to the MWE system. The MWE system knows what RFID reader is sending the information and what forklift it is attached to, and therefore can assign to the boxes the location of the forklift. If the RFID reader keeps detecting a tag (indicating proximity to that tag), the MWE system will assign to that tag the same location as the forklift.

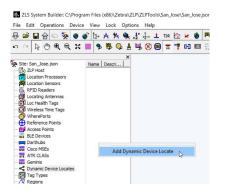
MWE must be configured properly so that Dynamic Fusion happens only with the intended forklifts and RFID readers, and not randomly with any forklifts and readers. This configuration is done in the System Builder configuration tool and is explained later in this section.

Dynamic Fusion involves the following pieces:

- A moving vehicle.
- A tag being tracked and located by MWE attached to the moving vehicle. This tag is called a locate source in the System Builder tool.
- A tag scanner or device mounted on the moving vehicle. This is called a dynamic device in the System Builder tool.
- Low-cost tags attached to the boxes (a tag type that can be scanned/detected by the scanner/device mounted on the vehicle).

To configure Dynamic Fusion, add dynamic devices in System Builder. To add a dynamic device in System Builder, follow the steps below:

1. Click on **Dynamic Device Locates** in the tree-view, then right-click in the middle pane and select **Add Dynamic Device Locate** from the popup menu, as shown in the following figure.



The Dynamic Device Locate properties window displays:

Association Identity Number 1	Enabled	•	
ocate Source			
Source Type			•
Source ID			_
Dynamic Device			
Device Type			•
Device Number			-
Update Type			•
	al Description		

2. In the Locate Source pane, select a Source Type.

This is the type of tag being attached to the moving vehicle and located by the MWE system. The options are: Dart, (passive) RFID, WhereNet, BLE. In **Source ID**, enter the ID of the tag being attached to the vehicle.

Association Identity Number 1	Enabled	•	
			_
Source Type  Whe	ereNet		•
Number 1 Enabled  Vumber 1 Locate Source Type WhereNet Source Type WhereNet Dynamic Device Device Type  Uddate Type Vuddate Type  Vuddate Type  V			
ynamic Device			
Device Type			•
Device Number			•
Update Type			•
	nal Description		

3. In the Dynamic Device pane, select a Device Type.

This is the type of scanner or device mounted on the vehicle. Options are: BLE Beacon, BLE Receiver, RFID Reader. What you must select depends on the type of tags being affixed to the boxes. If the boxes are being tagged with passive RFID tags, you must select Device Type=RFID Reader. If the boxes are being tagged with BLE beacons, select Device Type = BLE Receiver. If the boxes are being tagged with BLE beacons, select Device Type=BLE Beacon.

**4.** Select the Device Number.

This is an integer number assigned by System Builder to each device added in System Builder. For example, if you have added 3 RFID readers in System Builder, they will have Device Numbers 1, 2, and 3 respectively. For any device added in System Builder, the device number is displayed near the top of its properties window, as in the example below:

RFID Reader RDR2 (2)	
RFID Identity Antennas	
	RFID Reader Identity
	Number 2
	Enabled 🔽
Network Interface	Model Generic-Reader 💌
	Date Installed 1/ 7/2020 -
IP Address	Serial Number
192.168.30.104	

The Dynamic Device Locate properties window displays:

Association Identity Number 1		Enabled	~	
ocate Source				
Source Type	WhereNet			•
Source ID	19555001			
ynamic Device				
Device Type	RFID Read	er		•
Device Number	2			•
Update Type	All			•
	Optional De	cription		

The options in the **Update Type** field depend on the Device Type selected. If you have selected Device Type=RFID Reader, then Update Type allows you to select which particular antenna (1,2,3,4, or All) port will be used.

- 5. Once you have made your selections, click OK.
- 6. Once you have configured your Dynamic Devices, perform a **Publish** operation in System Builder to apply the configuration.

# **System Device Alerts**

System alerts triggered by MWE fall into two categories:

- Device related alerts. These are alerts about the health and status of locating devices, including sensors, readers, tags, and more. The available alerts are listed in the Configuration > System Alert Set tingeport lists all the system alerts that the MWE software can generate.
- MWE Server and Services. The status of the MWE server and MWE services can be viewed in the **Dashboard > Grafana System Health** page. One can also define thresholds to trigger alerts.

The table below gives meaning of various fields/columns in the System Alert Settings report.

Field/ Column	Description
Alert	The name of the alert condition.
Time Updated	This is time the alert condition occurred or was resolved.
Туре	This column will show System for alert conditions defined by the MWE module, and 'Application' for alert conditions defined by applications installed on top of MWE.
Category	Provides a way to filter the alert conditions based on more specific criteria. For example, the value will be Infrastructure for alerts related to Location Sensors and other infrastructure devices, Tag for alerts related to tags, Software for alerts affecting the MWE software, and so on.
Severity	High indicates a condition that will severely affect system operation and performance and needs immediate attention.
	Medium refers to a condition that will affect system performance and should be addressed soon.
	Low indicates a condition that should be corrected, but it will not affect overall system operation and performance, and does not require immediate attention.
Enabled	Yes indicates the alert is enabled, so that it will be set to Open when the system detects this condition, and an alert notification will be displayed or sent.
	No indicates the alert is disabled; even if the system internally detects this condition, the Status field will not be set to
	Open and no alert notification will be displayed or sent. Note that several alerts are installed disabled (Enabled=No). This is by design.
	A regular user will not be able to enable or disable a system alert. This currently can be done only by Zebra Product Support engineers.
Auto Close	Y indicates that the Status of an alert will be automatically changed by the system from Open to Close when the alert condition does not exist anymore.
	N indicates that the alert condition can be closed manually only.
Subject	This is the content of the subject line of email notification messages sent out when an alert condition is raised.
Message	This is a brief description of the error condition.
Action	Explains the necessary steps to correct the error condition. To see the full text of the Corrective Action, select (left-click on) a line, right-click and select View Detailed Information from the popup menu.
Recipients	List of email addresses to be notified when the alert is triggered.

#### Table 12System Alert Types

To view the system alerts that are currently open, you can do one of the following:

- · Open the Dashboard page in the web client
- Open the Alerts > Open System Alerts report

To view a history of system alerts, including when and what system alerts were open and closed, see the **History > System Alert History** report.

# Contacts

You can configure each system alert to be automatically emailed to a specified list of contacts whenever the alert is open or closed. First, enter contact information.

To add a contact:

- 1. Open the **Configuration > Contacts** report.
- 2. Click the + Add tool button.
- 3. Select + Add Contact.

刹 •• ZEBRA	Dashboard Reports History	Alerts Saved	Infrastructure Configuration	on Users admin <del>-</del>
Reports / Contacts	C Run Repor	: + Add 🖍 Update	🗎 Delete  🛓 Export 🛭 Detai	ls 💷 🛛 🔂
Contact	Description     I       Add Contact       Contact Name *		Phone	Language

4. Enter the contact information and click **OK** to save the information. Mandatory fields are indicated by an asterisk.

<b>锁₊ ZEBRA</b>		Dashboard Reports Histor	y Alerts Saved	Infrastructure Configuration	on Users admin <del>-</del>
Reports / Contacts		C Run Report	+ Add 🖍 Update 🥫 Delete	🛨 Export 🕡 Details	1 Results 🎟 🛛 🖬 🔒 🎦
∎ • <b>○</b>	Contact	Description	Email	Phone	Language
Contact	John Smith	Site Manager	jsmith@company.com	123-456-7890	English

 To modify or delete a contact, select the contact in the report and then click the Edit or Delete buttons on the report's toolbar.

# **Alert Notification**

Each system alert can be configured to be automatically emailed to a specified list of contacts whenever the alert is open or closed.

To configure alert notifications:

- 1. Open the Configuration > System Alert Settings report
- 2. Select an alert in the report (click square checkbox in first column), and then select Update > Update Email Notification

Zebra MotionWo	rks Enterprise	×	+						• - C	x c
← → C ▲	Not secure	10.21	205.60/#/reports/system-alert						on Q 🕁	<b>1</b>
्री⊶ ZEBRA				Dashboard	Report	s	History Alerts Infra	astructure Config	uration Users	admin 👻
Configuration / Sys	tem Alert Settings					-⊖ R	lefresh 68 Rows 🧪 Update	e <u>+</u> Export	🗿 Details 🛛 III 📄 🖬	
∎ • <b>0</b>			Alert Name	Туре	Categ	1	Update Email Notification	ted	Enabled	AutoClos
Туре			Dart No Receiver Enabled	Infrastructure	Dart	1	Change Alert Message	1:03:24 AM	Yes	Yes
All	~		Dart No Reference Tag Enabled	Infrastructure	Dart		High 10/29/21	, 11:03:24 AM	Yes	Yes



NOTE: Currently only one alert can be selected and configured at a time.

3. The Update Email Notification data entry form opens:

Update Email Notification	
Alert Name	
Dart No Receiver Enabled	
Recipients	
+ Add/Update Recipients	
Select "Add Recipients" to asign Recipients to this alert	
ок	

4. Clicking on Add/Update Recipients opens the Select Site Recipients window:

Select Site	
All	~
Recurring	Repeat Interval (in hours)
No	• 0
Select Recipients	
Search contact	
0 contacts selected out	t of 3
John Smith	
Mary Jones	
Carlos Medina	

If the MWE deployment includes more than one site, select the site that the alert is being configured for. If you would like the alert to be sent periodically while the alert is open, set **Recurring** = Yes and specify a notification or **Repeat Interval** (in hours). Select the contacts that will receive email notification and click **Save**.

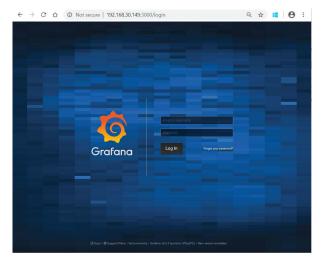
For emails to go out you need to provide information on the email server. For additional information, refer to the MWE Configuration Guide.

# **MWE Health**

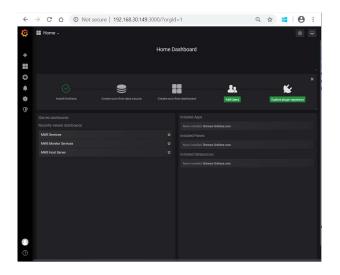
The health and status of the MWE server and services can be monitored in the **Dashboard** > **Grafana** - **System Health** page.



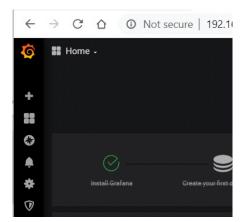
The login page is shown below.

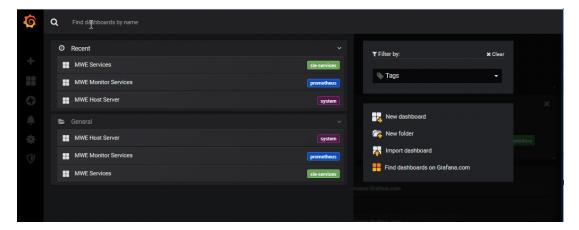


The default login is mwe-monitor / monitor! The home dashboard page opens:



In Grafana, users can configure the dashboard. MWE includes some pre-built dashboards. To access them click on the **Home** dropdown list on the top left of the screen:





In the example above, the pre-built dashboards are:

- MWE Services
- MWE Monitor Services
- MWE Host Server

Depending on the MWE version, a different set of pre-built dashboards could display.

The following figure shows the MWE Services dashboard:



#### **Device Manager**

Locating devices such and sensors and readers can be added to MWE using the System Builder tool or using the Device Manager report in the MWE web client. Refer to the MWE Configuration Guide for details on adding devices via System Builder.

In Device Manager, directly add configure, and manage devices in a MWE deployment. Only passive RFID readers (FX7500, FX9600, ATR) can be added via this report in MWE 2.0. The RFID readers must have firmware version 3.9.16 or higher. Support for other device types will be added in future MWE releases.

	∜•• ZEBRA	١							I	Dashboar	d Reports	History Alerts	Infrastructure Configura	ation Users	admin 🔻
	Infrastructure	· / Devices								Norti		Area (0) 👻 🧳 🎝 Refre	sh 🕂 Add 🕦 Site Info	🗄 Templates	• 🏻 🏝
	Device Type	: <i>≡</i>	Device Model	= Firmware	=	Hostname	≡	Status	Antennas		Config. State	😑 Site Name	😑 Map Name	=	i
	RFID Reader	r	FX7500	<u>3.7.26.0</u>	ŧ	192.168.1.93		Running	••		Published	North LA Site		Edit	
	RFID Reader	r	FX5500		±	153.44.543.50		n/a		••	Saved	North LA Site		Edit	
	RFID Reader	r	FX5500		±	153.44.543.52		n/a			Saved	North LA Site		Edit	
	RFID Reader	r	FX7500		<u>+</u>	153.44.543.53		n/a		••	Saved	North LA Site		Edit	
	RFID Reader	r	FX5500		Ŧ	153.44.543.54		n/a		5	Saved	North LA Site		Edit	:
4															Þ

RFID readers deployed via the **Devices** page send data directly to the MWE server. They do not send data to a ZLA appliance and therefore a ZLA is not required, and their operation can be configured by selecting one of 4 pre-defined operation modes. Nevertheless, you can still deploy RFID readers via the System Builder tool to send data to a ZLA using the more configurable LLRP protocol, as explained in the MWE Configuration Guide.

For more details on Device Manager, please see the MWE Device Manager User Guide.

Additional MWE documentation includes:

- MWE Installation Guide
- MWE Configuration Guide
- MWE REST API
- MWE Camel Interface
- MWE Device Manager



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