OpenLR tools - Map viewer

v. 1.4.2

User Guide

TomTom International B.V. **2013-09-17**

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1 Introduction

1.1 OpenLR MapViewer

The MapViewer application draws an OpenLR map and provides basic map view functionalities. Additionally the user can select locations in the map and encode them. The location reference can be analyzed and stored. Location references can also be decoded and shown in the map.

1.2 Starting the application

The MapViewer application requires Java Version 6 (or above), a map database accessible with the OpenLR map interface and a corresponding map loader implementation (must be found in the class path).

You can use the following command line to start the MapViewer:

java -Xmx512m -cp [class path resources] openlr.mapviewer.MapViewer

The " *java*" command starts the java virtual machine and launches the application. The " *-Xmx512m*" option specifies the maximum size of the memory allocation pool. The computer running the application should be equipped with at least 1GB memory. The class path resources must include the map viewer code with all its dependencies, typically this is file *mapViewer-[version]-with-dependencies.jar* from the OpenLR website. Furthermore at least one OpenLR map loader implementation must be contained. Such is also available on the website. The last command line parameter *openlr.mapviewer.MapViewer* specifies the main class of the application.

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2 User interface

2.1 Main window

After starting the application and loading a map the main window of the OpenLR MapViewer will be shown. Figure 2.1 shows this main window after startup. The map being loaded and shown in the main area of the window in this example is the map of Utrecht (version 2007.07, provided by TomTom).

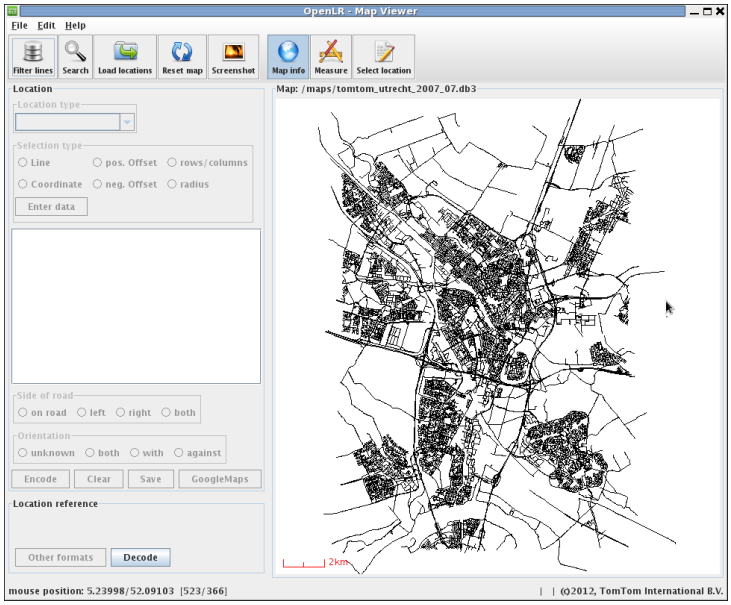

Figure 2.1: The main window

The main window divides into four rows. The menu bar at the very top, the toolbar below, the main area in the middle and the status bar at the bottom.

2.1.1 Menu bar

The menu bar provides drop down menus regarding general functionality and settings.

The user is able to exit the application from menu "File".

In section "Edit" it is possible to customize several settings. Option "Preferences" defines the general application settings. The user is able to specify colors and stroke sizes regarding the map graphics. Some of the color settings relate to the functionality to filter network links, please see section *Filtering* for details. Changing a color is possible by clicking the colored box in front of the label. A dialog for choosing a desired color will open.

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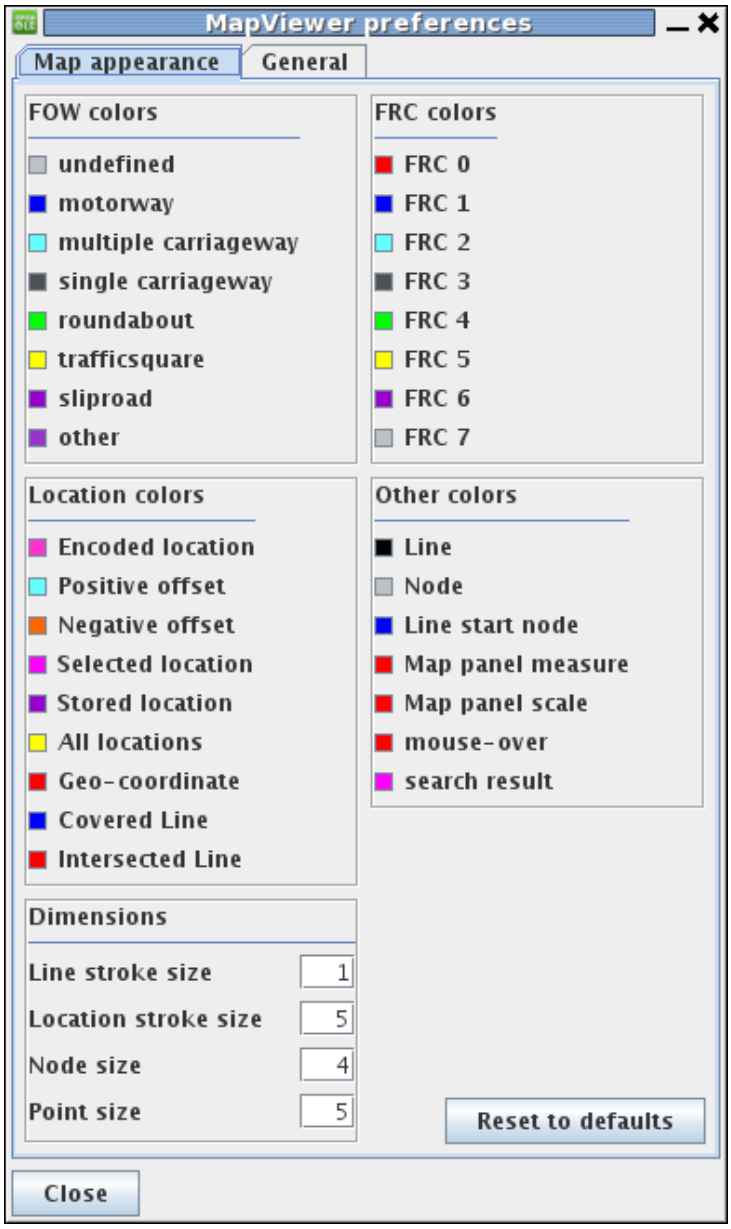

Figure 2.2: The preferences dialog

Tab "General" provides to specify some general properties.

It is possible there to define a dedicated path to a web browser executable. This property is used for the feature that visualizes the currently active location in Google Maps. The property is optional. Clearing the value removes this setting.

Furthermore the section provides settings that activate the feature of displaying the log after OpenLR encoder or decoder runs.

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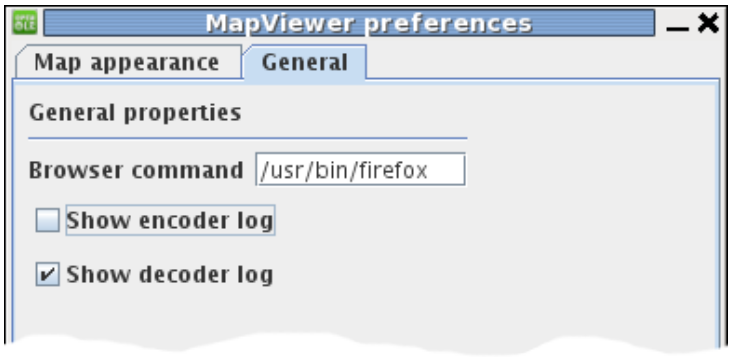

Figure 2.3: General properties

2.1.2 Toolbar

The toolbar holds action buttons for all important actions and modes. Table 1 summarizes the available buttons and gives a short explanation.

The toolbar splits into two blocks. The first one, containing the buttons "Filter lines", "Search", "Load locations", "Reset map" and "Screenshot" provides general functionality that is available in every state of the application. The second block holding "Map info", "Measure" and "Select location" provides map-related mouse features that are mutually exclusive.

Icon	Action	Icon	Action
	Filtering the road network		Searching for coordinates, nodes and lines
	Load locations from file		Reset the map view
	Make screenshot of map		Show map information (standard mode)
	Measuring distances in the map		Selecting a location

Table 1: Explanation of the toolbar buttons

Feature "Screenshot" creates an image of the current state of the map graphics and allows to save it to a file.

Button "Reset map" resets the map graphics to its default display area.

"Map info" activates the output of information about map elements when hovering with the mouse pointer over it. It can be used to disable the other map related modes "Measure" and "Select location".

The remaining buttons comprise a more complex functionality. Please see the specific sections for details.

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2.1.3 Status bar

The status bar at the bottom of the main window presents additional information to the user. On the right it displays the copyright information. The space in the left displays information provided by the current functionality like measuring. When moving the mouse over the map graphics it shows the geo-coordinate that corresponds to the position of the mouse pointer. The coordinates are presented in the format [longitude/latitude].

2.1.4 Main area

The main area of the MapViewer graphical user interface resides between the toolbar and the status bar. The map panel is located on the right side and shows the current viewport of the map. At the bottom of the map panel the scale shows the actual zoom level and scale (red bar).

On the left side several information panels are located. The location panel is at the top and shows all the attributes of the currently active location. This part also provides all available input options when a location is selected by the user. In the lower part of the location panel the "Encode" button, allowing to encode the selected location, and the clear button to delete the current location can be found.

The location reference panel is placed at the bottom of the main area and shows the encoded location reference as a Base64-encoded string. The location reference data can also be viewed in other formats by pressing the "Other formats" button. The decoding process will be started by pressing the "Decode" button. This will open another dialog where the location reference to be decoded can be chosen.

2.1.5 Line information

While moving the mouse pointer over a line in the map panel an information panel with all relevant information about that line will be shown. Figure 2.4 shows an example where the mouse is close to a line. The related line is highlighted in red in the map panel and the corresponding line information is shown in the info panel. The blue point indicates the start point of the highlighted line. Moving the mouse pointer to the other side of the line will highlight the line with the counter direction (if available). The information panel will be removed automatically after some seconds.

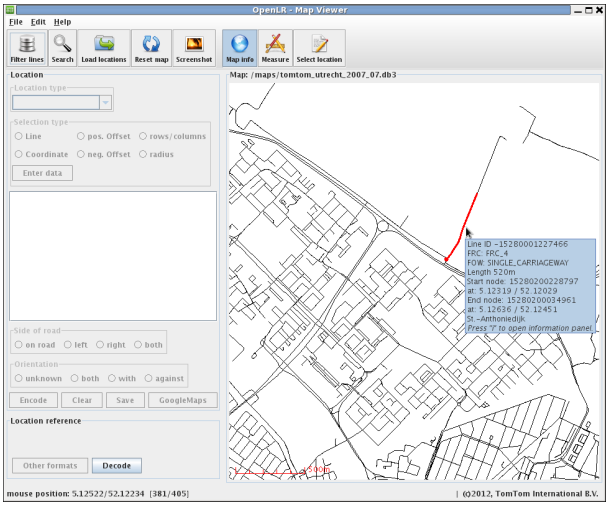

Figure 2.4: Line information at mouse pointer

While the line information panel is shown the user may press the "i" key. This will open a persistent dialog with the line information (see figure 2.5). This enables the user to access the information for a longer period of time and allows to mark and copy it.

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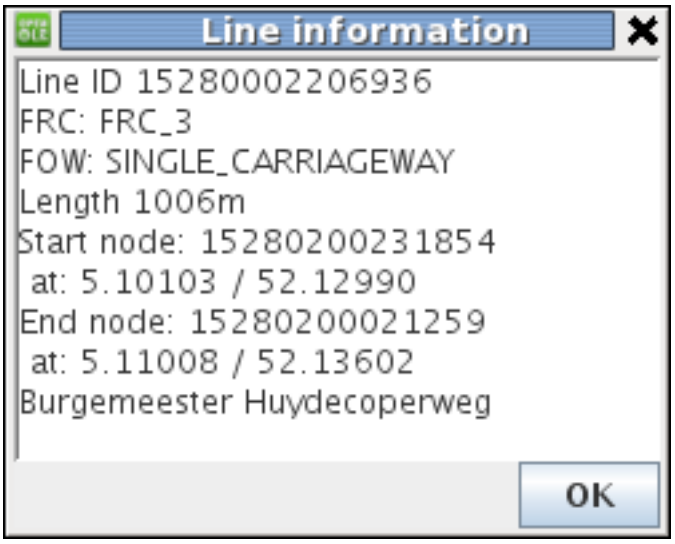

Figure 2.5: Line information in a persistent dialog

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3 Map load

3.1 Map load

After starting the OpenLR MapViewer application the map loader selection dialog will be shown (see figure 3.1). All map loaders which were registered as a service For details on linking the map loaders please see section *Starting the application*

After selecting the required map loader the parameter panel will be updated. The parameter panel shows all parameters defined by the map loader implementation. Required parameters are marked with an asterisk (*), all other parameters are optional.

If the parameter is of type "file" or "directory" a button will be shown which opens a file/directory open dialog where the user may browse the file system. If the parameter is of type "string" just an input field is provided.

Besides the parameters defined by the loader implementation it is possible to specify a name for the map to load in field "Map name". This is a mere display option. The given value will be used to label the map graphics with a meaningful name.

It is possible to load two maps at once. In order to do that the user has to activate option "Load two maps". In this case two map loader configuration forms will be displayed. Both maps will be presented in a split map section of the applications main display area.

After all required parameters are set pressing the "OK" button will start the map load process. Pressing the "Cancel" button will end the application immediately.

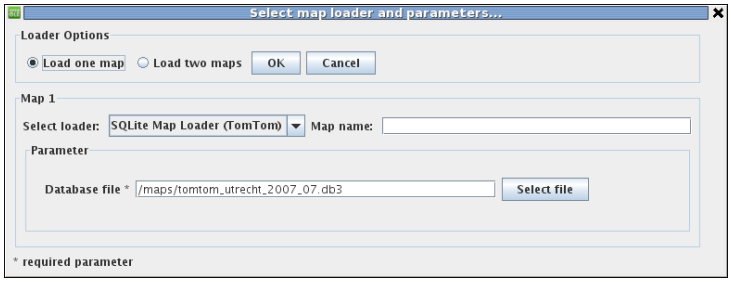

Figure 3.1: Map loader selection dialog

If the map load process has started the map load progress dialog will be opened. This dialog informs about the current map load action and the progress of the current task as well as the progress of the overall map load (see figures 2 - 4). The dialog can be closed by pressing the "x" button and the MapViewer application will be aborted.

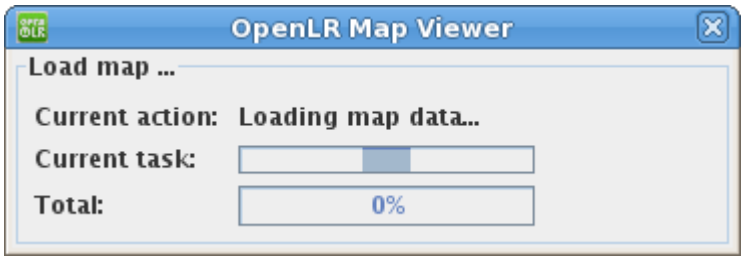

Figure 3.2: Map load progress - loading map data

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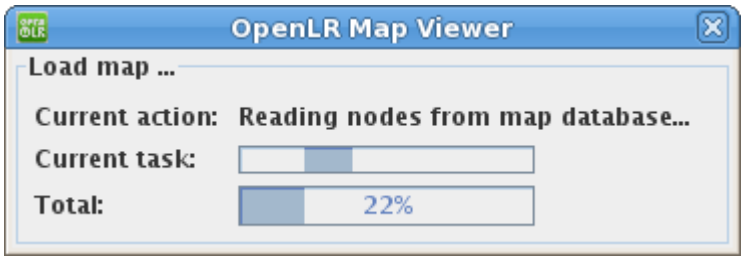

Figure 3.3: Map load progress - loading nodes

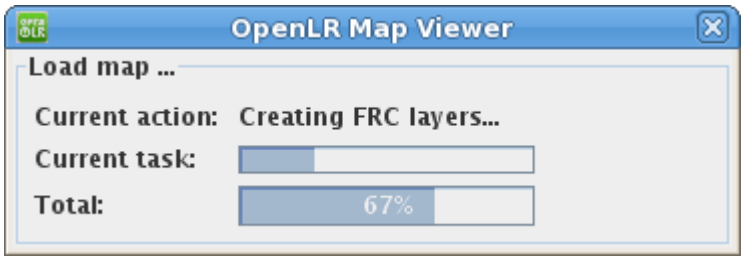

Figure 3.4: Map load progress - creating map layers

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4 Navigating the map

4.1 Navigating the map

Basic map view manipulations are zooming in and out, moving the map and resetting the map view.

4.1.1 Zoom in

Zooming into the map is possible by double-click with the left mouse button. The position of the mouse pointer defines the point that shall be centered in the resulting display area.

4.1.2 Zoom out

Zooming out can be achieved via double-click with the right mouse button. The position of the mouse pointer defines the point that shall be centered in the resulting display area.

4.1.3 Move

The map can be moved by selecting "dragging" the map graphics with the mouse. Holding the left mouse button while moving the mouse will shift the map graphics simultaneously . After releasing the mouse button the map view will be refreshed and show the new map area.

4.1.4 Reset

The reset button of the toolbar will reset the map view to its default display area. The complete map will be shown again.

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5 Filtering and highlighting

5.1 Filtering and highlighting

The roads in the network can be filtered according to their functional road class (FRC) and their form of way (FOW) values. Additionally all nodes can be drawn on top of the road network.

The filter functionality is active as long as the related toggle button in the toolbar is activated. Toggling it again or closing the filter dialog removes the filter from the map graphics.

After a click on the "Filtering" button a new dialog will open and present the filter options (see figure 5.1).

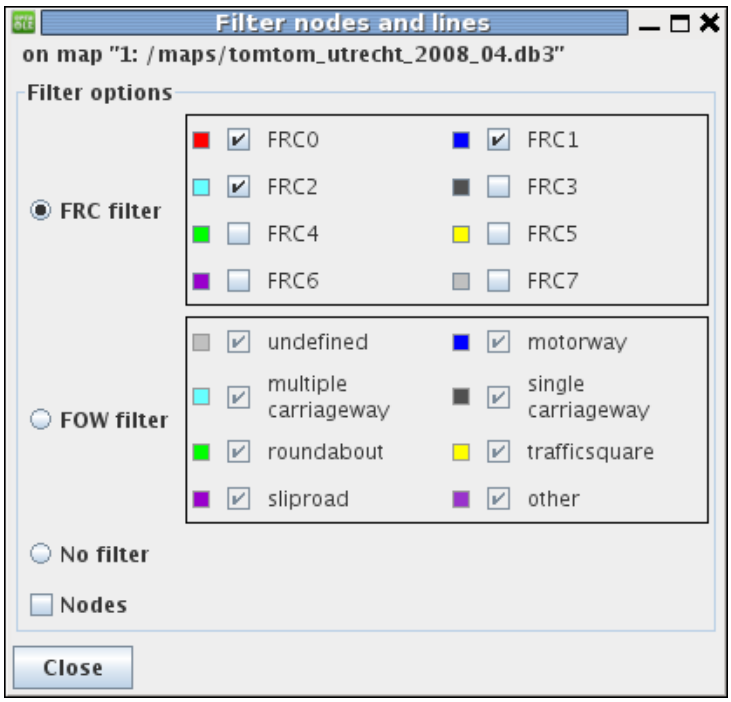

Figure 5.1: Filter options

Figure 5.1 shows the filter options dialog if no filtering is enabled. The map panel shows all lines in black and no nodes are drawn.

5.1.1 Displaying nodes

The filter options allows to draw the network nodes if the corresponding checkbox is selected. Figure 5.2 shows this option enabled. Figure 5.3 shows the map drawn with lines and nodes. The nodes are colored in blue by default. The color can be changed in the preferences. See section *User interface* for details.

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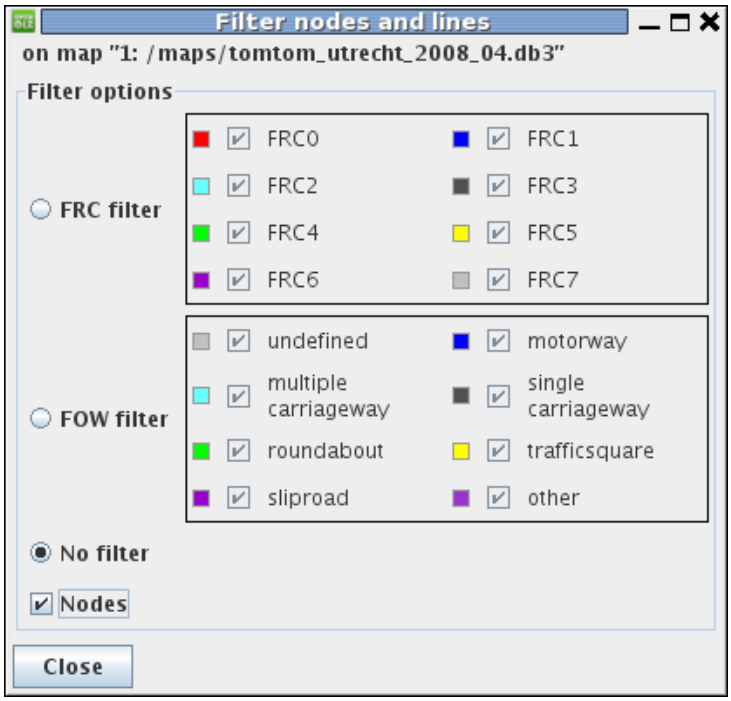

Figure 5.2: Nodes enabled

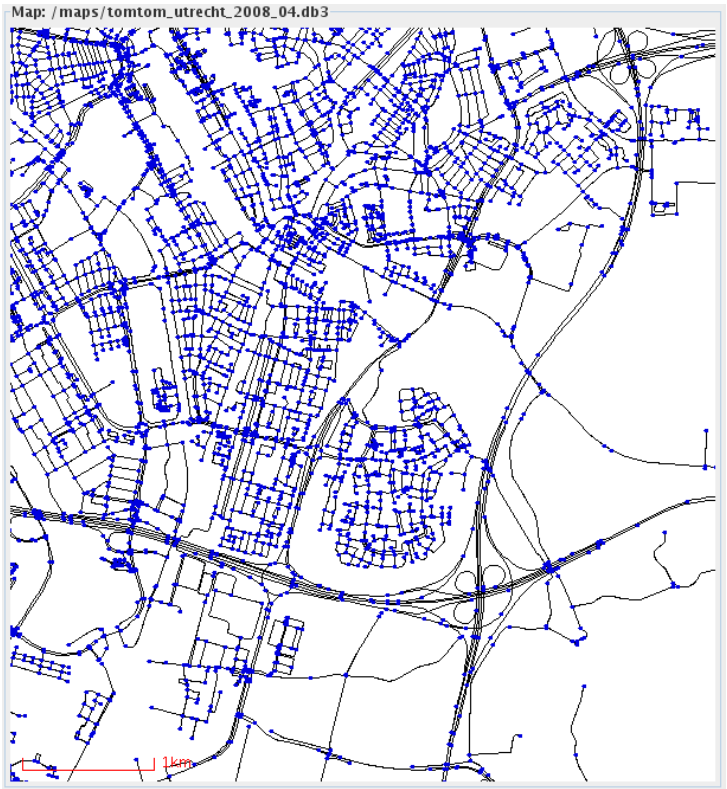

Figure 5.3: Map with nodes drawn on top of the road network

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5.1.2 FOW filtering

The network links can be filtered according to their form of way (FOW) property. If this filter option is enabled (see figure 5.4) the links will be drawn in different colors according to their FOW value (see figure 5.5). The map panel draws all links of the selected types. Pressing the colored button in front of the label of an FOW type enables the user to change the color of the related links.

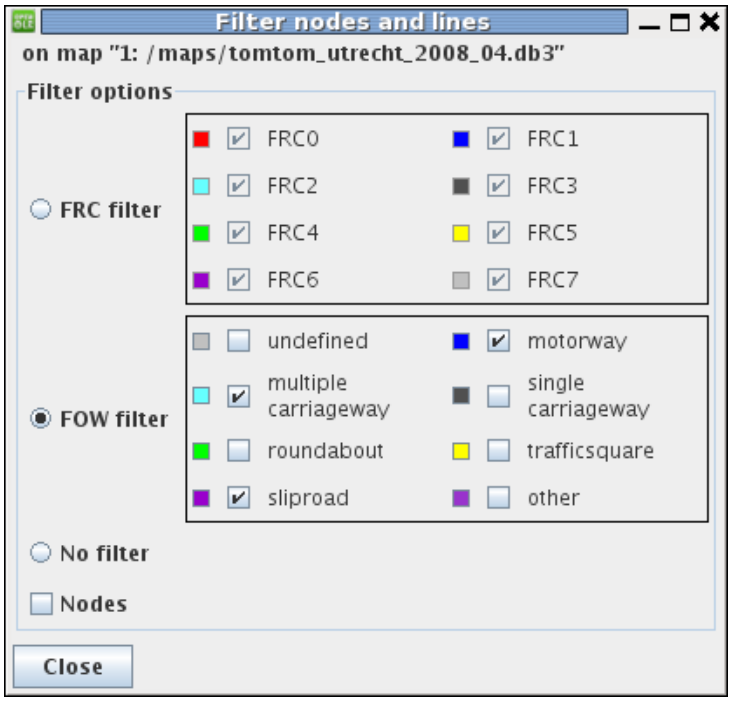

Figure 5.4: Filtering according to the FOW values

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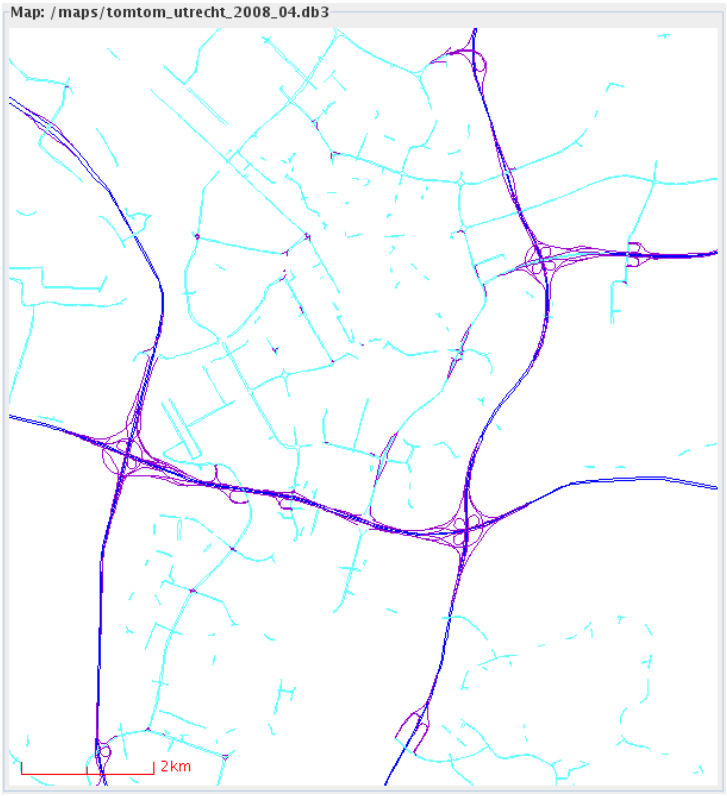

Figure 5.5: Filtered and colored FOW types

5.1.3 FRC filtering

The networks links can be filtered according to their functional road class (FRC) property. If this filter option is enabled the links will be drawn in different colors according to their FRC value. Figure 5.7 shows the exemplary map of Utrecht drawn with the selection as shown in Figure 5.6. Pressing the colored button in front of the label of an FRC type enables the user to change the color of the related links.

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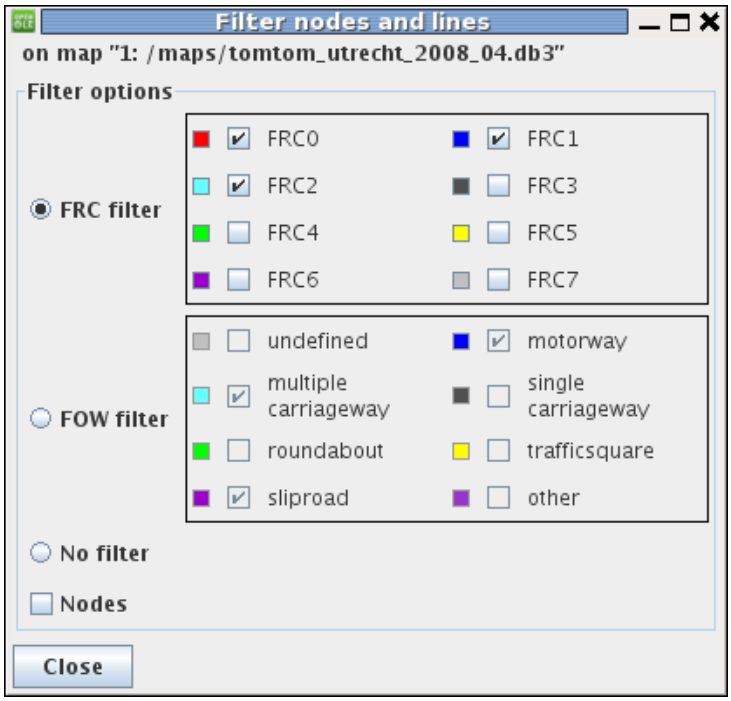

Figure 5.6: Filtering according to the FRC values

Figure 5.7: Filtered and colored FRC types FRC0, FRC1 and FRC2 only

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6 Searching

6.1 Searching

It is possible to search the map for coordinates, nodes, lines and road names. When clicking on the search button a new window will open allowing to select the search type and enter the coordinates, IDs or road names to search for (see figures 1, 3 and 5).

The search result is highlighted as long as the search button in the toolbar is activated. Toggling it again or closing the search dialog removes the highlight from the map graphics. The properties of the appearance of the search results can be adjusted in the map viewer preferences. Please see section *User interface* for details.

6.1.1 Coordinate search

The coordinate search takes a WGS84 coordinate (latitude and longitude) as input (see figure 6.1). If the coordinate is valid the point in the map will be highlighted in red and the map view will be zoomed to this point (see figure 6.2).

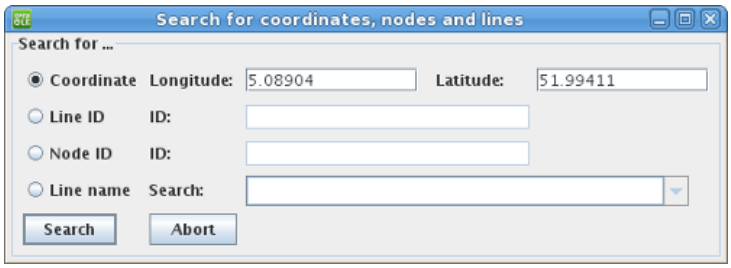

Figure 6.1: Search for a coordinate

Figure 6.1 shows the search for a coordinate at longitude of 5.08904 and latitude 51.99411. This coordinate is covered by the example map of Utrecht.

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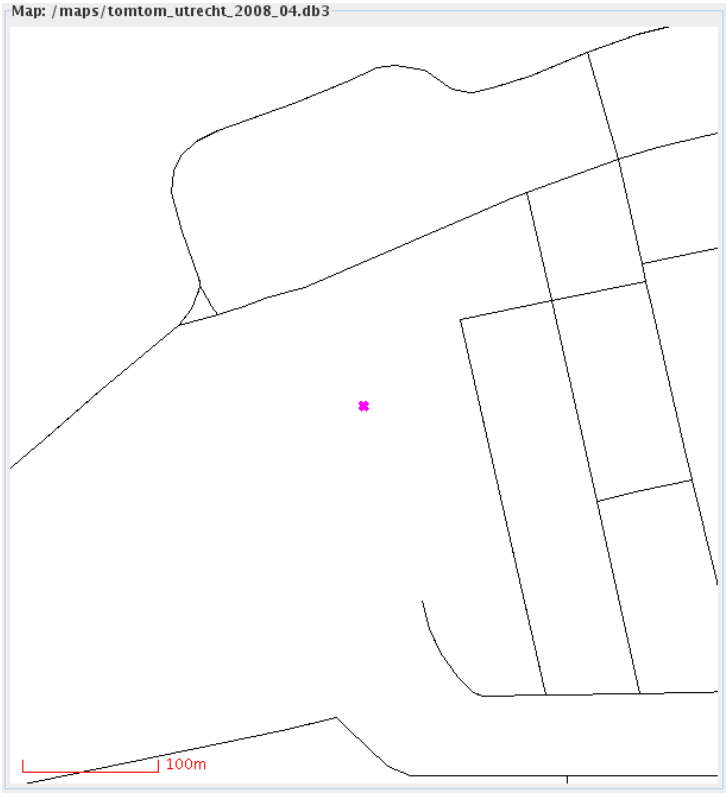

Figure 6.2: Coordinate search result

Figure 6.2 shows the coordinate at longitude = 5.08904 and latitude = 51.99411 (red point).

6.1.2 Node search

The search for a node takes the node ID as input (see figure 6.3). If the node with that ID is found in the map it will be highlighted. The map view will be zoomed to the node (see figure 6.4).

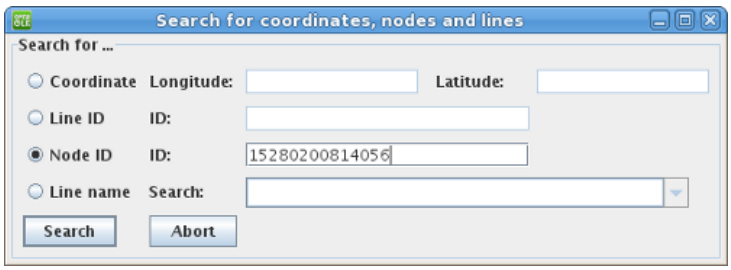

Figure 6.3: Search for a node

Figure 6.3 shows the search for a node with ID 15280200814056. This node is part of the example map.

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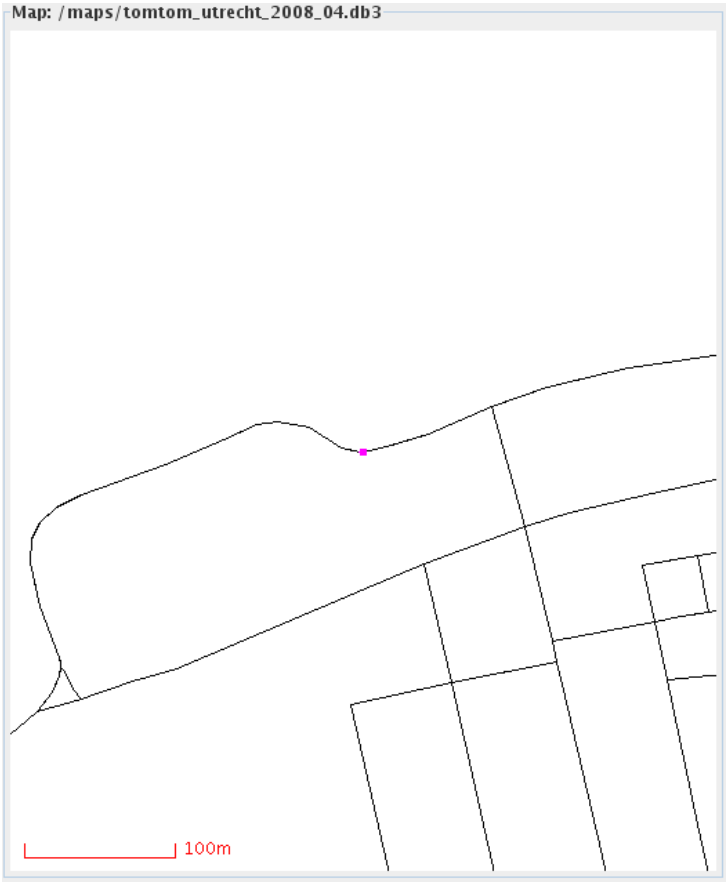

Figure 6.4: Node search result

Figure 6.4 shows the node with ID 15280200814056 (red point).

6.1.3 Line search

The search for a line takes a line ID as input (see figure 6.5) If the line with that ID is found in the map the line will be highlighted. The dot indicates the start node of the line. The map view will be zoomed to position of the line (see figure 6.6).

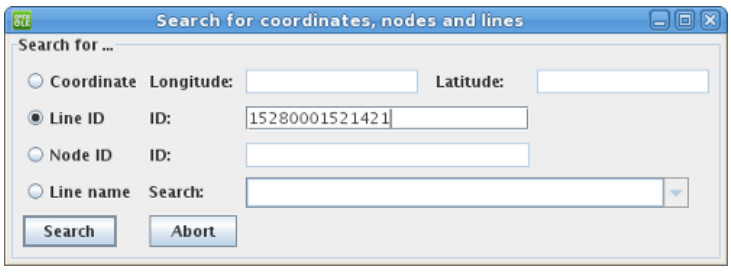

Figure 6.5: Search for a line

Figure 6.5 shows the search for a line with ID 15280001521421. This line is part of the example map.

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Figure 6.6: Line search result

Figure 6.6 shows the line 15280001521421 highlighted.

6.1.4 Road name search

The search for road names starts with entering (parts of) the road name into the text field. (see figure 6.7). A list of possible road names which match the current text is shown (see figure 6.8) and the desired road name can be chosen (see figure 6.9). The search will include results that match the given text fragment at any position, even inside words.

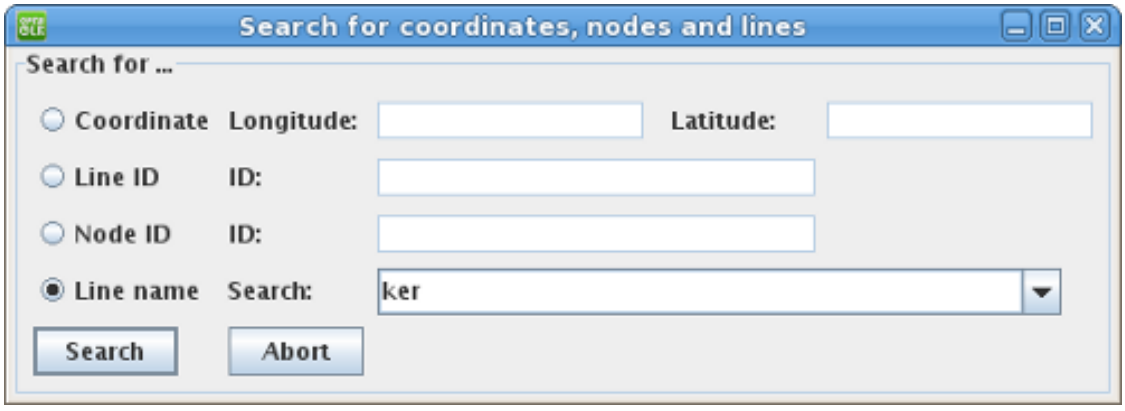

Figure 6.7: Search for a road name

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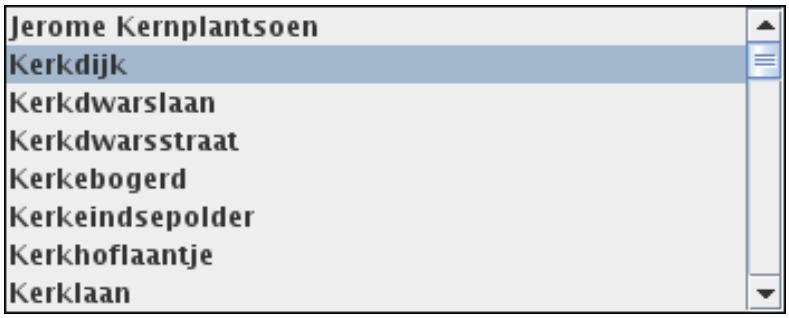

Figure 6.8: List of road name matches

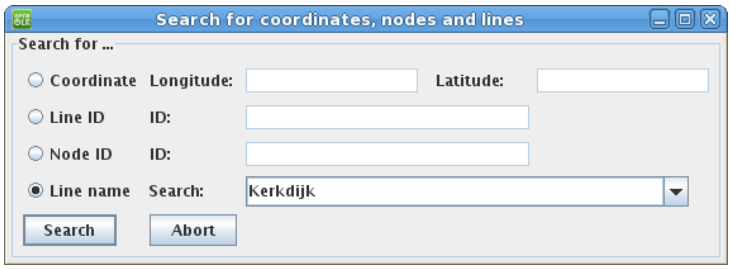

Figure 6.9: Select road name

Figure 6.10 shows the result of the search for the road name "Kerkdijk". This line is part of the test map.

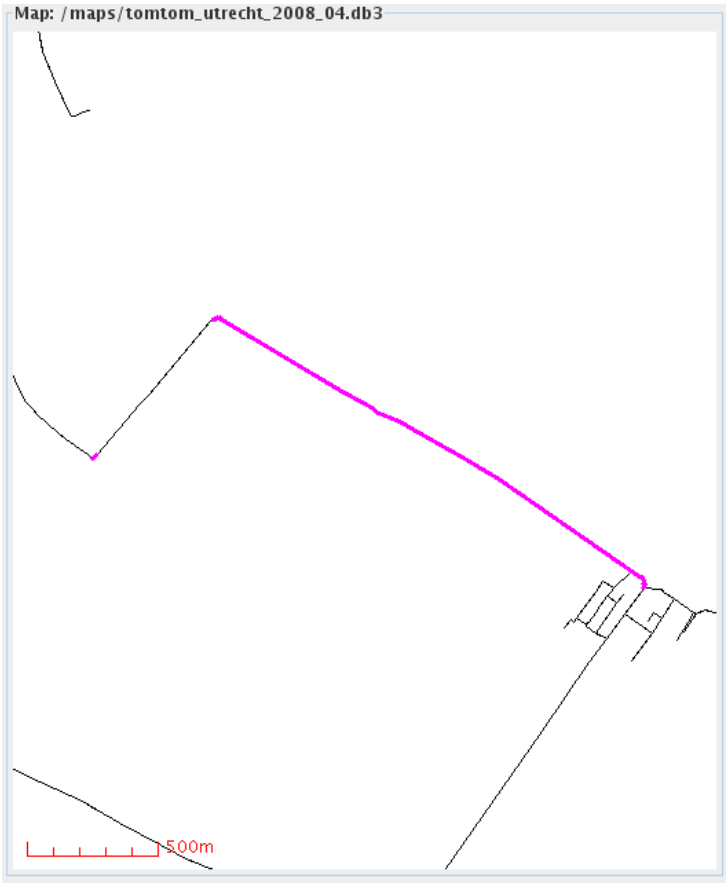

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Figure 6.10: Road name search result

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7 Measuring

7.1 Measuring distances and bearings

Pressing the "Measure" button activates the measuring mode. This mode enables you to measure distances between two points somewhere in the map. Furthermore it is possible to measure the angle to the true north, the "bearing" as it is defined in OpenLR.

In measure mode the mouse cursor will change to a cross symbol. First the user has to select the start point for the measurement by clicking within the map area. The start point will be marked with a red dot and while moving the mouse pointer a red line indicates the direction and distance to the counter point of the measurement. Repeated clicking will update the start point.

The status bar shows the coordinates of the start point, the current position of the mouse cursor (the end point) and the calculated distance between these two positions as well as the bearing value.

Leaving the measurement mode can be done by clicking "Map info" from the toolbar.

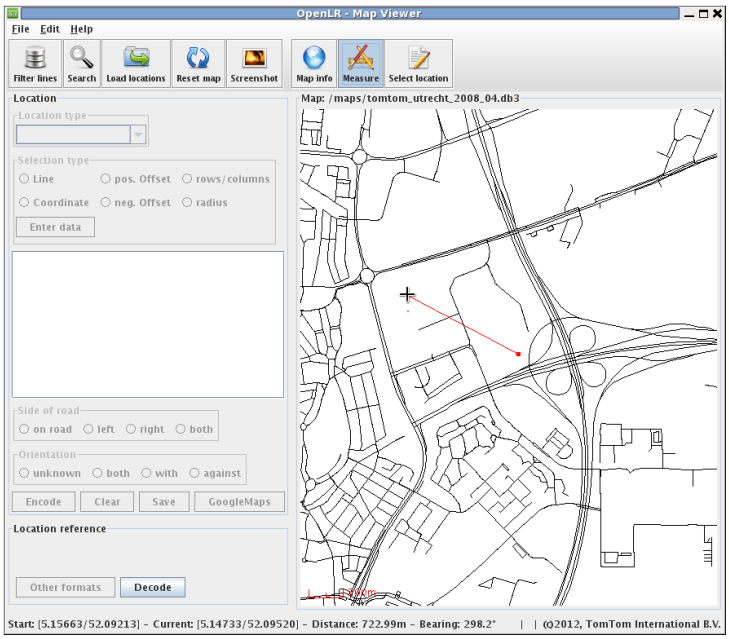

Figure 7.1: Measuring distances

Figure 7.1 shows the distance measurement between the start coordinate (longitude 5.15663, latitude 52.09213) and the end coordinate (longitude 5.14733, latitude 52.09520). The start is marked with a red point. The distance between start and end is 722.99 meters, the bearing 298.2°.

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8 Load locations

8.1 Load locations

Locations can be stored in a file to retain them or exchange them with others. This storage format is map-dependent as it uses the line ID to identify a certain line within a map. Such location files can be loaded and each location within that file can be viewed and encoded.

The generation of location files can also be done with the OpenLR MapViewer. Just select a location and press the "Save" button. A file selection dialog pops up asking for the file name for storing the location. If the file already exists it will ask whether that file should be overwritten or the location shall be appended. Section "Encoding and Decoding" gives detailed information on how to select locations on the map.

After pressing the "Load locations" button in the toolbar the dialog shown in figure 8.1 will appear. The path to the location file needs to be filled in (typed in or selected from a dialog). Pressing the "Load locations" button will read in all locations stored in that location file.

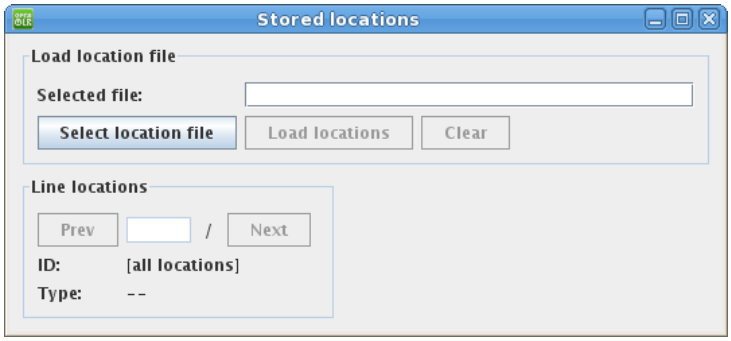

Figure 8.1: Load locations dialog

8.1.1 Overview of all locations

After loading all locations from the file the dialog shows the number of successfully loaded locations. The buttons "Next" and "Prev" are enabled to step through all locations (see figure 8.2). Location number 0 has a special meaning. It indicates that no specific location is selected. In this state all locations will be shown in the map graphics (see figure 8.1, yellow lines). If the loaded locations shall be removed, then the "Clear" button needs to be pressed.

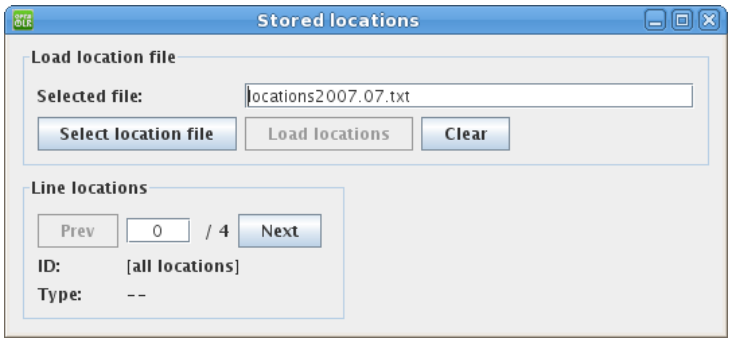

Figure 8.2: After loading locations file

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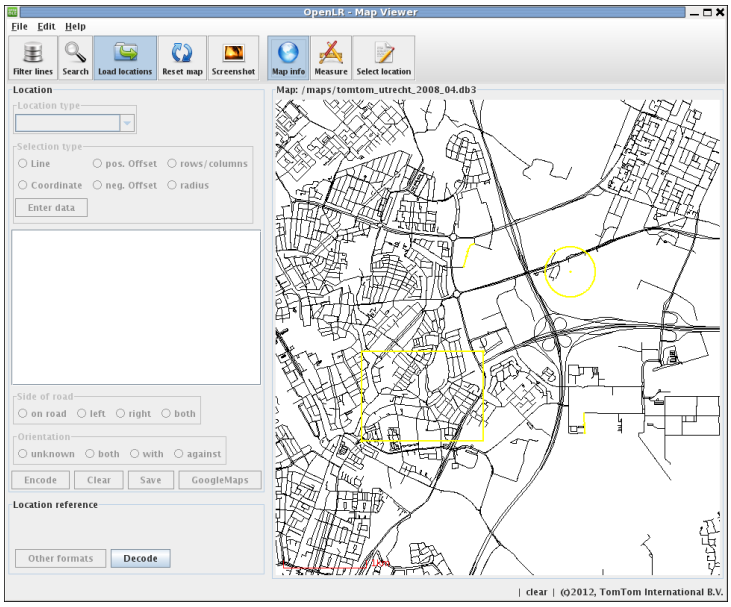

Figure 8.3: View all locations

8.1.2 Stepping through the locations

By pressing "Prev" and "Next" it is possible to step through the list of loaded locations. Starting from the beginning of the file the next button will load the next successfully loaded location.

Pressing the "Next" button once will load the first location. Figure 8.4 shows that this is a line location and figure 8.5 shows the current location in the map panel.

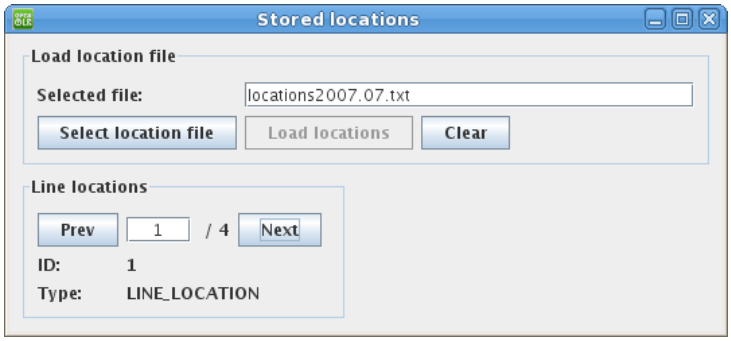

Figure 8.4: Select first location

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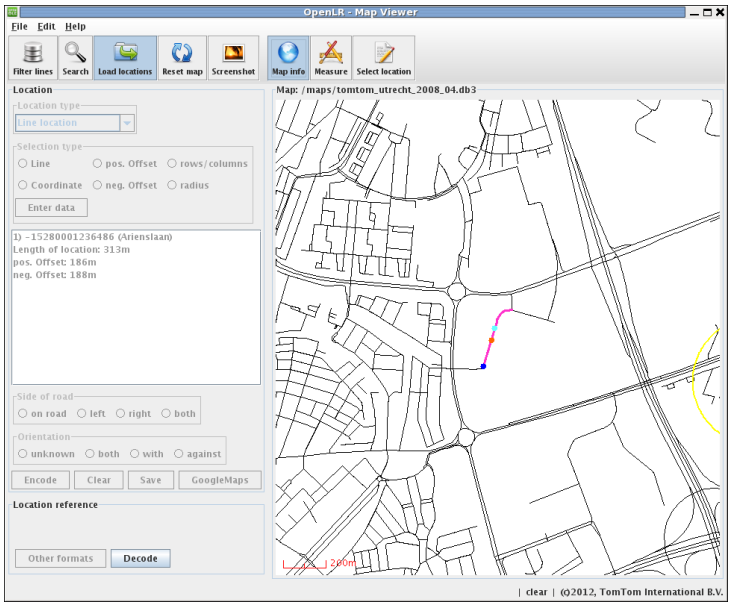

Figure 8.5: View first location in map

Clicking the button "Next" repeatedly will focus the remaining locations one by one.

8.1.3 Location file format

The location file is map-dependent and the locations can only be loaded in combination with the original map. The format is text-based. Each line stands for one location. Comments start with a "#" symbol. All characters after that will be ignored. All location types can be mixed and empty rows will be ignored. The following paragraph shows an example file containing 4 locations.

```
#TomTom map, Utrecht, 2007.07
LIN;id1;186,188,-15280001236486
PAL;id2;15280002130892,102,0,0
REC;id3;5.12733,52.08037,5.14866,52.08999
CIR;id4;5.16389,52.09853,300
```

For details on the format of the location codes please visit the website of the OpenLR command line toolkit: http://www.openlr.org/otk.html!

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9 Encoding and Decoding

9.1 Encoding & Decoding

The main applications of the OpenLR MapViewer are encoding of locations which are selected in the map and decoding of location references and displaying them in the map.

9.1.1 Selecting a location

The following example shows how a line location can be encoded. The user can define a line location by clicking on the lines in the map panel. A location will be colored magenta. A blue dot indicates the start point of the location. The selected lines will be listed in the location information panel on the left whereby the start line comes first.

Pressing the button "Select location" activates the select mode and the user needs to choose a location type (see figure 9.1). In this example this should be entry "Line location" from the drop-down list.

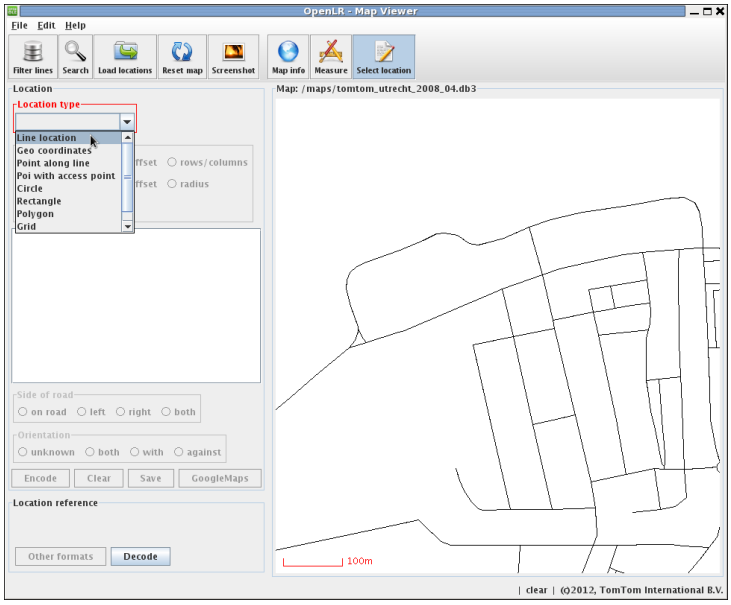

Figure 9.1: Select location type

For line locations the default selection mode is the selection of lines. When clicking within the map panel the highlighted line will be added to the location. Figure 9.2 shows the situation where already 4 lines were selected. The next line is highlighted, line information are shown in the line information panel and clicking with the mouse will add this line to the location. If the line is connected to the already existing part of the location it will be added (see figure 9.3). If the line is not connected to any end of the existing part of the location it will not be added (see figure 9.4). Lines can be removed from the location from start or end if they are clicked again in the map (see figure 9.5). If the location shall be cleared completely the button "clear" can be used.

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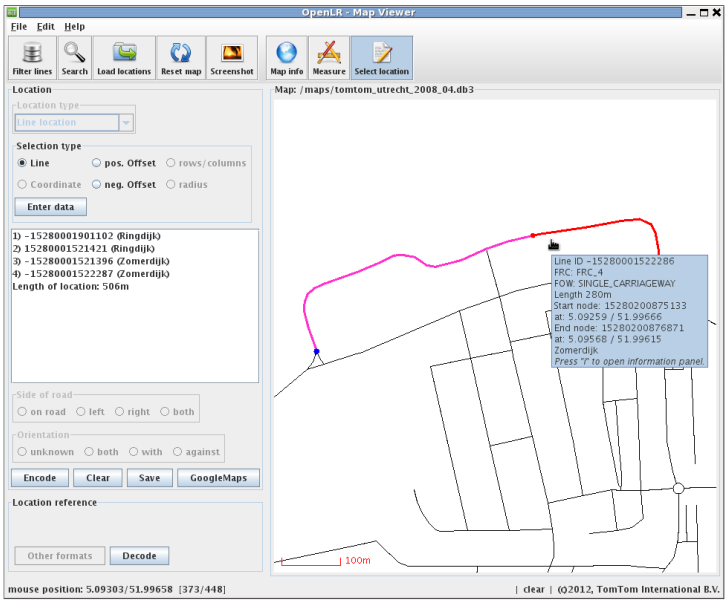

Figure 9.2: Line location with currently 4 lines and the next line is highlighted

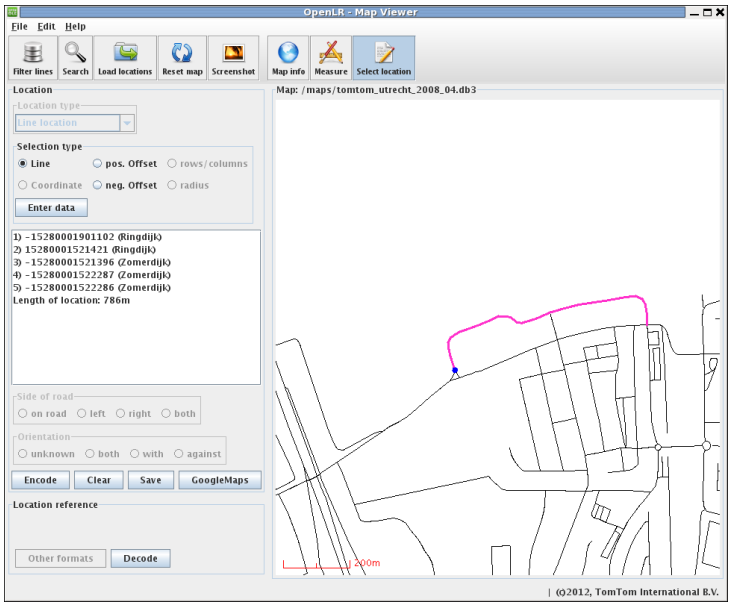

Figure 9.3: Line location with 5 lines (last line is added)

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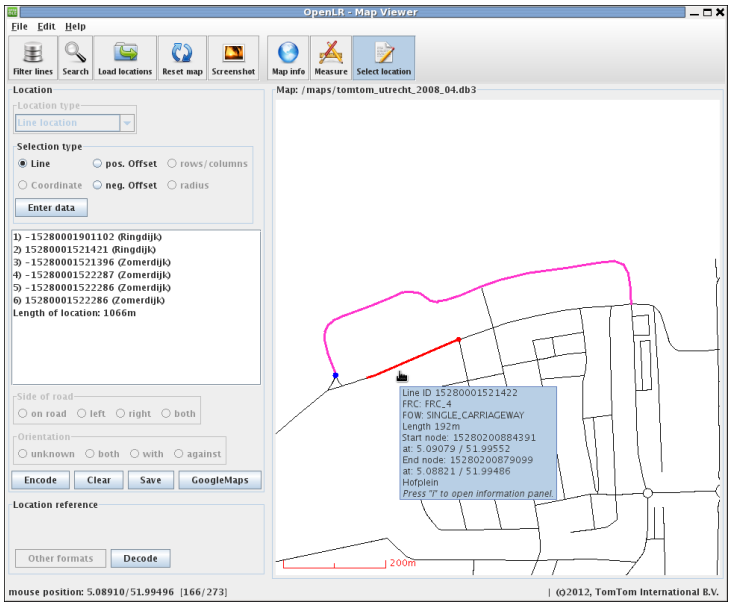

Figure 9.4: Line location but next selected line is not connected

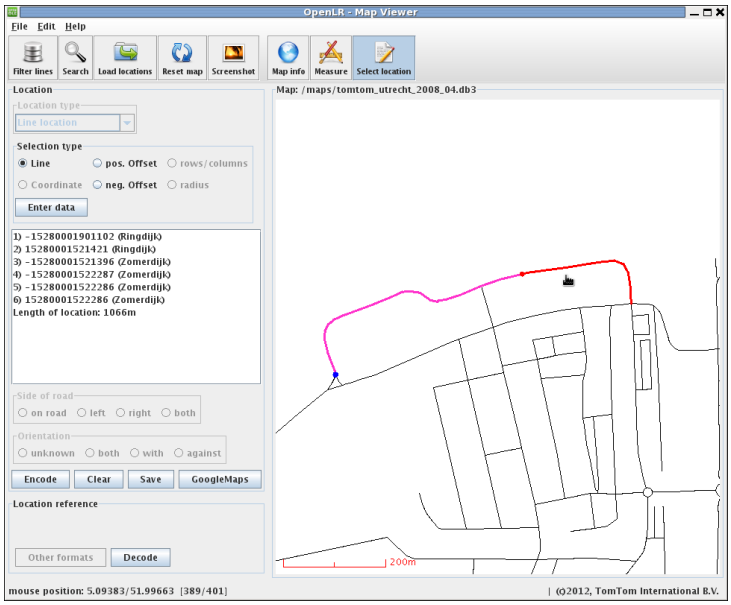

Figure 9.5: Line location remove last line again

Changing the selection type to "pos. Offset" allows the user to select a positive offset value by clicking in the map. The selected positive offset will be shown as a green dot along the location (see figure 9.6)

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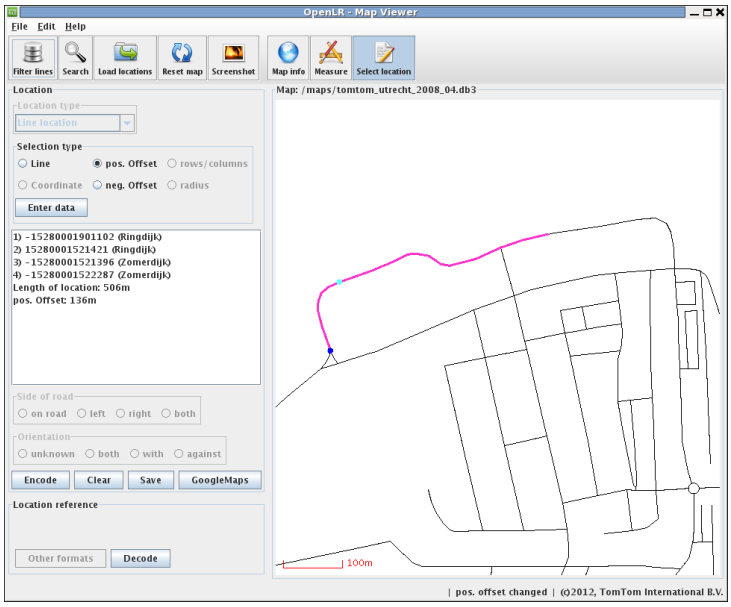

Figure 9.6: Select positive offset

Most of the input types can also be entered using the keyboard. Pressing the "Enter data" button will show an input dialog where the user can enter the data to specify the value for the currently active selection type (see figure 9.7).

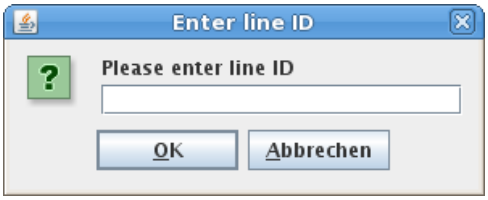

Figure 9.7: Enter location details

9.1.2 Encoding

After selecting a location the user can press the encode button to start the OpenLR encoding process (see figure 9.8). The selected location will be encoded and the location reference will be returned in several formats. The binary format will be shown in the location reference panel as a Base64-encoded string. This string can be selected and copied to the clipboard via shortcut [CTRL] + [C] for use in other applications.

If the encoding process fails an error message will be shown.

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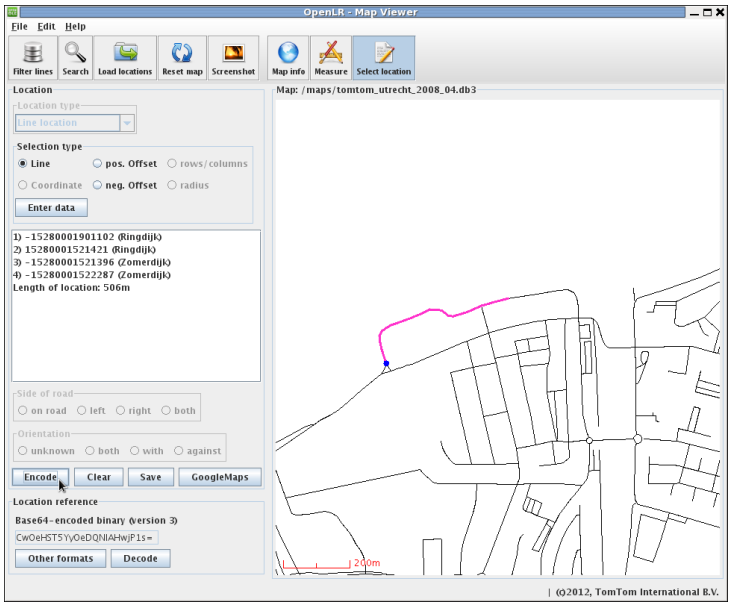

Figure 9.8: Encoding a location

During evaluation of location encoding it can be useful to get information about the internal encoding process. This information can be retrieved by using the log viewer functionality. If this feature is enabled a dialog, as shown in figure 9.9, is opened after each encoding run listing the log output of the encoder module. For activation of this feature please see the MapViewer preferences.

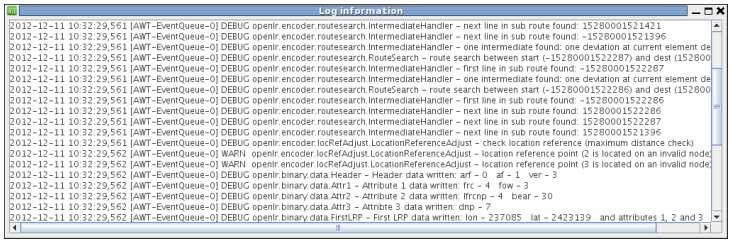

Figure 9.9: Log output encoding

It is possible to adapt some configuration parameters of the OpenLR encoder via the user interface. Item "Edit" from the menu bar of the application provides section "Encoding properties". Selecting this will open the dialog shown in figure 9.10 providing all available encoder settings. For details on the several parametes please visit the website at http://www.openlr.org/encoder.html.

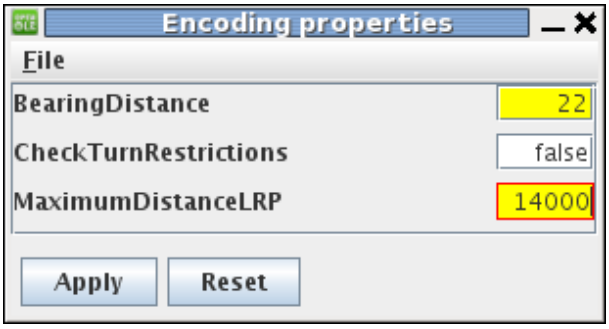

Figure 9.10: Encoder properties with customized values

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A changed property in this dialog is marked with a red border. In this state it is not effective, yet. Figure 9.10 shows this situation for option "MaximumDistanceLRP". Only if the "Apply" button is executed the value is applied to the internal settings and will be effective in the next encoding run. The settings dialog marks values with a yellow background that are currently set with a value that differs from the standard value. The standard is displayed when hovering with the mouse over the related form field.

Button "Reset" allows to reset all the properties to their default values.

Another helpful functionality is to load or save encoder settings. These options are available from the menu bar of the settings dialog as shown in figure 9.11. They enable to store or share settings. Configuration files created with this functionality can be used as input for executions of the OpenLR encoder in other applications (see http://www.openlr.org/encoder.html).

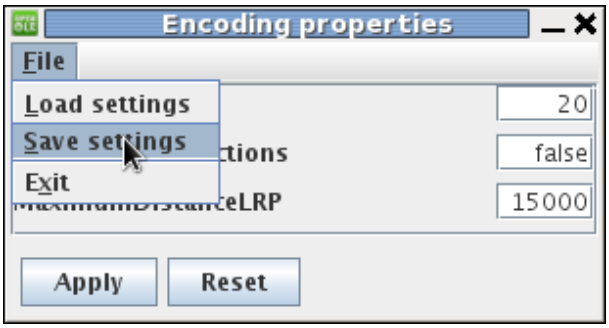

Figure 9.11: Load or save encoder settings

9.1.3 Information on encoded location reference

If a location has been selected and encoded, several physical formats of the location reference are available. The binary format is shown in the text field of the location reference panel as a Base64-encoded string. Pressing the "Other formats" button will allow the access other formats.

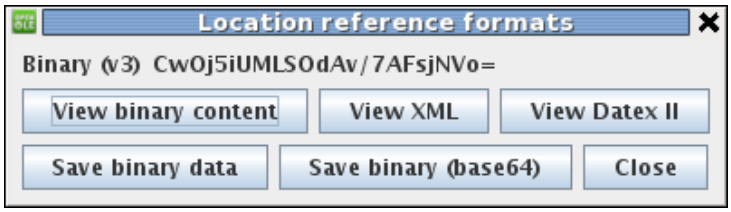

Figure 9.12: Other physical data formats

The dialog shown in figure 9.12 provides the options to view or store the content of the location reference in several physical representations. Button "View binary content" internally executes the "binview" tool of OpenLR command line toolkit (OTK) which transforms the binary data into a human readable version (see http://www.openlr.org/otk.html for details). The result of this transformation will be displayed in a separate dialog (figure 9.13). If the physical decoding of the binary data fails an error message will be shown.

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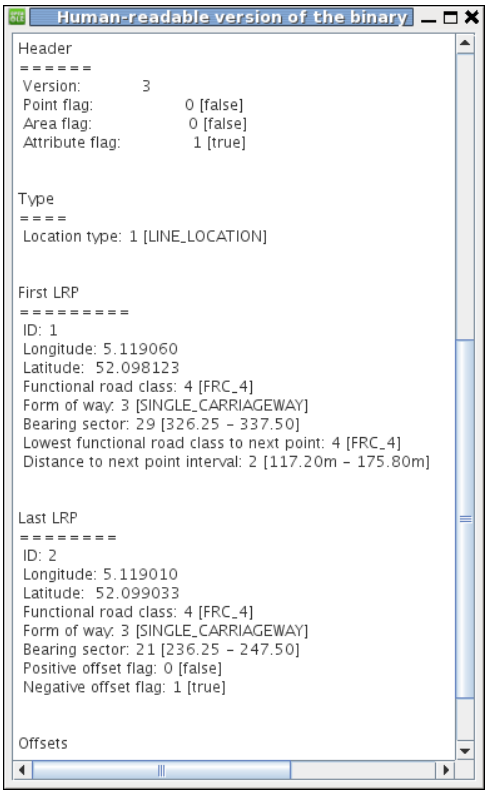

Figure 9.13: View content of binary location reference

The XML or Datex II format of the encoded location reference will be shown if the user clicks on the correspondent button. A new dialog will open and present the XML structure. This dialog provides the possibility to save the location reference in this physical format.

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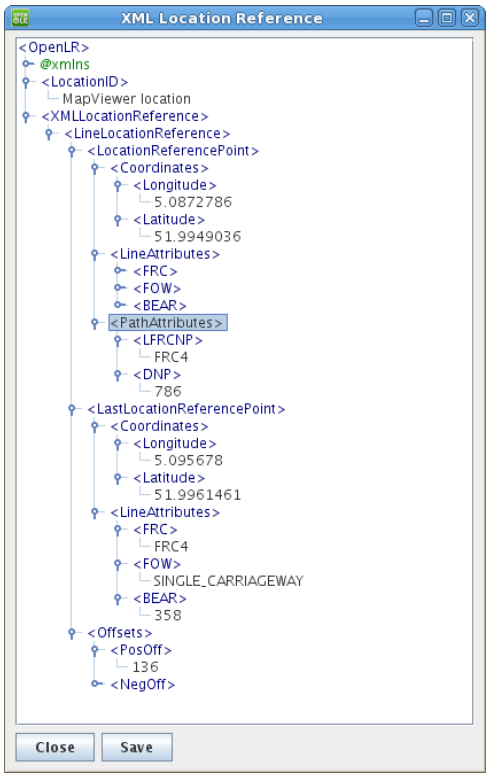

Figure 9.14: XML location reference

Button "Save binary data" allows to store the pure binary data of the binary location reference to a file. This is a very compact but not human-readable format. "Save binary (base64)" enables to store the base 64 encoded format of the binary location reference as displayed above the buttons in this dialog.

9.1.4 Clear location

A selected or even encoded location can be removed by pressing the "clear" button. This will remove all lines from the location and clears the location information panel (see figure 9.15).

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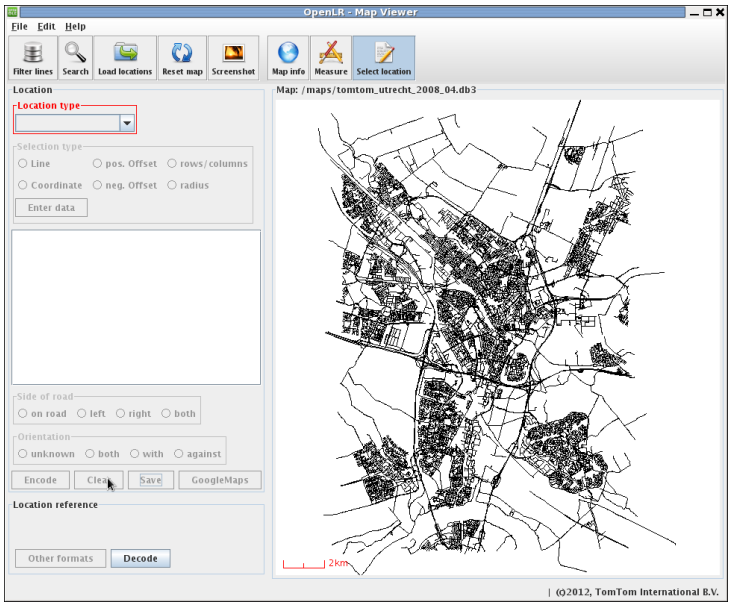

Figure 9.15: Location cleared

9.1.5 Decoding

Pressing the "Decode" button shows a dialog where the user can decode location references (figure 9.16). The location references can be loaded from file or the previously encoded binary data can be used.

The decoder takes the selected format and data and tries to resolve the location in the map. The decoded location will be shown in the map panel (see figure 9.17). The location is drawn in green and the blue dot indicates the start of the location. If the decoding process fails then an error message will be shown.

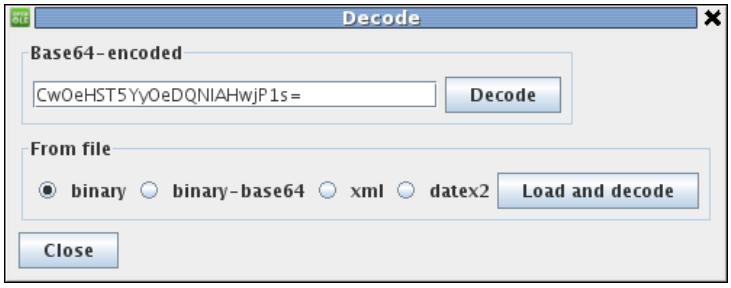

Figure 9.16: Decode location dialog

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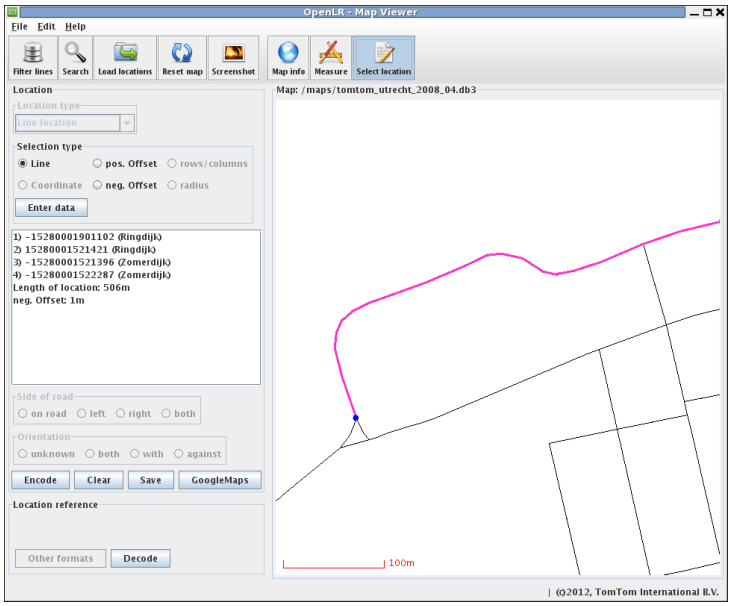

Figure 9.17: Decoded location

During evaluation of location decoding it can be useful to get information about the internal decoding process. This information can be retrieved by using the log viewer functionality. If this feature is enabled a dialog, as shown in figure 9.18, is opened after each decoding run listing the log output of the decoder module. For activation of this feature please see the MapViewer preferences.

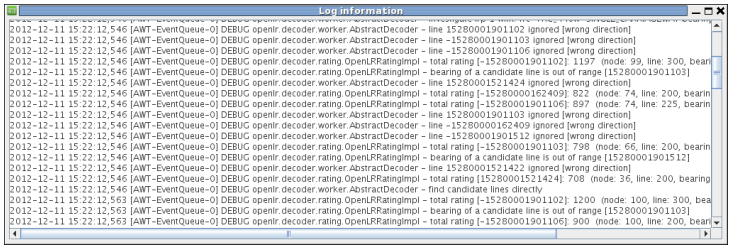

Figure 9.18: Log output decoding

It is possible to adapt some configuration parameters of the OpenLR decoder via the user interface. Item "Edit" from the menu bar of the application provides section "Decoding properties". Selecting this will open the dialog shown in figure 9.19 providing all available decoder settings. For details on the several parametes please visit the website at http://www.openlr.org/decoder.html.

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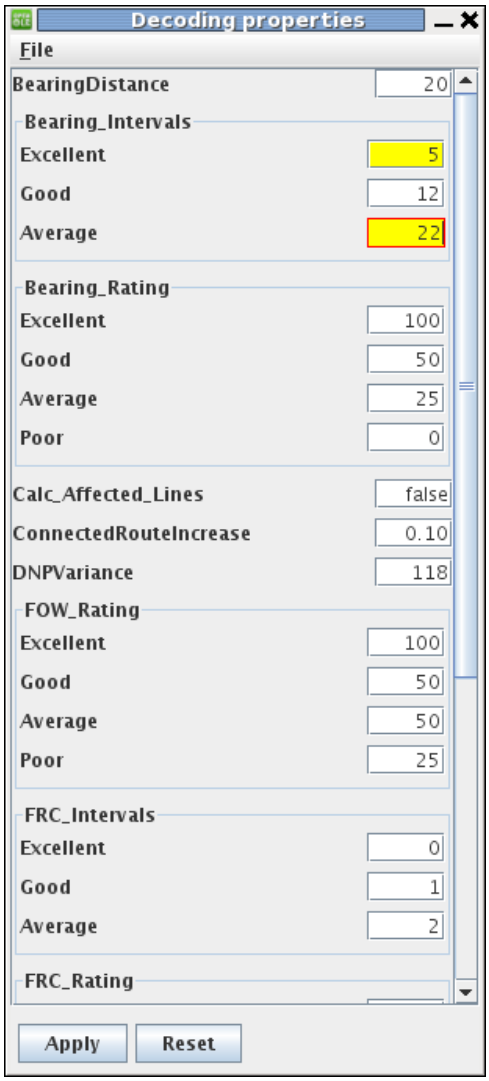

Figure 9.19: Decoder properties with customized values

A changed property in this dialog is marked with a red border. In this state it is not effective, yet. Figure 9.19 shows this situation for option "BearingIntervals/Average". Only if the "Apply" button is executed the value is applied to the internal settings and will be effective in the next decoding run. The settings dialog marks values with a yellow background that are currently set with a value that differs from the standard value. The standard is displayed when hovering with the mouse over the related form field.

Button "Reset" allows to reset all the properties to their default values.

Another helpful functionality is to load or save encoder settings. These options are available from the menu bar of the settings dialog as shown in figure 9.20. They enable to store or share settings. Configuration files created with this functionality can be used as input for executions of the OpenLR decoder in other applications (see http://www.openlr.org/decoder.html).

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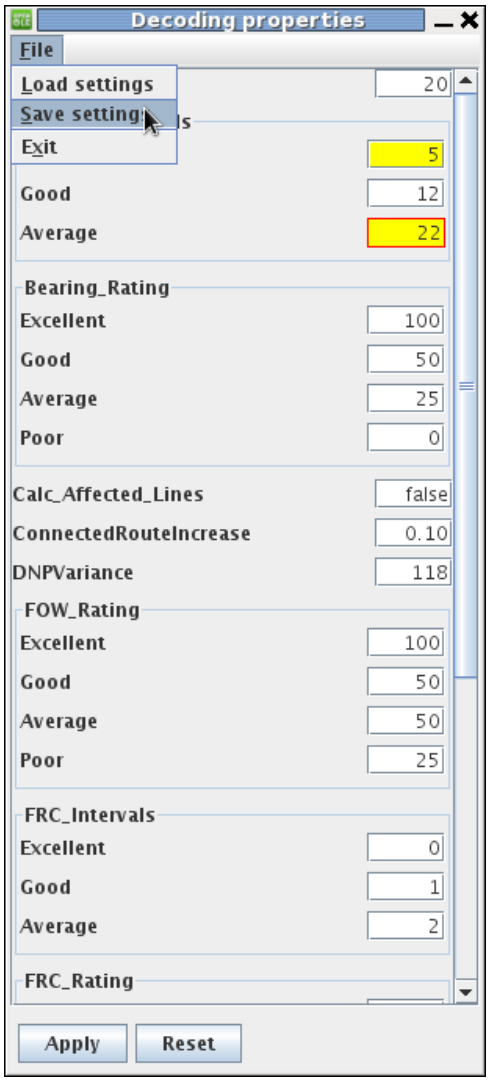

Figure 9.20: Load or save decoder settings

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10 Working with two maps

10.1 Loading two maps

It is possible to run the MapViewer with two maps at the same time. This allows to evaluate OpenLR encoding and decoding on two different maps in parallel, e.g from different vendors or of different versions.

Activation of the second map is done in the map load dialog directly after start of the application. The dialog provides the option “Load two maps”. Selecting it will add another input form for configuration of the second map as shown in figure 10.1.

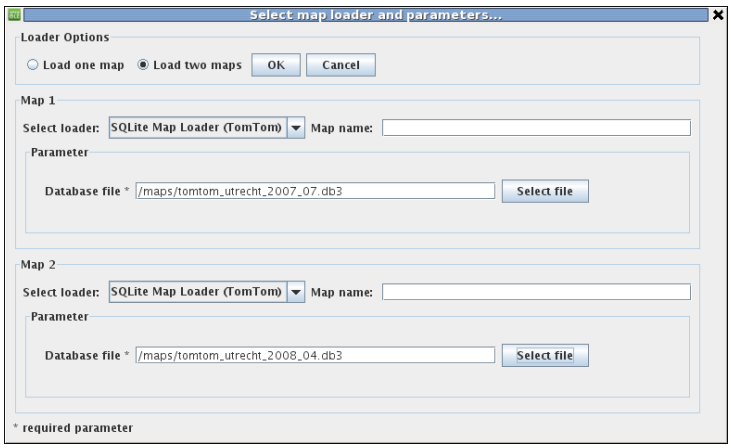

Figure 10.1: Load two maps

The example in this manual makes use of the same loader type to load the two example maps provided on the website . However, there is nothing against loading from two different loaders, i.e. two completely different types of map implementations. The map loaders are responsible to provide access to them via the common OpenLR map interface, which hides the implementation details.

When all the map initialization is done the main application window will present a split map area (see figure 10.2). The map configured in the first place in the load dialog is the one in the upper part of the map area, the other one beneath.

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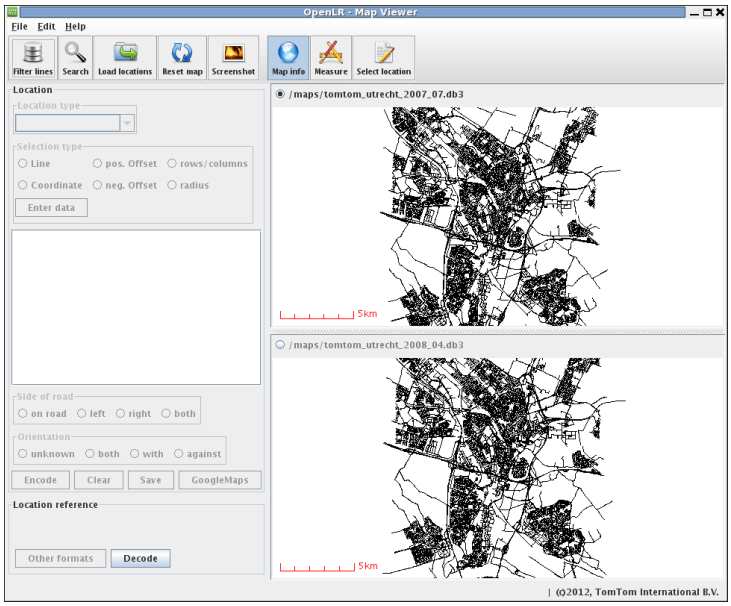

Figure 10.2: Two maps loaded

10.2 Working with two maps

Only one map at a time is active. Each of the maps provides a radio button reflecting the activation state. The user can determine which map shall be enabled before executing actions like encoding or decoding. All the features available in the toolbar are possible for either map. Figure 10.3 shows an exemplary setup of different filtering on both maps.

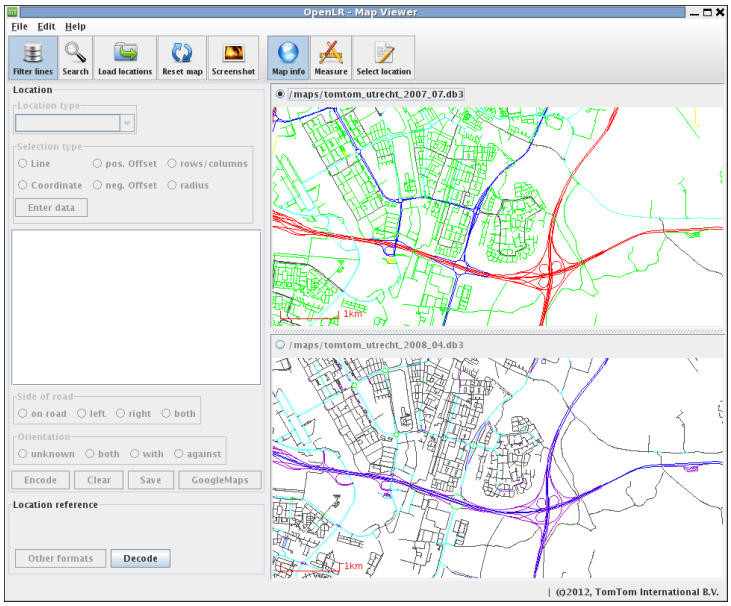

Figure 10.3: Load two maps

A typical use case is to encode on one and decode on the other map. This process would look as follows.

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First the user selects the location on map one and hits the “encode” button afterwards (figure 10.4). The calculated location reference code can be selected as shown in figure 10.5 and copied to the clipboard for later via shortcut [CTRL] + [C].

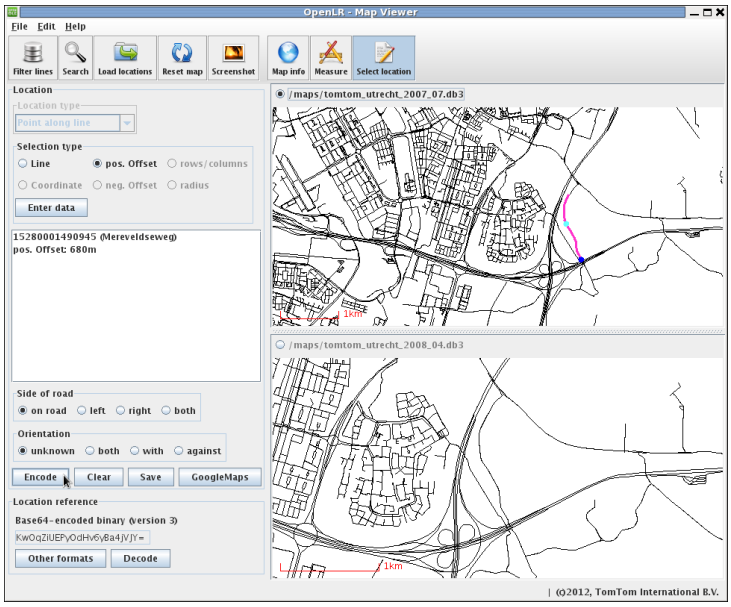

Figure 10.4: Encode location on map one

Figure 10.5: Copy location reference code

Next the second map has to be activated via its radio button, see figure 10.6. Pushing the “Decode” button afterwards will open the decoding dialog. The stored location reference code should be inserted into the input field via shortcut [CTRL] + [V] (figure 10.7).

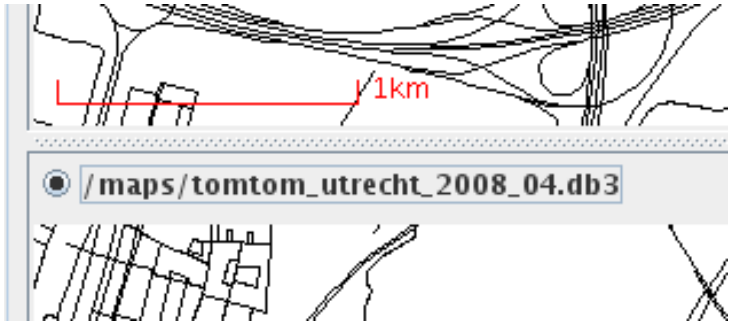

Figure 10.6: Switch active map

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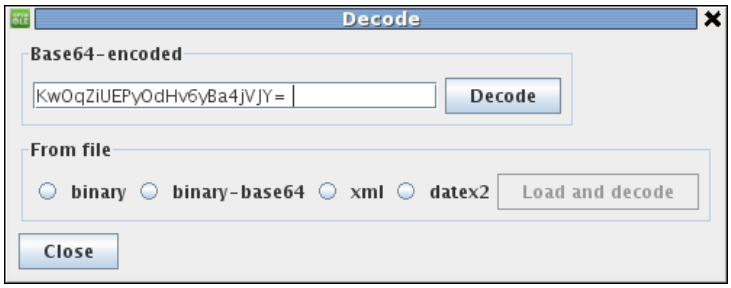

Figure 10.7: Decode the location reference

The execution of the “Decode” button in the opened dialog will resolve the location reference on map two as shown in figure 10.8.

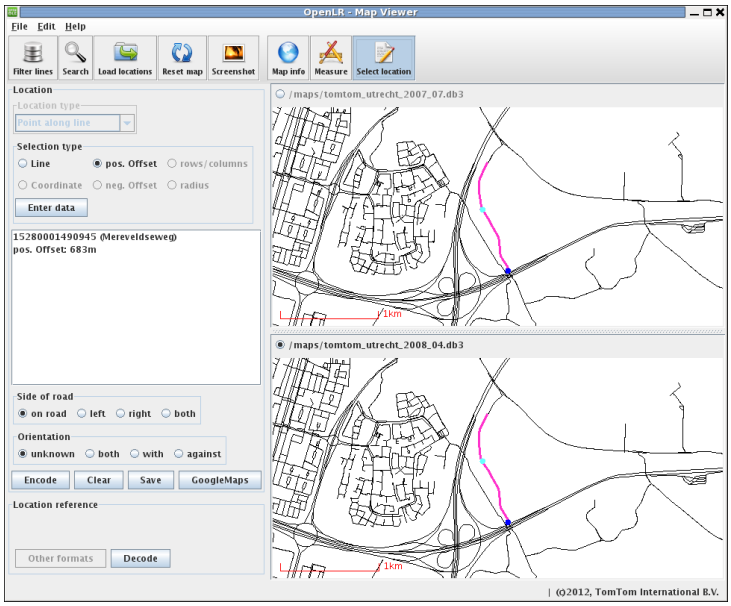

Figure 10.8: Decoded location on map two

The two locations instances are stored internally related to their maps. Switching between map one and map two will always update the location information panel on the left to show the data of that location instance actually assigned to this map.

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