CNM Mobility

User's Guide

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Chapter 1 About This Guide

This is the User Guide for the CNM Mobility application to be used in the Teldat Hx-Automotive or Hx-Rail families.

1.1 Supported Devices

The information contained in this installation guide only applies to the Hx-Automotive or Hx-Rail families equipped with a GPS navigation device and/or cellular interfaces. Please note that the device must have been previously registered on the platform using the purchased management license associated to said device. A mobility license can be added to devices that are currently registered and managed. In the CNM application, the Mobility plug-in must be active to enable the reception of cellular and location events.

1.2 Who should read this manual?

This manual should be read by users who wish to add the mobility plug-in to Hx-Automotive or Hx-Rail families managed and registered on CNM.

1.3 When should I read this manual?

Read this guide as soon as you are ready to use your CNM Mobility application. This manual shows several scenarios where CNM Mobility is useful and how to configure its different parameters.

1.4 What is in this manual?

This user guide contains the following information:

- Scenarios where the application is useful.
- Configuring the application using the Teldat Management Platform (CNM).
- How to monitor the devices and the parameters that can be monitored.
- Usage and licensing of the Teldat Management Platform Mobility plug-in.
- Troubleshooting.

1.5 What is not in this manual?

This user guide does not contain information relative to the hardware of the Hx-Automotive or Hx-Rail families. Moreover, it does not detail every management operation available on the Management Platform, offer comprehensive information on the Hx-Automotive or Hx-Rail families software and its configuration, or focus on applications other than CNM Mobility. It does not contain information on how to setup the device for Internet connection. To obtain information on how to configure the device, please see the relevant manuals for the different protocols to be found at *www.teldat.com*.

1.6 How is the information organized?

Chapter 2 is an introduction to the CNM Mobility application and the different scenarios where it is useful to deploy it. Chapter 3 shows the different configuration methods for this application. Chapter 4 explains how to use the Management Platform's dashboard, how to select the different monitoring alternatives using parameter or device-based filters and how to view the metrics belonging to a single device grouped by interface. Chapter 5 explains how to configure a license in order to use the Mobility plug-in.

In addition, the annexes in this document focus on additional CNM Mobility features and troubleshooting.

1.7 Technical Support

Teldat, S.A. offers a technical support service. The device software can be regularly updated for maintenance purposes and for new features.

Contact information:

Web: www.teldat.com

Tel Nº: +34 918 076 565

Fax: +34 918 076 566

Email: support@teldat.com

Note

The manufacturer reserves the right to make changes and improvements in the appropriate features to either the software or hardware of this product, modifying the specifications of this manual without prior notice. The screen captures shown throughout the guide are provided as information guidelines only. Some small modifications may exist in the current software.

1.8 About OpenSource Software

Some software components used in this product are copyrighted and licensed under the GPL, GFDL, LGPL and other open source licenses. Within three years after our last shipment of said product, you may obtain the complete source code from us by downloading it from Teldat, S.A. free of charge. If you want to obtain this source code in a physical medium (such as a CD-ROM), the cost of physically performing source distribution may be charged. This offer is valid to anyone who has this information.

For more information on the licenses for the installed software in the Hx-Automotive or Hx-Rail families, please see the *About section* under device configuration.

Chapter 2 What is the CNM Mobility solution and why is it useful?

2.1 CNM Mobility application

This well-known feature provides geolocation and time information regardless of the whether conditions and location. Users who own a Teldat device equipped with GPS tracking can locate their device at all times.

This application is useful for companies that offer transportation services and want to know the route followed by each of their vehicles. Moreover, it allows companies devoted to passenger transport to learn which areas offer greater coverage and provide connectivity services to their customers.

Through CNM Mobility, corporations can improve the service offered by their devices and gather useful information on the routes followed. This, in turn, helps them make decisions that can save costs and increase revenues.

Teldat offers a CNM platform plug-in specially designed for companies equipped with Hx-Automotive or Hx-Rail families. This user guide explains how to use the platform to obtain geolocation information, as well as the coverage provided by each of the device's connected antennas.

That said, CNM Mobility is not a fleet management system. It is a tool designed to monitor communication-related parameters such as coverage, signal strengths, bandwidths, throughput, etc.

2.1.1 Advantages

- *Increase in productivity and performance.* It helps boost the on-board communication services, reducing costs while improving internal monitoring, end-user experience, etc.
- *Have your devices located at all times.* In the event of theft or accident, you will know where the device is and located and can take all appropriate actions to minimize potential damage.
- *Know the areas with best coverage for traveling devices.* Know which devices can offer data services (like Wifi) to customers and provide good coverage throughout the trip.
- *Monitor and program alerts based on the quality of the signal using the device's antennas.* This improves the response time to failures, as devices are able to anticipate them.
- *No additional communication costs.* The system is able to monitor the monthly bandwidth used by each cellular interface and sends alerts if the maximum value allowed per month has been exceeded.

2.2 Scenarios

This section focuses on the most common scenarios configured to optimize this kind of traffic application.

2.2.1 Control of users connected to connectivity services

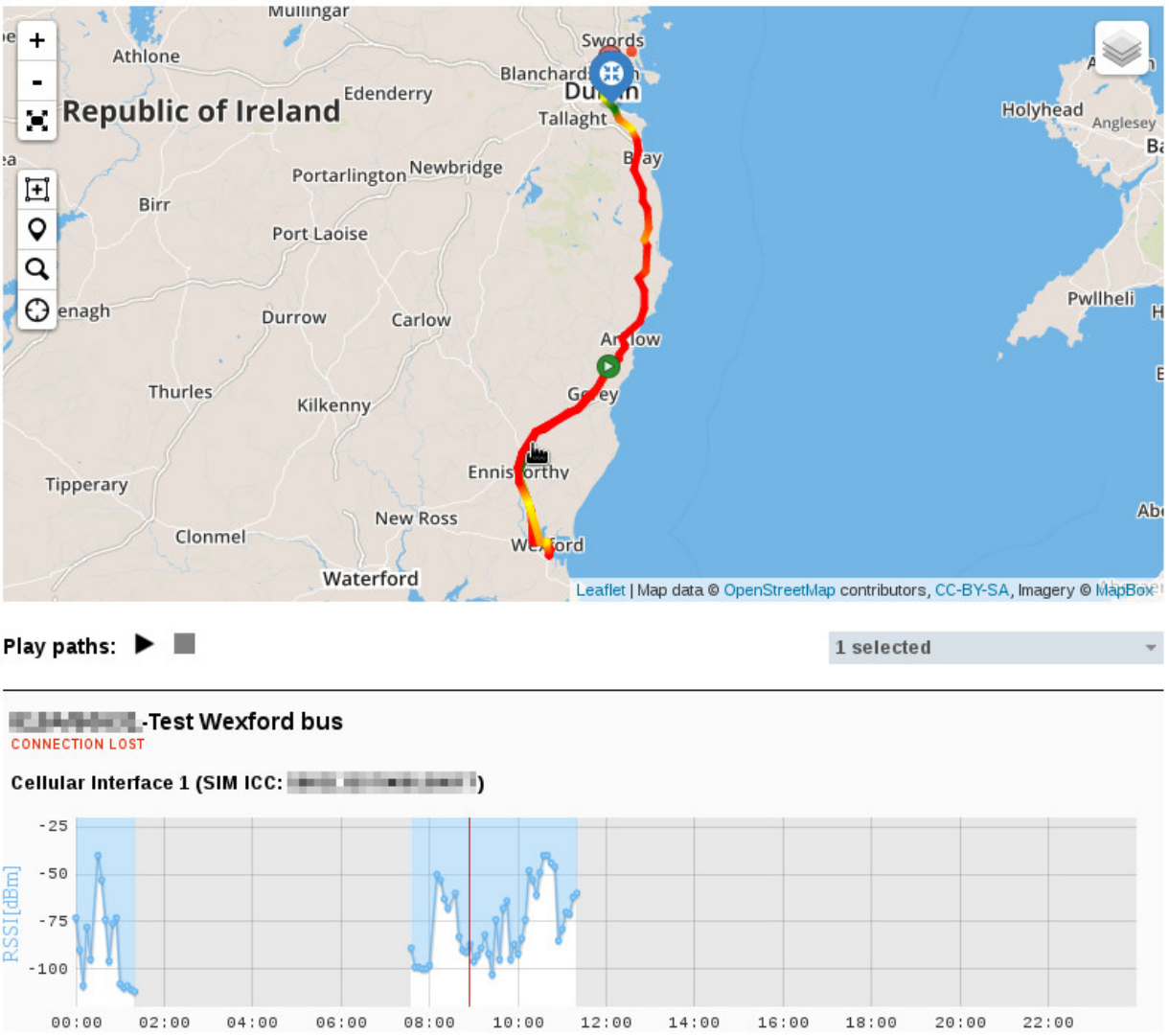
The first scenario shows two devices belonging to the Hx-Automotive or Hx-Rail families installed on a bus. They offer different communication services to passengers during the journey.

Passengers will not be using these services at all times, meaning not all vehicles will have the same consumption. Mobility provides information about consumption as well as signal coverage. With this data it is possible to improve the service given to users (in terms of greater consumption) and reduce costs in areas where consumption is lower by setting the data capacity of devices.

2.2.2 Low signal coverage detection

Imagine your users have complained about the service being slow at certain times of the day. With CNM Mobility, knowing what coverage areas pose a problem is possible just by looking at the route of a vehicle on a map. Just by passing the mouse over an area, you get data on coverage, the strength of the signal and the technology connected. This tool saves you from having to analyze tons of data to identify the problem.

Fig. 2.1. Detect problems instantly with Mobility



Chapter 3 Configuration

3.1 Device monitoring section

3.1.1 Parameters to monitor

The Mobility-related parameters that must be monitored can be configured in the device's monitoring panel. This section can be reached by clicking on the marker representing the device that shows up on the map, or by searching for it under the *Devices* option in the main menu.

These options will only be available when the device has an active Mobility plug-in license.

All parameters relate to cellular information or GPS data:

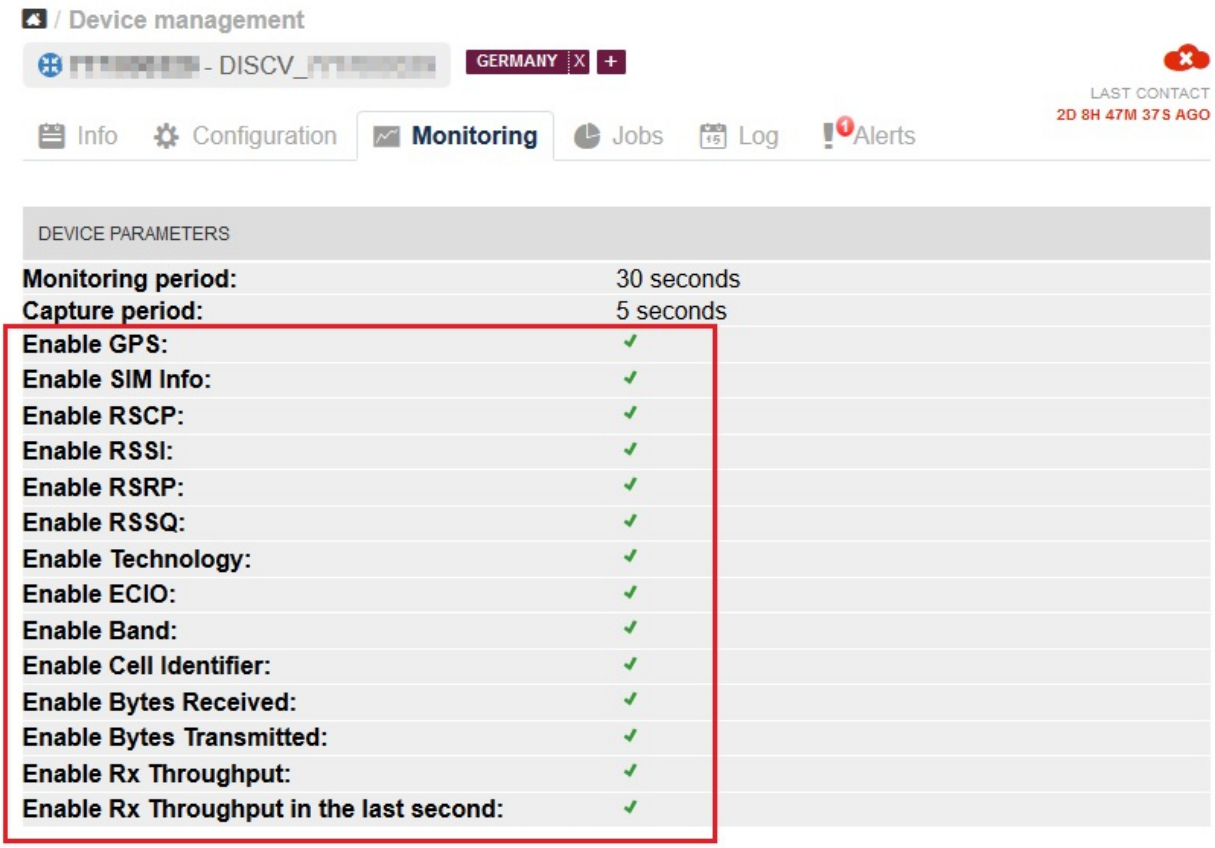
- *Enable GPS:* This option enables the sending of GPS information.
- *Enable SIM Info:* This option enables the sending of SIM data.
- *Enable RSCP:* This option enables the sending of Received Signal Code Power. This value denotes the power measured by a receiver on a particular physical communication channel.
- *Enable RSSI:* This option enables the sending of a Received Signal Strength Indicator. This value measures the power present in a received radio signal.
- *Enable RSRP:* This option enables the sending of Reference Signals Received Power. This value measures the received power in an LTE network.
- *Enable RSRQ:* This option enables the sending of Reference Signal Received Quality. This value measures the quality of the received reference signal in an LTE network
- *Enable Technology:* This option enables the sending the type of technology used in cellular communications (GPRS, CDMA, LTE...).
- *Enable ECIO:* This option enables the sending of Ec/Io data. This value measures the ratio of energy per chip received at the interference level.
- *Enable Band:* This option enables the sending of the band used in communications.
- *Enable Cell Identifier:* This option enables the sending of the identifier associated to the cell the device uses to establish a cellular connection.
- *Enable Bytes Received:* This option enables the sending of the number of bytes received since device was powered on.
- *Enable Bytes Transmitted:* This option enables the sending of the number of bytes transmitted since the device was powered on.
- *Enable Instant Throughput:* This option enables the sending of the throughput in a given instant.
- *Enable Throughput in the last second:* This option enables the sending of the throughput in the last second.

For each one there is a check box. In order to select which parameters are to be monitored, click on the *Edit monitoring parameters* button. Hit enable to link the data of the parameter to the available box (or disable it to achieve the opposite effect).

Note

The sending of each monitored parameter requires some bandwidth. The system allows the user to uncheck non-relevant parameters so as not to incur in unnecessary data transmissions.

Fig. 3.1. Fine grain control for configurable parameters

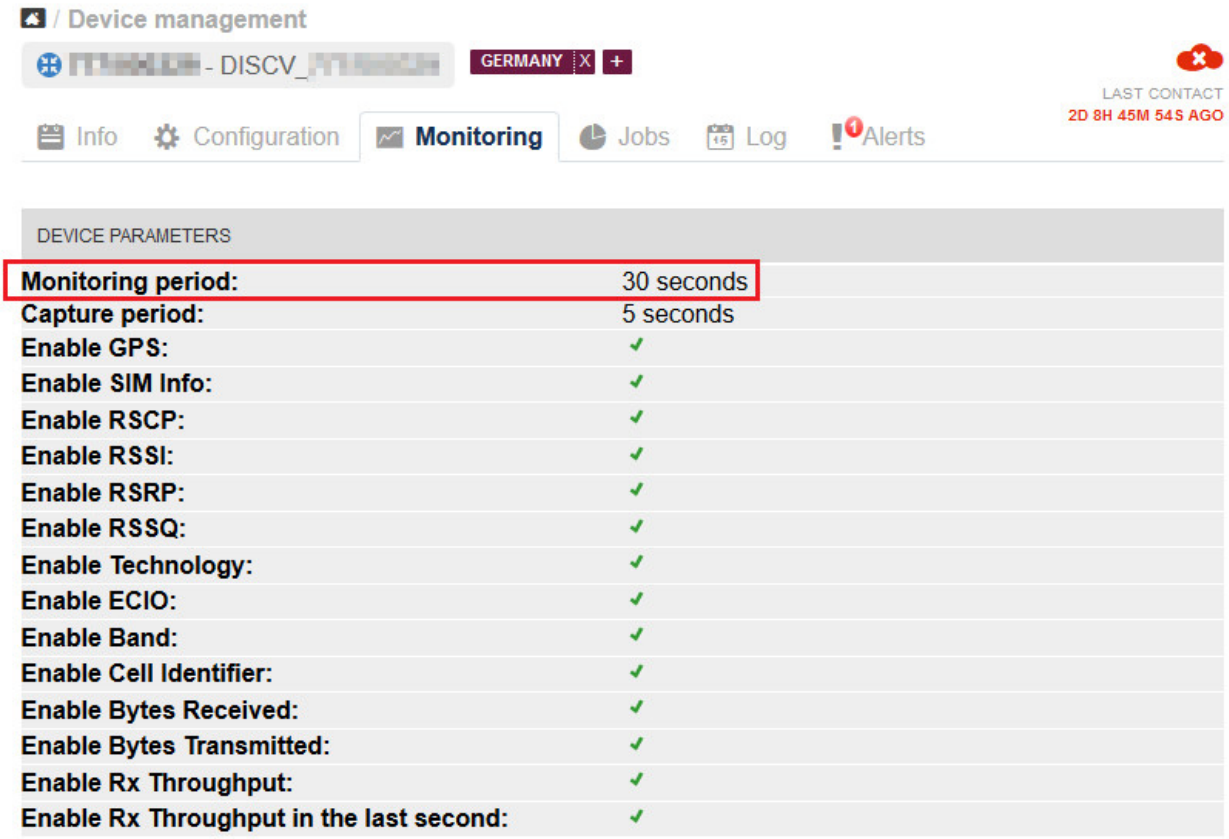


To keep any changes made, simply click on the "Save Changes" button.

3.1.2 Monitoring Period

To configure how much time the device waits before sending data to the CNM for a second time, go to the *Monitoring* panel under device configuration. The value is set to 30 seconds by default, but it can be set at any value that is higher than the device's data capture value.

Fig. 3.2. Setting how often the device is connected to CNM Mobility



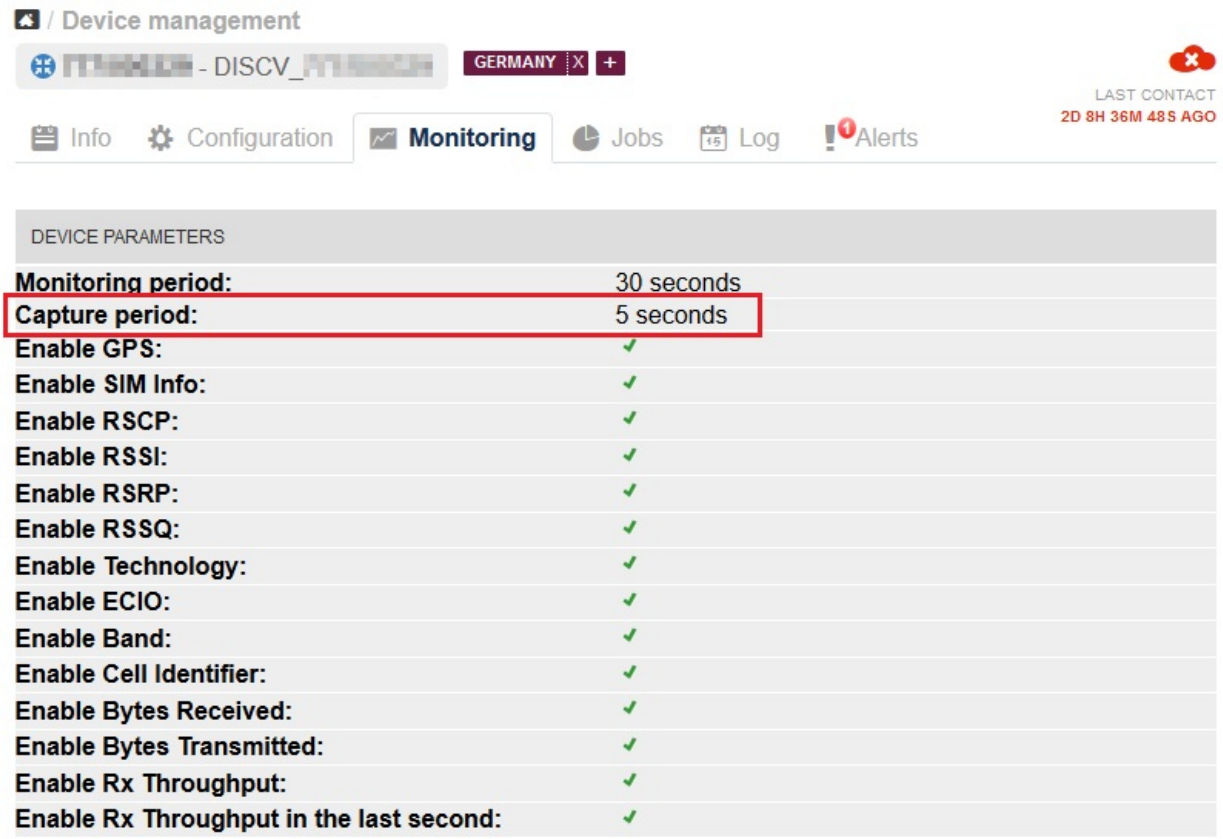
Note

To change the parameter value, remember to click on *Edit monitoring parameters* first and then press on the *Save Changes* button. This way, the device will apply the changes made next time it connects to the CNM Mobility feature.

3.1.3 Capture Period

To configure the time the device waits before carrying out a second survey of the configured parameters, go to the monitoring panel under device configuration. By default, the value is 5 seconds. However, you can set a higher value (as long as it is lower than the one set for the *Monitoring period*).

Fig. 3.3. Setting how often the device get monitoring data.



Note

To change the parameter value, remember to click on *Edit monitoring parameters* first and then press on the *Save Changes* button. This way, the device will apply the changes made next time it connects to the CNM Mobility feature.

3.1.4 Disconnection Alerts

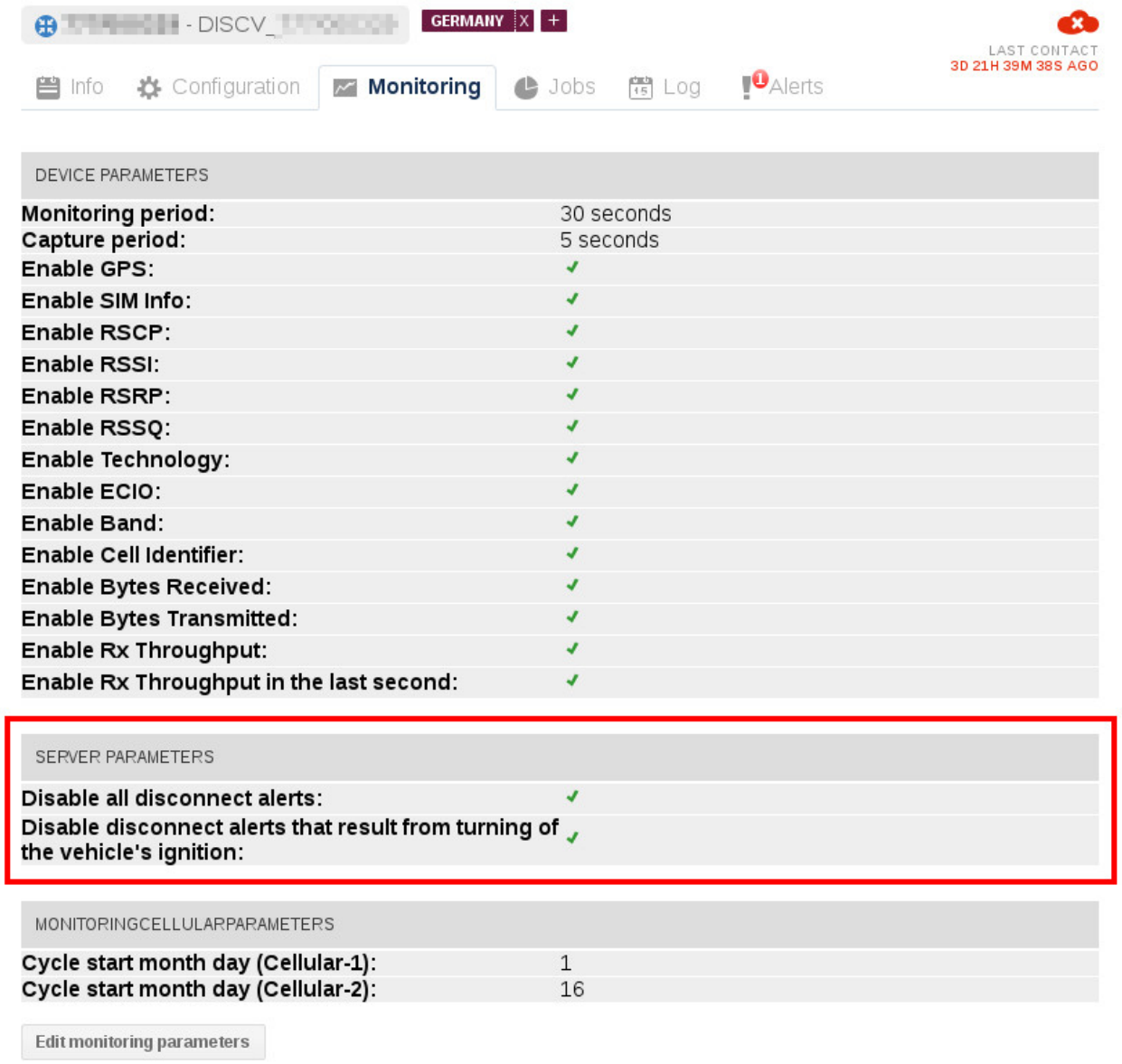
Usually, mobility devices only activate when the vehicle is running. CNM usually monitors if a device is on, generating an alert when it does not receive communications from the remote device. In the case of mobility devices, the generated warnings or alerts would be false (unless otherwise specified).

In mobility devices, it is important to enable the *Disable all disconnect alerts* and *Disable disconnect alerts due to vehicle ignition off* options. This will prevent false alerts from being sent when the device passes through areas where there is no coverage, or when the device is turned off because the engine of the vehicle in which it travels has been switched off.

Note

To change the parameter value, remember to click on *Edit monitoring parameters* first and then press on the *Save Changes* button. This way, the device will apply the changes made next time it connects to the CNM Mobility feature.

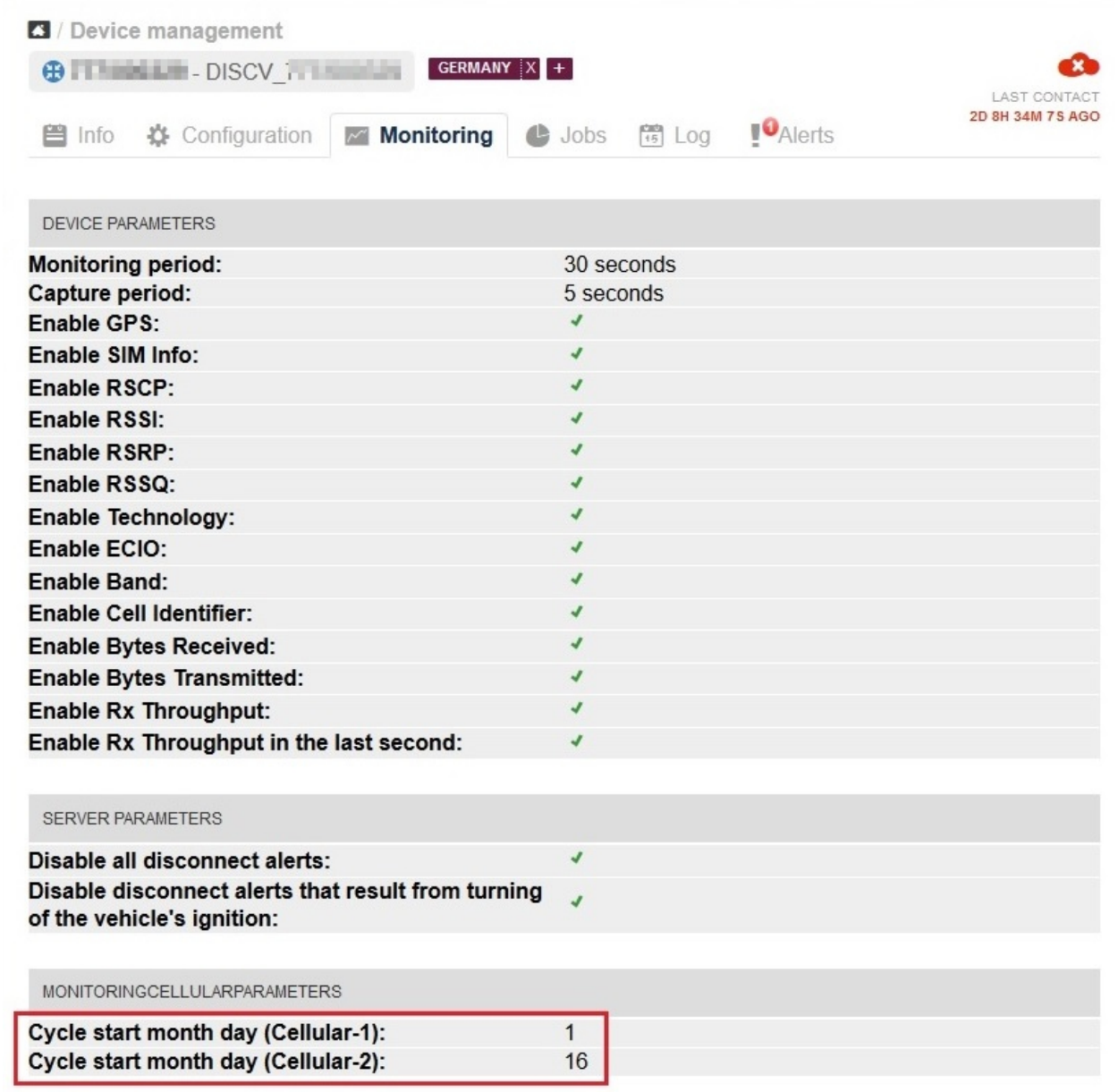
Fig. 3.4. Set whether an alert is generated when the device is disconnected.



3.1.5 Billing cycles

The last two options are related to the day of the month in which the billing period begins for each cellular interface. This information is very useful to monitor the information on data consumption per interface during the billing cycle. The two graphs that show this information will only display the billing cycle consumption, regardless of the time filter applied in the dashboard.

Fig. 3.5. Choose the day of the month in which the cycle starts



3.2 Groups Configuration

The *Monitoring period* and *Capture period* options can be configured for groups of devices. The new value for these two parameters will apply to all devices belonging to the group. These options are accessed by selecting a group from the *Groups* panel, under the *Devices* menu option.

Fig. 3.6. List of configurable groups of devices

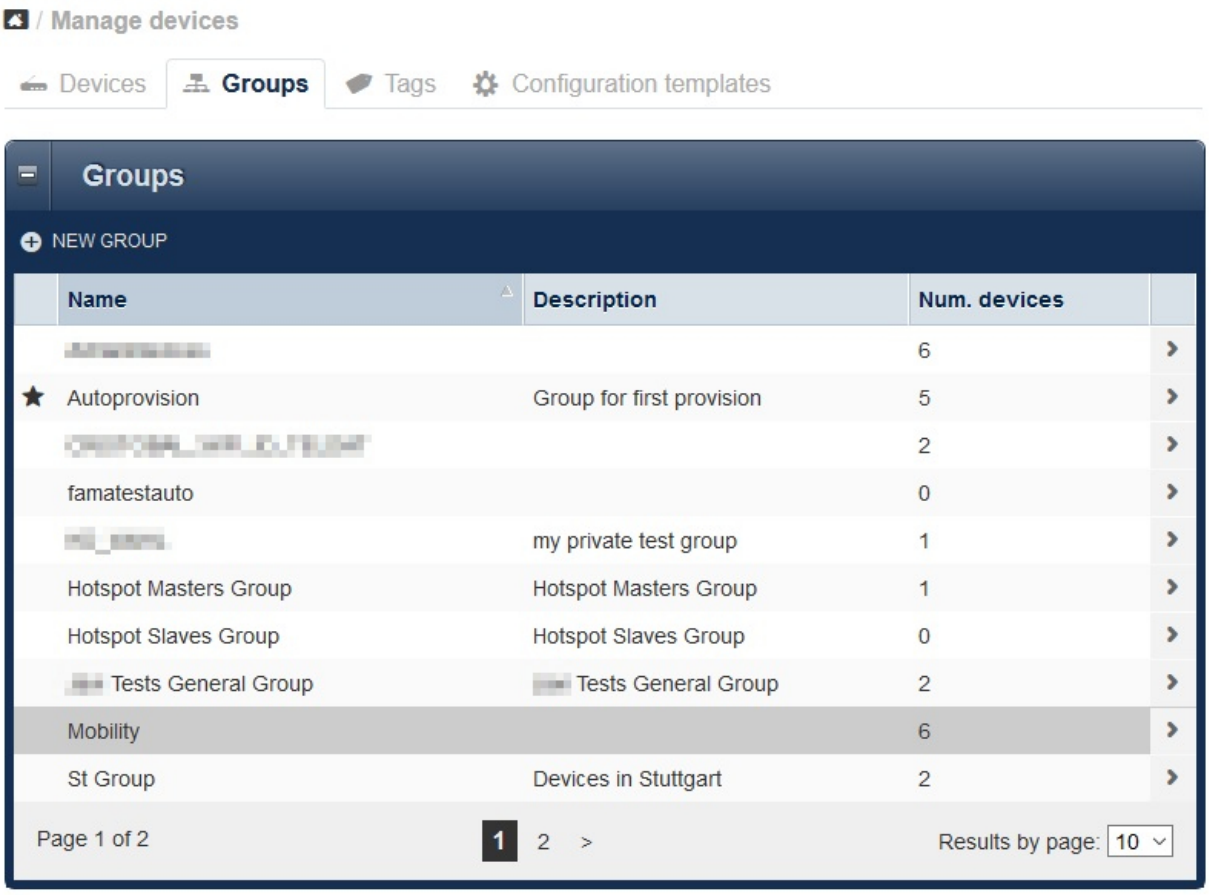
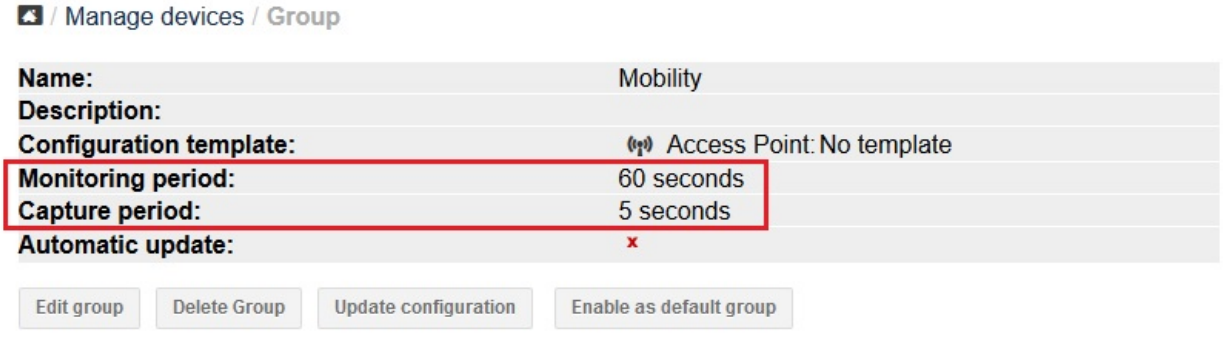


Fig. 3.7. Device Group Configuration Options



Chapter 4 Monitoring

4.1 Introduction

The internal parameter values of this application are periodically sent to the management platform.

If you have a Mobility plug-in license, you can associate it to the devices of the Hx-Automotive or Hx-Rail families located in the platform and listed under your user environment. This gives them access to the Mobility features.

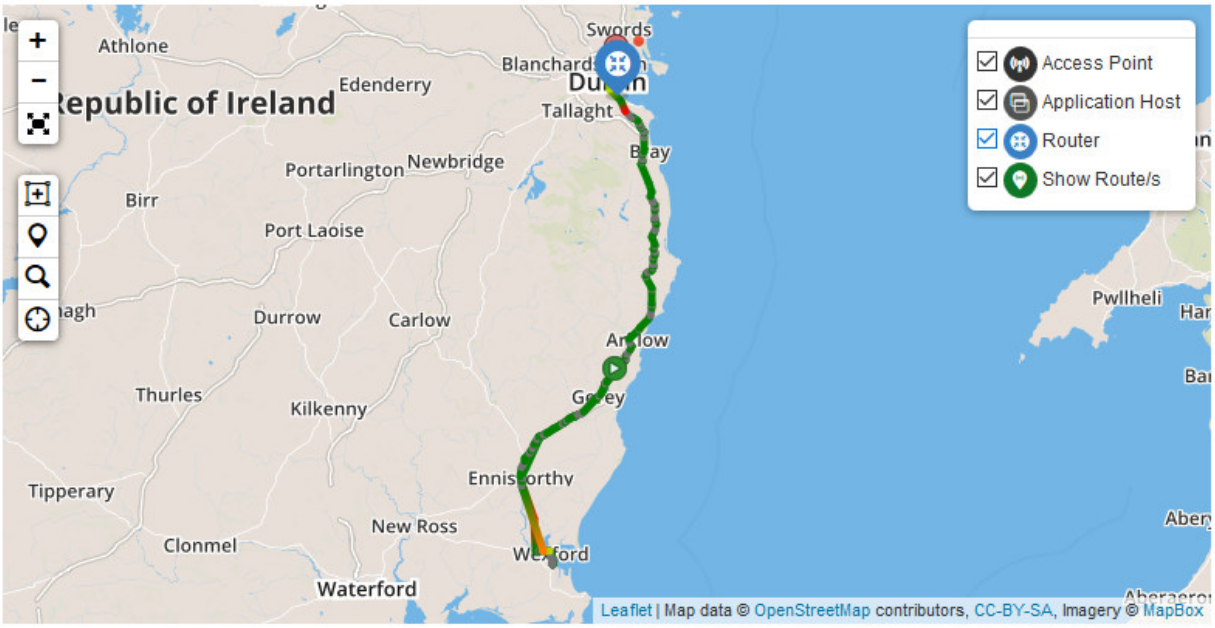
4.2 Map

4.2.1 Tracks

CNM Mobility allows to the user to track devices. This information is represented on the map found in the dashboard. These paths can be displayed in two ways: as a gray line or as a color gradient line. The first one gives information on the position of the device at the time selected by the user. The other adds some quality details to that same information, depending on the first parameter selected by the user. As for quality, a gradient of colors is used where green indicates a good measure, yellow an acceptable one, and red a bad measure.

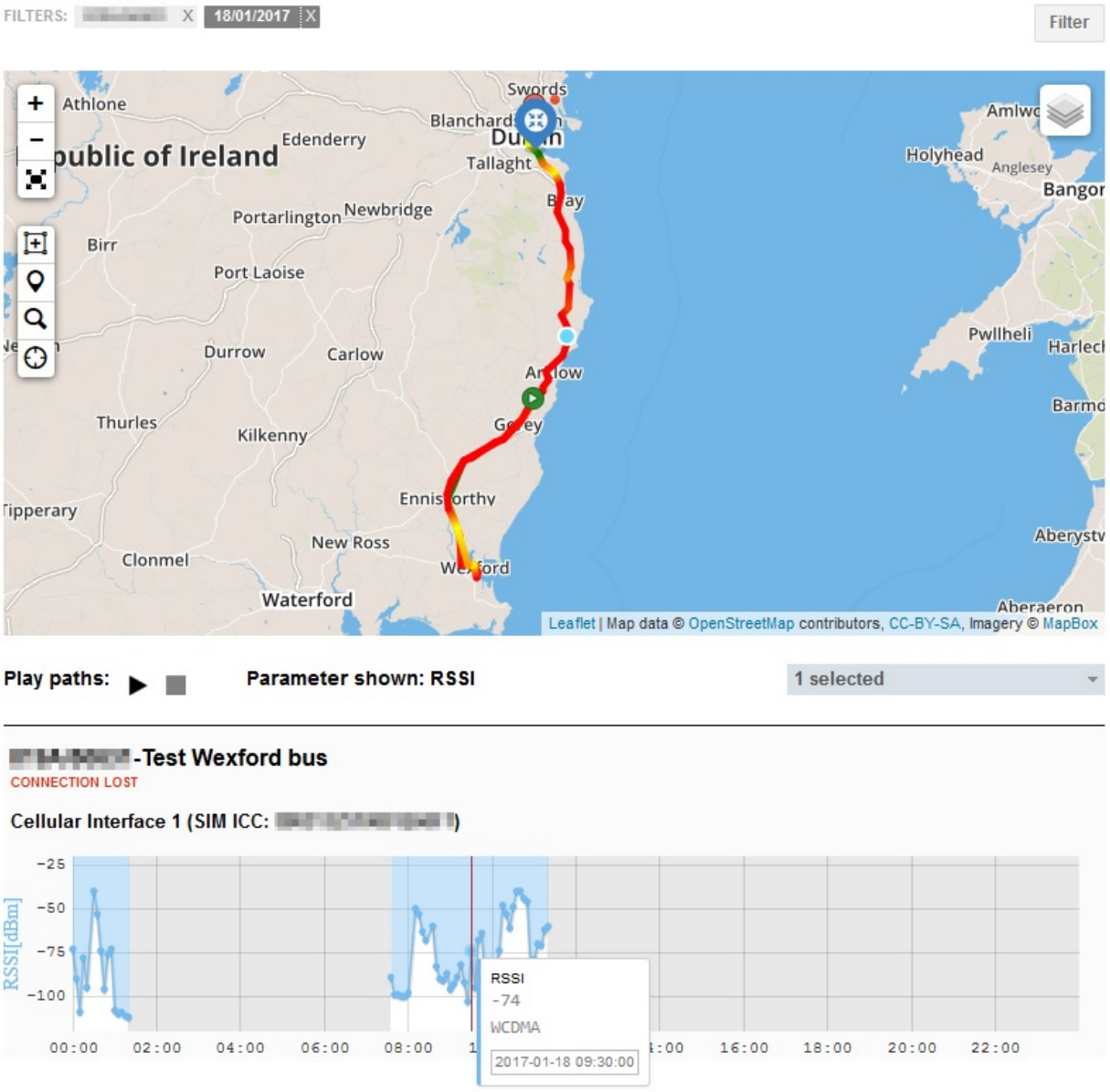
There are two ways to show tracks of the device in the map. Go to the *Show Path/s* checkbox and select one or several parameters from the multi-select box in the bottom right corner.

Fig. 4.1. Devices tacking



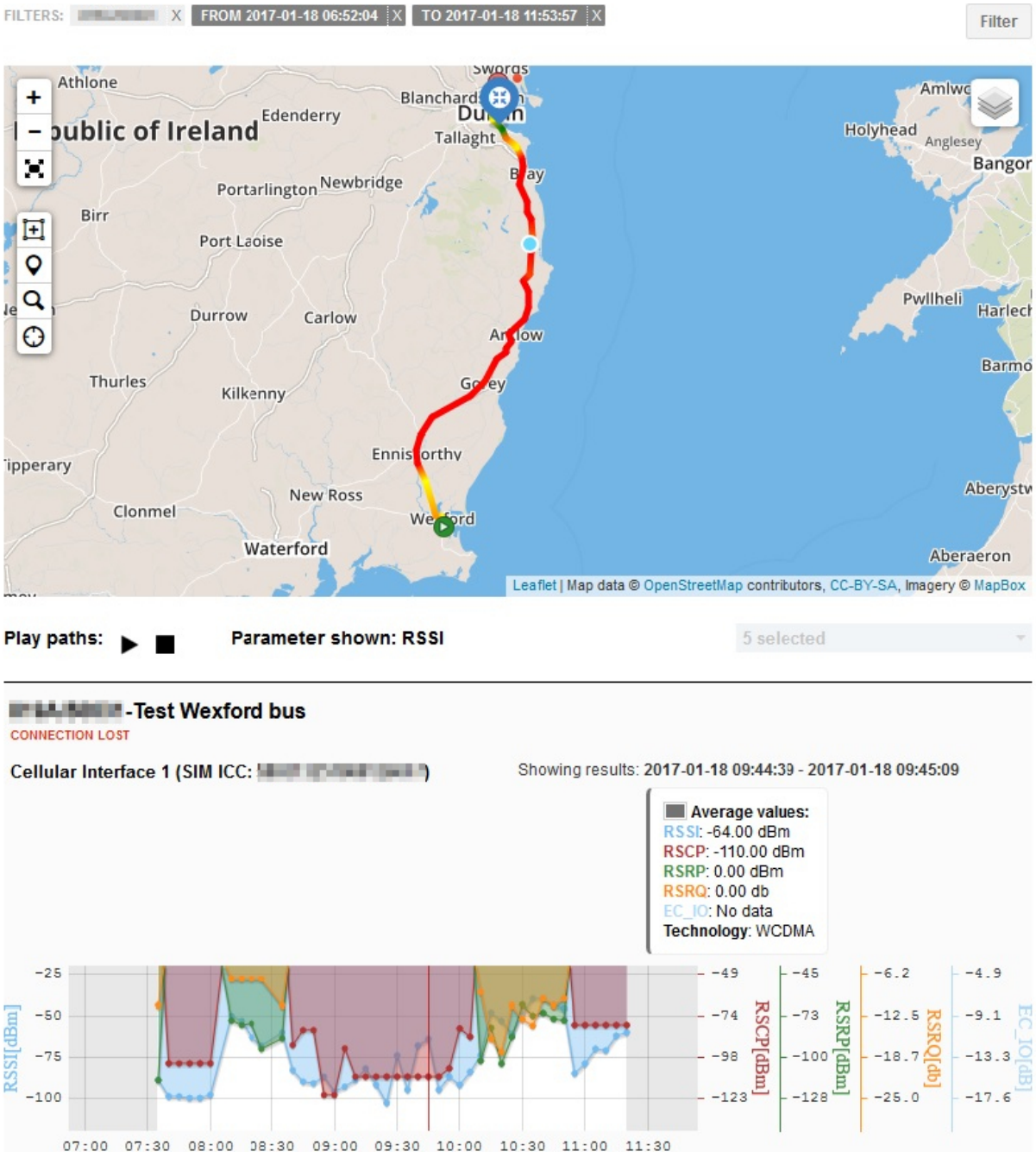
When a device track is displayed with an associated parameter, a time graph will appear for each device interface. These graphs represent a series of data, distinguished by color and by the parameters selected. If a user places the mouse over a graph point, a blue circle appears and shows the position of the device at the time selected by the user.

Fig. 4.2. Knowing where the device was when it gave that value.



Alternatively, you can follow the path chosen by the device(s). A vertical red line will appear on the graph to show the time, and a blue circle will appear on the map to show the device's location at the time. This animation lasts for 30 seconds, but the user can pause or stop it anytime.

Fig. 4.3. It is possible to see the path traveled by the device.



4.2.2 Monitoring of general mobility parameters

The Mobility Dashboard Plug-in monitors parameters related to the quality of the signal of those devices connected to the antennas, as well as their data transfer rate. In general, the following parameters are monitored:

Note

The text in brackets of the ranges in value indicates the color that will be used to show the quality of the tracking on the map.

- *RSCP:* collected RF energy after the correlation / unscrambling process.

  Limit values

  - Good (green): >= -88 dBm
  - Acceptable (yellow): -95 dBm <= RSCP < -88 dBm

- Bad (red): < -95 dBm

- *EC/IO:* ratio of the received energy per chip and interference level

  Limit values

  - Good (green): >= -8 dB
  - Acceptable (yellow): -14 dB <= EC/IO < -88 dBm
  - Bad (red): < -14 dB

- *RSSI:* strength of the received signal. This value takes RSCP and Ec/Io into account.

  Limit values

  - Good (green): -60 dBm <= RSSI < -40 dBm
  - Acceptable (yellow): -80 dBm <= RSSI < -60 dBm
  - Bad (red): < -95 dBm

- *RSRP:* (used in LTE) average power of resource elements that carry cell-specific reference signals over the entire bandwidth.

  Limit values

  - Good (green): >= -80 dBm
  - Acceptable (yellow): -90 dBm <= RSRP < -80 dBm
  - Bad (red): < -100 dBm

- *RSRQ:* (used in LTE) ratio between RSRP and the received signal strength indicator(RSSI).

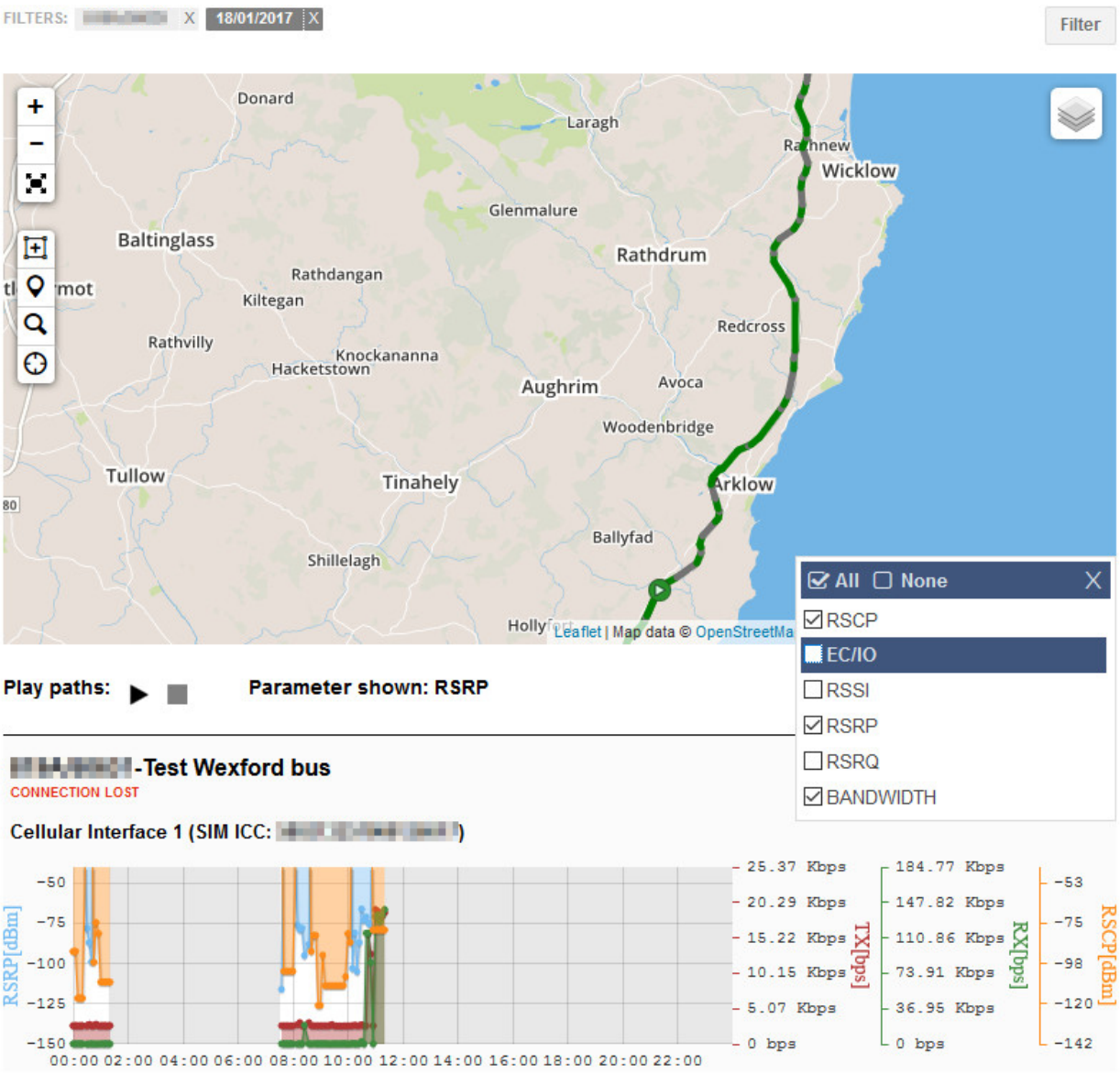
  Limit values

  - Good (green): >= -20 dBm
  - Acceptable (yellow): -15 dBm <= RSRQ < -20 dBm
  - Bad (red): < -10 dBm

- *BANDWIDTH:* data rate relative to the capacity of the digital channel.

To see the values taken by one or more of these signals for one or several devices, select the menu parameter on the bottom-right side.

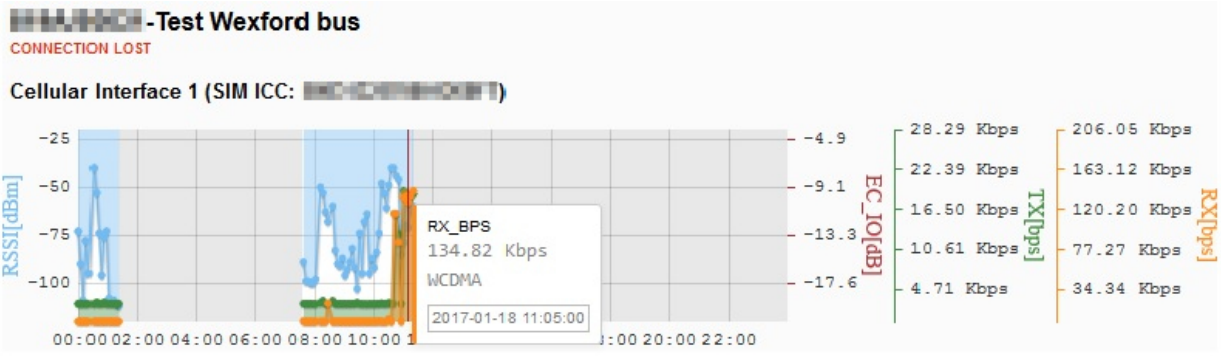
Fig. 4.4. With the menu, you can control what parameters to display.



In addition, the menu includes two options to select or deselect all parameters.

The data of a parameter is shown in the graphs, one per cellular interface of the device. It is possible to interact with the graph in several ways. One of them is to place the mouse over a point, which will show a box with detailed information on the value of the signal, the technology used by the device and the date when the event was collected.

Fig. 4.5. Detailed signal information



It is also possible to zoom in a certain area to get a clearer view of the data for a period of time. To do this, you only

need to click on an area and drag it as far as you want (within the limits of the graph).

Fig. 4.6. Sometimes the data appears too close and is not easy to read.

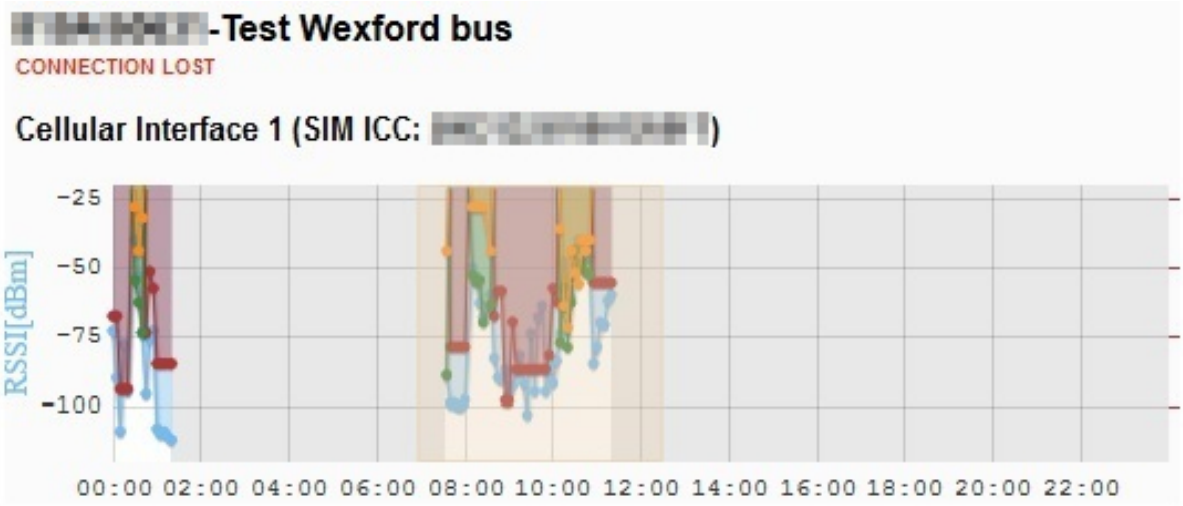
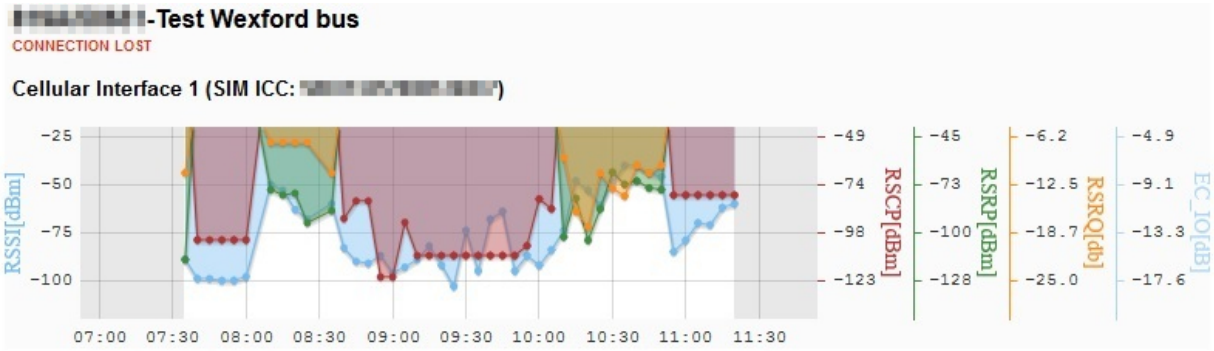


Fig. 4.7. A zoomed area gives a clearer view of the data.



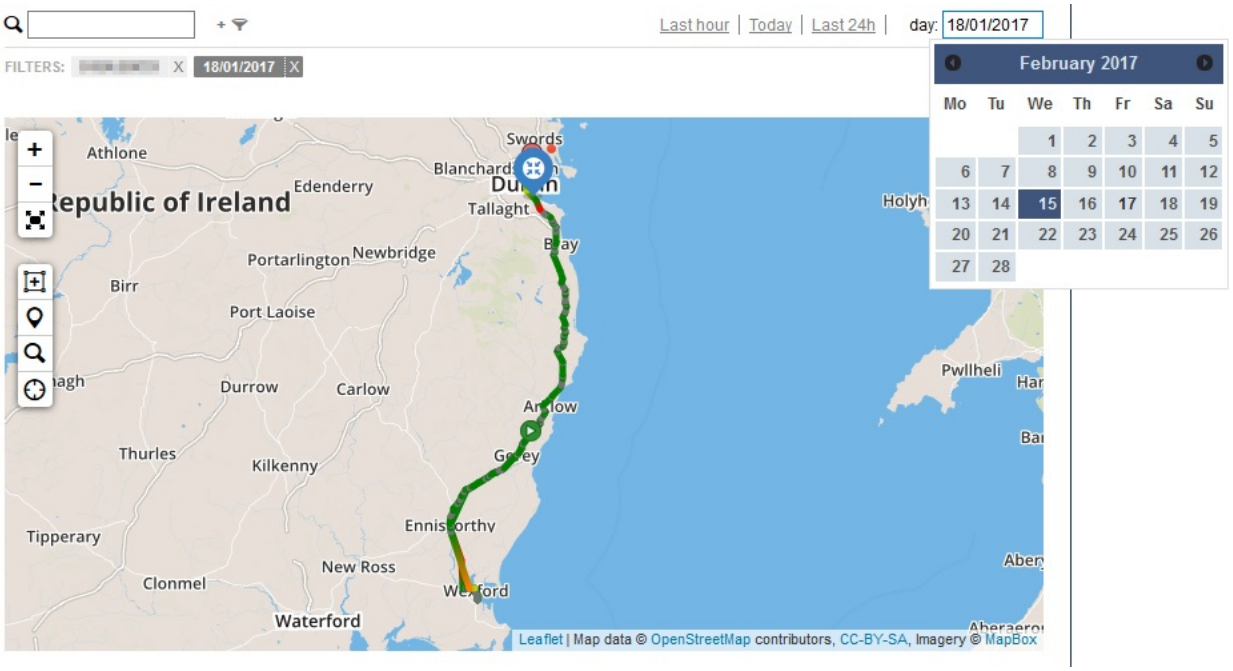
Note

You can zoom in as many times as you like. To return to the first data display, click twice on a graph area.

4.2.3 Filtering the devices to monitor

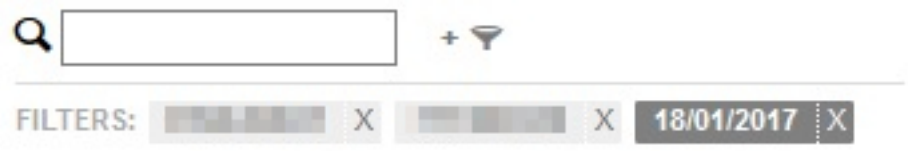
There are two types of filters in Mobility: time or device. Both can be used simultaneously or separately. The following images show the elements that make up these filters.

Fig. 4.8. Time Filters



The menu allows you to view data for a specific day. Once the day is selected, simply press the *filter* button. In addition, shortcuts have been added to display last-hour data (from the start of the current day to the current time or for the last 24 hours from the current time). You do not need to click on the *filter* button for these shortcuts.

Fig. 4.9. Device Filters



By default, if no devices are selected, the first five registered devices are displayed. A device is selected by entering its serial number, or part of it, in the input field. A list of devices that match the name will appear, just click to select it.

Each time a filter is applied, Mobility will try to center the view of the map so that all of them are visible

Note

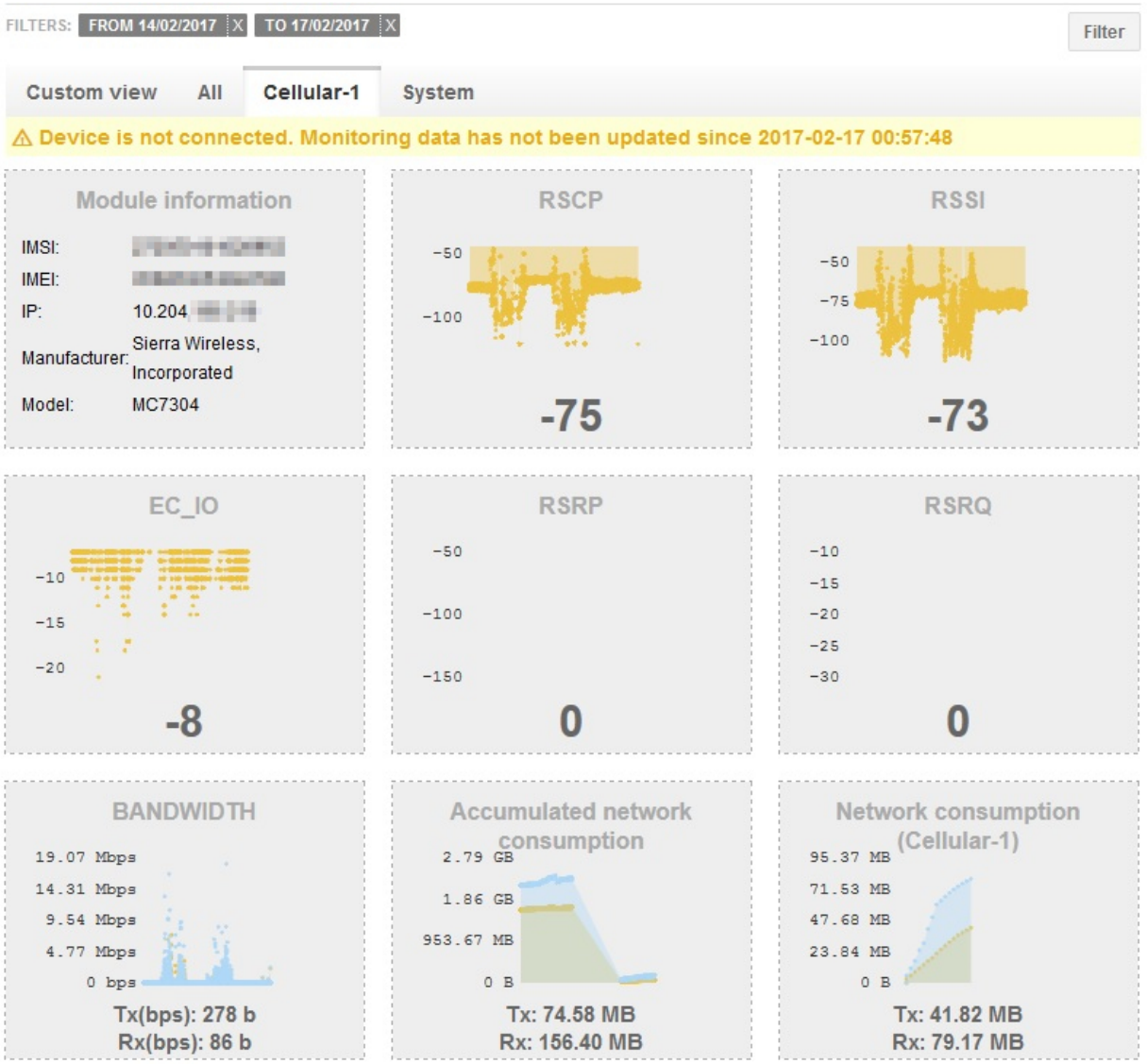
Only five devices can be shown simultaneously.

4.3 Analysis

4.3.1 Cellular interfaces

Mobility adds a new panel in the dashboard for each cellular interface devices have. In this panel, a graph per monitored parameter is presented (as in the map). In addition, three new graphs are displayed showing interface information, total accumulated data consumption and consumption at any given time.

Fig. 4.10. New panels grouping information from cellular mobility interfaces



Several graphs focus on different mobility information, as detailed below

- *Module Information:* It offers information on the cellular module data: IMSI (International Mobile Subscriber Identity), IMEI (International Mobile Equipment Identity), IP address, model and manufacturer of the module.
- *RSCP, RSSI, EC_IO, RSRP, RSRQ:* The values of these parameters are shown over time.
- *Bandwidth:* It represents both the transmitted and received bit ratio over time.
- *Accumulated network consumption:* How much data belonging to all cellular interfaces has been transmitted and received in total over time. The graph shows the levels of consumption from the moment the device was registered in CNM Mobility.
- *Network Consumption:* How much data belonging to one cellular interface (its name must appear between brackets) has been transmitted and received in total over time. This graph only displays the billing period configured for the device, regardless of the range of dates. Thus, if it has been filtered for a time interval that is within the billing period, no data will show up in the graph.

Interacting with graphs is allowed just like in the version with no Mobility plug-in.

Chapter 5 How Teldat, S.A. licensing works

Mobility is a plug-in subject to the licensing restrictions detailed under the *How Teldat, S.A. licensing works* chapter of the *Management Platform Guide*.

5.1 Assigning plug-in licenses

First, access the licenses section in the management portal using the left hand menu option or the *Licenses* home icon.

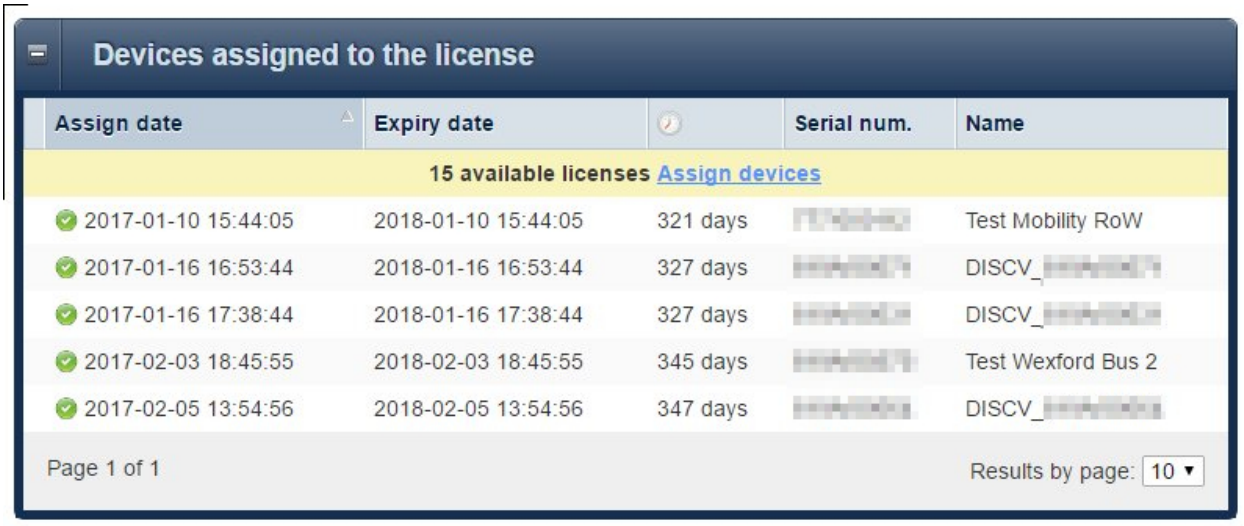
Here there is a table containing the available licenses: select a *Plug-in: Dashboard Mobility* license.

Fig. 5.1. Dashboard Mobility licenses

If you have unassigned licenses available, a message at the top of the table appears with a link that helps you assign said licenses to devices. If you click on the *Assign devices* link, a text box where you can search for devices, groups or tags, is shown. Said search box behaves just like the device filtering search field.

Click on *Assign devices* to confirm your selection. This action cannot be undone.

Fig. 5.2. Dashboard Mobility assigned licenses



Appendix A Troubleshooting

The following sections describe common problems and potential solutions. They may help you search for issues when users cannot track devices from the Hx-Automotive or Hx-Rail families.

A.1 Symptom: Tracks do not appear

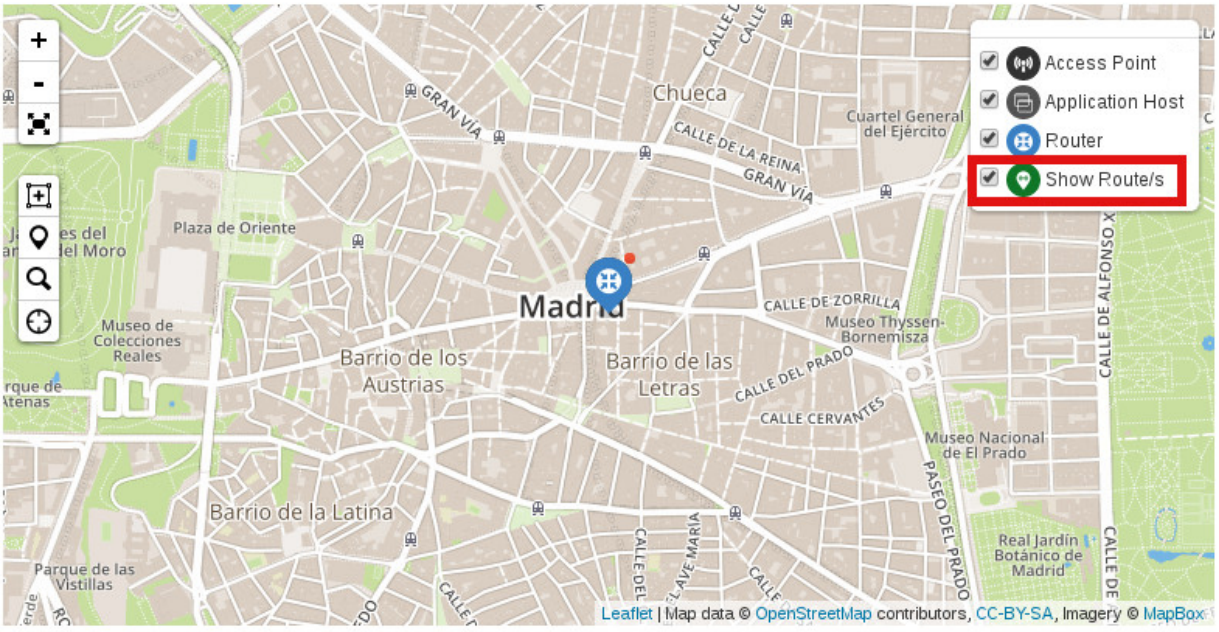
A.1.1 Mobility parameter values are present

Check that the selected devices are routers and have GPS capability. If so, chances are there is no valid GPS data for the chosen time filter. If you are checking the last-hour data, try filtering by *Today* or *Last 24h*.

A.1.2 Mobility parameter values are not present

Check that the selected devices are routers and have GPS capability. If so, chances are there is no valid GPS data for the chosen time filter, or that the track layer is disabled. First, check that the *Show Route/s* option is enabled in the layers menu (located on the map's top right corner). If you are checking the last-hour data, try filtering by *Today* or *Last 24h*.

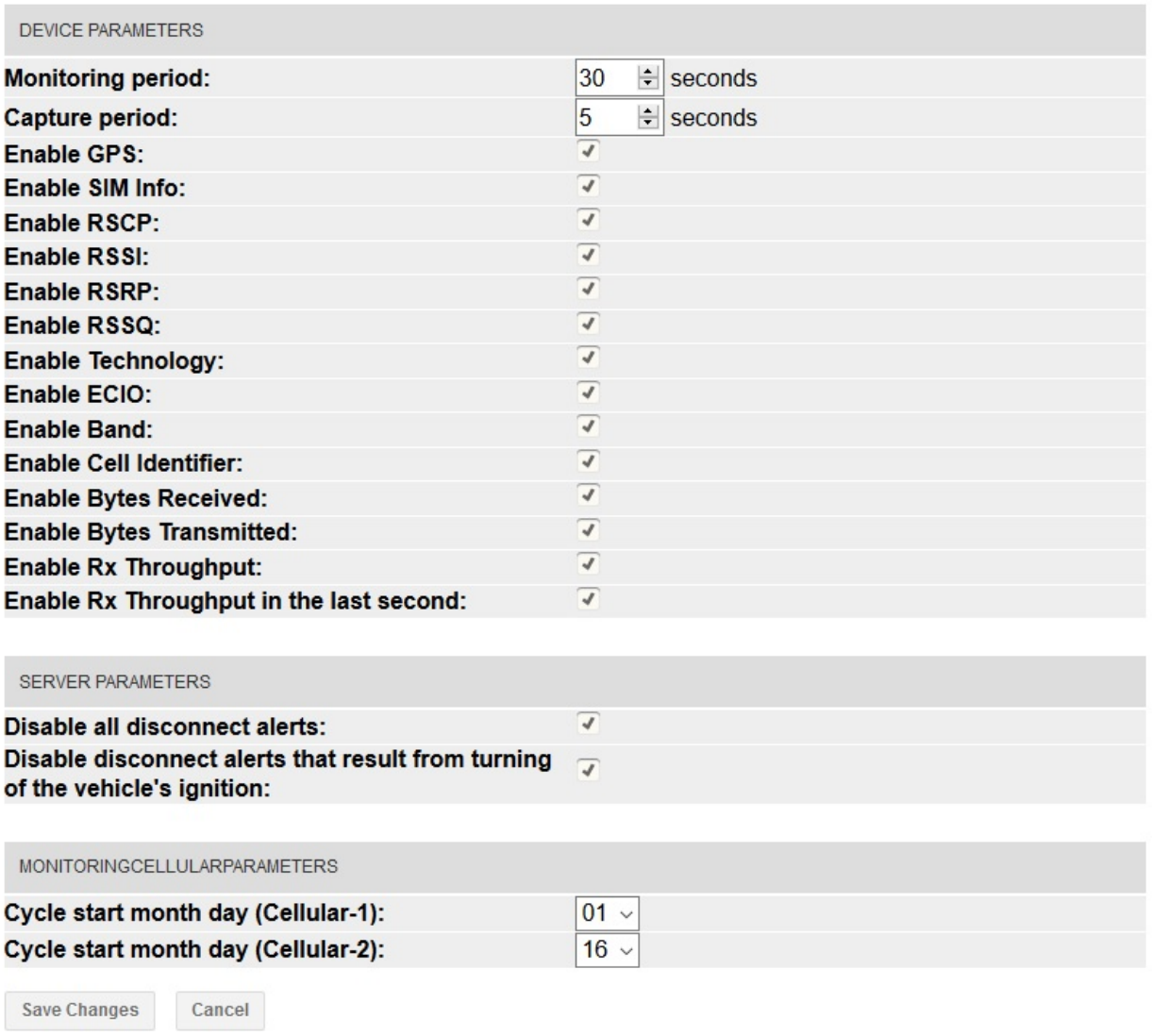
Fig. A.1. Check if track layer is activated



A.2 Symptom: Tracks accuracy is not enough

It is likely that the capture period does not have an adequate value for the precision you want. Go to the monitoring panel (under device configuration) and lower the value of the capture period (in seconds).

Fig. A.2. Configuration of capturing period



Note

A value of 5 seconds is usually accurate enough.

A.3 Symptom: Cellular information does not appear

Enabling some monitor parameters makes sense when the device is connected to a certain technology. If the device appears as off for a given time filter, try a different one. If you know that the device is off, turn it on in case the data you want to see has been stored in the device buffer. If this is the case, the data will appear in the graphs after a while.

A.4 Symptom: The graph of the bandwidth present a saw-tooth like form

If you are applying one of the following time filters: *Last 24 hours*, *Last week* or *Last month*, peaks can appear. They indicate a large consumption and may have to do with the grouping of values by time (normally 5 minutes), in order to make the graph readable. You can try to zoom in an area that interests you, or try to decrease the time filter to *Last hour* or *Today* .