

Network Editor for JOSM

-Manual-

This is a first version of the manual. Please feel free to give feedback on both, the plugin and this document to improve them. Any advice and hints on mistakes, misspelling, errors and functionality is appreciated. Please address to:

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Network Editor for JOSM – Manual

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1. Installation

The editor described in this document is a plugin which is developed for an application called JOSM (Java OpenStreetMap Editor) that allows you to view and edit information offered by OpenStreetMap. The following instructions will explain the basic functionalities of JOSM and the network plugin. The open source application runs with Java 1.6 or higher. A working Java installation is therefore required prior to the following steps.

1.1. Getting and Installing JOSM

JOSM is available on the following website:

<https://josm.openstreetmap.de/>

On the upper section click on “(Launch) josm.jnlp” to start the download. When finished, start the downloaded Java web application. Ideally JOSM should now open up and show the welcome screen. If this is not the case, something went wrong. See the JOSM wiki for further help if needed.

<http://wiki.openstreetmap.org/wiki/JOSM>

1.2. Installing the Plugin

In order to use the network editor plugin you need JOSM to know about the plugin. Click on the icon that shows a square with two adjusters at the top of the screen to open the preferences menu (alternatively you can just press F12 on Windows or XXX on Mac) [1]. On the left bar, navigate to the plugin settings (yes, it obviously is the icon showing a *plug* and a *socket*) [2]. Here you may see a list of available plugins. As for now the MATSim plugin is not hosted on the official plugin site but on the server of our department. That is why it will not be listed on default. To get the plugin show up in the list you have to add the link of the host location to the sources JOSM looks up for plugins. Click on “Configure sites” [3] and add the following link¹:

¹ If this does not work you can also try to manually download the matsim.jar file by yourself from the given link via a web browser of your choice. Afterwards copy it to the plugin folder of JOSM to make it appear on the plugin list:

- C:\Users\username\AppData\Roaming\JOSM\plugins **on Windows**
- /Users/username/.josm/plugins **on a Mac**
- /home/username/.josm/plugins **on a Linux system**

<http://svn.vsp.tu-berlin.de/repos/public-svn/dist/plugin> [4]

Refresh the list [5] and search for an entry called “matsim”. Activate it [6]. After closing the preferences window JOSM will download the plugin. On success you are asked to restart the program. Confirm to do so. If JOSM does not restart and/or brings up an error message stating that the restart failed ignore it and just start the application again by yourself. Congratulations! You now successfully installed the network editor plugin for JOSM. Any updates of the plugin will automatically be updated if you added the link to the plugin sources.

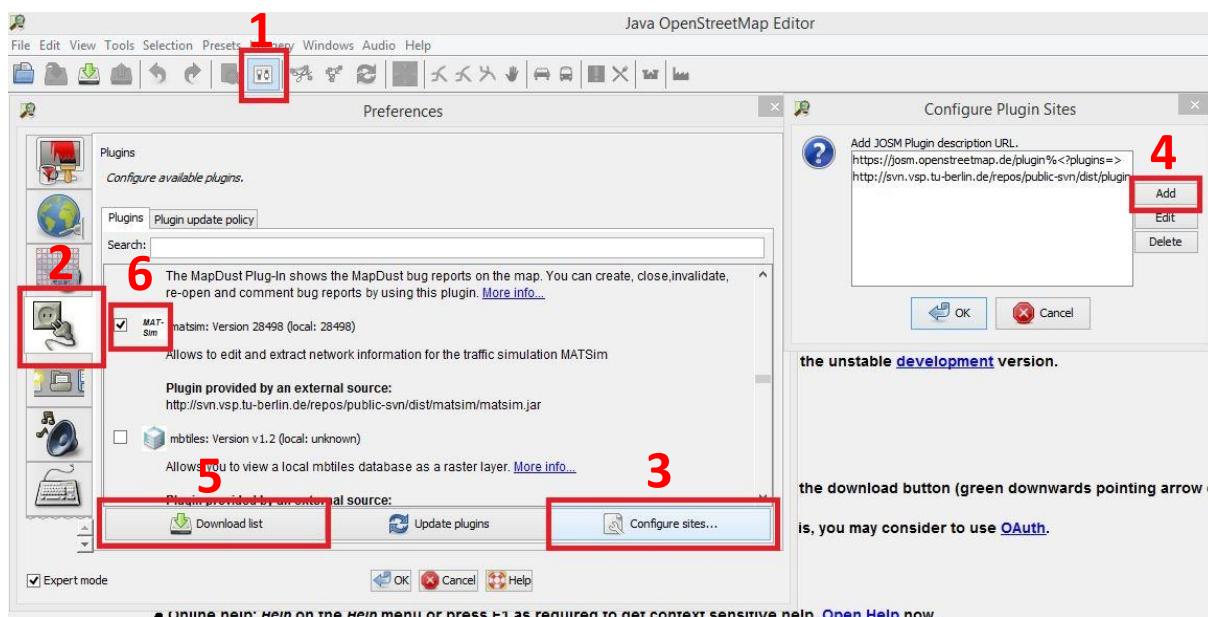


Figure 1 illustrates the installation of the network editor

2. Using JOM

Before you can start using the plugin you should be aware of some of the basic functionalities of JOSM. The program itself offers a lot of interesting functions of which only a few are needed to use the network editor. Those will be explained in short form. For more and detailed information have a look at the JOSM wiki (<http://wiki.openstreetmap.org/wiki/JOSM>). It is available in different languages.

2.1. Main View Components

On the top of the screen you find the main menu and a bar with different tools [1]. Once a layer of map data is opened it will show up in the central area of the screen [2]. You can navigate through by right-clicking and dragging the mouse. To zoom in our out, use the mouse wheel. To the left of the map you can see another bar with different fancy icons. The upper half of those represents different tools for editing map data [3]. The other half will toggle the map related toggle dialogs that show various information regarding map data [4]. The actual toggle dialogs are located on the right side of the map [5]. Below the map you can see some additional information (e.g. current geo coordinates or distance of a selected line) [6].

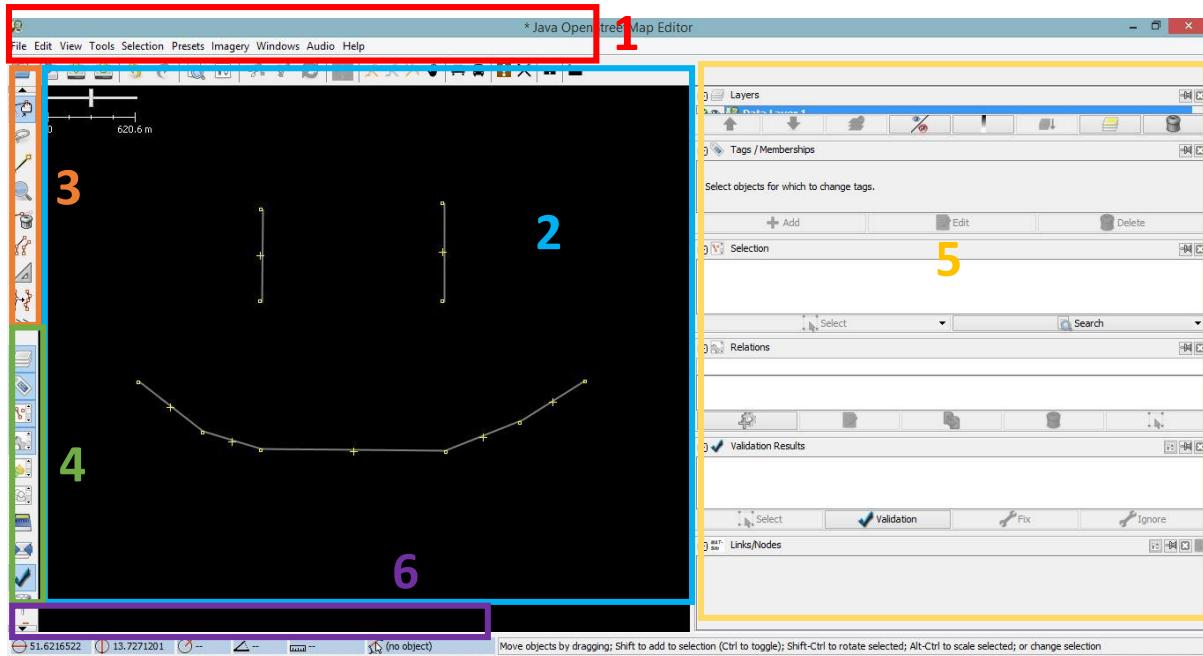


Figure 2 shows the different parts of the JOSM screen

2.2. Downloading OpenStreetMap Data

To download map data from the OpenStreetMap servers click on the download icon  on the toolbar under the main menu. A download dialog will open, showing a map. Again you can navigate by right-clicking and dragging the mouse while treating the mouse wheel causes the map to zoom in or out. You can now select data from a region of interest by drawing a rectangle around it. You can do this by using the left mouse button. Once you are done selecting click on the “Download” button. The map view will show the data of the selected region as soon as the download is complete. A new layer will be created in which the data is stored. You can see all available layer in the layers toggle dialog .

NOTE: The selection of a region is strongly limited in size. To import large map areas use external tools or websites to download the map in “.osm” format. You can then open it via the open button .

2.3. Basic Viewing and Editing in Selection Mode

You can now examine the downloaded data by selecting the displayed elements.

In selection mode ( icon on the left) click on an object in the map to select it. It will then appear on the selection toggle dialog . JOSM uses three forms of primitive data types of which two are relevant for the plugin:

- Nodes: Points with coordinates that describe remarkable positions on the map and function as start and ending of ways. They will represent the nodes of MATSim networks.
- Ways: Lines that start and end along nodes. They can, however, consist of more than two nodes to define odd shapes. Closed shapes (e.g. rectangles or circles) are called closed ways. They are used to describe areas like forests or lakes. The MATSim equivalent to ways are the links of a network.

NOTE: As of version 1.0 only ways with exact two nodes are accepted to represent a link since MATSim links are defined by two nodes. Ways with more than two nodes are (for now) ignored in the plugin.

- Relations: Relations can be defined over two or more of the other primitives. They describe memberships to specific topics. This could be

two railway tracks (defined by two ways) that relate to the same public transport line. Relations currently have no meaning for the plugin.

Another key feature of JOSM is the handling of “tags” that describe properties and purpose of the tagged primitives. You can check for tags by selecting a given primitive on the map.

Make sure that the properties toggle dialog is activated  . All existing tags of the selected primitive will be displayed in this dialog. The tags are defined as key-value pairs. The OSM community uses guidelines for consistent entries. The keys are usually described by a predefined keyword. Their respective values can be numbers, logical values, free text or also defined keywords. It is possible to assign multiple values to a key.

Examples for commonly used keys are:

- highway (used on ways; predefined keywords as values)
- building (used on closed ways; “yes” or “no” as possible values)
- addr:housenumber (used on nodes; numbers as possible values)

For more information see:

<http://wiki.openstreetmap.org/wiki/Tag>

In JOSM, those tags can be freely edited by double clicking into either the key or value field in the properties dialog.

In selection mode you can delete selected primitives by pressing the delete key. Alternatively you can switch to the delete mode  and click on the objects you want to remove.

2.4. Drawing Mode

To draw your own primitives use the draw mode  . Click on an empty place in the map to start with a node. The node will then be the origin of your way. You will see a line that follows your cursor when dragging the mouse. Each click will add a new node to the way. Double click on a node to finish drawing your current way.

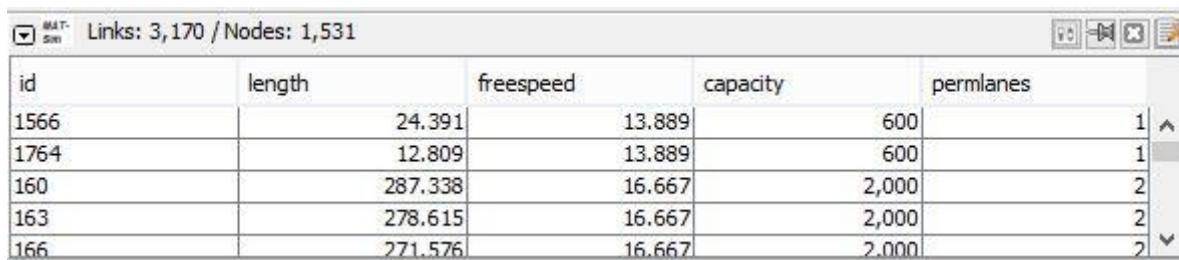
These are the basic functionalities you need to know when coping with the plugin.

3. Using the Network Editor

If you successfully installed the plugin you can now start using it. The main functionalities will be explained in this chapter.

3.1. MATSim Toggle Dialog

The network editor comes with its own toggle dialog. It can be (de-)activated via the (not yet so nice looking) MATSim icon on the left  .



The screenshot shows a dialog window titled "MAT-Sim". The title bar also displays "Links: 3,170 / Nodes: 1,531". The main content is a table with the following columns: id, length, freespeed, capacity, and permlanes. The table contains five rows of data:

id	length	freespeed	capacity	permlanes
1566	24.391	13.889	600	1
1764	12.809	13.889	600	1
160	287.338	16.667	2,000	2
163	278.615	16.667	2,000	2
166	271.576	16.667	2,000	2

Figure 3 shows the MATSim Toggle Dialog provided with the plugin

If a network for the currently active layer exists, all information about it will be accessible in this dialog.² The title of the dialog will show the total amount of links and nodes in the current network. You can use this to check for changes when adding or deleting content.

The main functionality is the table that shows information about links **that refer to the currently selected ways**. If one or more ways represent a link in the current network, the respective links will appear in the table. If a way currently has no equivalent in terms of MATSim links, no information will be shown. Thus nothing will show when the selection is empty.

If you click on a row in the table JOSM will jump to the referred way and highlight it.

The table shows information about the following MATSim link attributes:

- id: the id which identifies the link in the network (alphanumeric)
- length: the length of the link (numeric, in meters)
- freespeed: the speed on empty links (numeric, in meters per second)
- capacity: the capacity of the link (numeric, in vehicles per hour)

² The underlying network for a layer is stored separated from the actual map data. Regarding network data the information showed in this dialog always outweighs the information showed in other parts of the program. Please consider when confronted with conflicts.

- permlanes: the number of permanent usable lanes on the link (numeric, integer recommended)

You can freely sort the table by any of the columns by clicking on the head of the column.

On the upper right corner you can find four buttons. The first one will open up the preferences related to this plugin. Those will be explained in the following subchapters. The second button will attach/detach the dialog to/from the rest of the window while the third button deactivates and closes the toggle dialog. When clicking on the fourth button additional information about the whole network can be edited. Those are:

- effective lane width (in meters, 3.75 by default)
- capacity period (in seconds, 3600.0 by default)

They can be adjusted with numeric values.

NOTE: The toggle dialog is for **viewing purposes, only**. You cannot directly edit any of the values within this dialog. Check chapter 3.5 Editing Networks for information about how to edit the here shown values.

3.2. Converting / Exporting Networks

Before converting a network you should be informed about the OpenStreetMap tags that are related to the network editor. The only OSM-information we need for our network are stored in tags that are attached to ways that represent streets and the like. This is especially the *highway* tag which is used to declare ways as streets. There are several possible values for ways tagged as *highway*. See <http://wiki.openstreetmap.org/wiki/Key:highway> for thorough information.

The following values for the key *highway* will be regarded when converting:

- motorway
- motorway_link
- trunk
- trunk_link
- primary
- primary_link
- secondary

- tertiary
- minor
- unclassified
- residential
- living_street

For those values default parameters are used for conversion. You can view and edit these by opening the plugin specific preferences. Do this by either clicking on the preferences icon  in the MATSim toggle dialog or open the general preferences and navigate to the network editor preferences (at the moment it is the blank field tab with no icon on the left bar). There you will find two registers, “Visualization” and “Converter Options” – open the latter. Click on “Set converting defaults” to open up a window in which you can edit the default values for the given highway types:

- hierarchy: set hierarchies that can be used to filter out certain highway types that will not be converted (integer numbers)
- lanes: the standard number of lanes for the given highway (numeric, integer recommended)
- freespeed: the standard maximum allowed speed (numeric, in meters per second)
- freespeedFactor: adjust the freespeed by the given factor (not yet implemented)
- laneCapacity: the standard capacity for **one** lane of the highway (numeric)
- oneway: check to imply that this highway type generally is only passable in one direction

In a lot of cases you can just use the predefined values. Use “reset” to reset.

Ways that are tagged as *highway* can hold additional information about the properties of the street. Therefore the following tags can be added to provide more precise information:

- *lanes* (number of lanes)
- *maxspeed* (maximum allowed speed in kilometers per hour)
- *oneway* (set to true if the street can only be used in one direction, otherwise false or omitted)

Those indications will cause the default values to be overwritten for the respective single way.

In the “Converter Options” you have three other options available. “Clean network” will start the MATSim network cleaner on the converted network after the conversion. “Keep paths” will cause the conversion algorithm to keep each single node of a way even if it could be thinned out. The shape of the way will then result in multiple chained links. Please note that turning this on will cause your resulting network to become much bigger and, in some cases, messy. “Activate hierarchy filter” will cause the converter to ignore any highway type which hierarchy is set higher than the number entered here. Useful for extracting only big roads out of the map.

The actual conversion is found by clicking on “Tools” in the main menu. In the submenu you can find the entry “Convert to MATSim network” at the bottom of the list. The converter will start to extract the network data out of the given OpenStreetMap data. Afterwards a new layer will be created which will show the resulting network. Each link will be drawn as a single way. Since the MATSim links describe only one direction of a road, two overlapping ways will be drawn for a bidirectional road.

NOTE: You can use the visualization options to adjust an offset between overlapping ways that represent different directions. See chapter 3.6 Visualization. **You can cycle through overlapping ways by pressing the middle mouse button while hovering over them.**

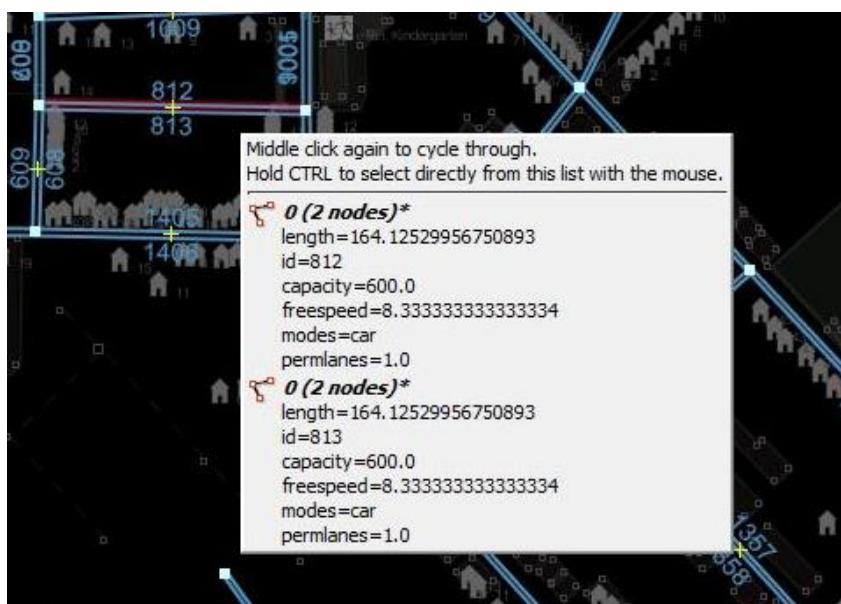


Figure 4: To select overlapping ways, use the middle mouse button

To export the network to an .xml file, use the save button  (CTRL+S on Windows or XXX on Mac). Make sure to select “MATSim Network Files (*.xml)” as the type of your file.

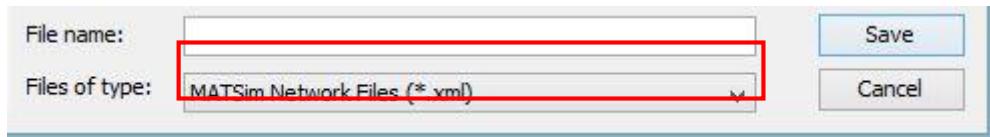


Figure 5: Select the MATSim file format for saving your network

That's it. You should now have a working MATSim network for the converted OpenStreetMap region.

NOTE: The only coordinate system you can export MATSim networks to is WGS84, which is used on default by JOSM. There will be an option to change coordinate systems in future releases.

An additional feature of the plugin is that it checks the current data with a validation. Each time you are about to export and save a network the validation will be triggered. As of this version it checks for duplicate ids and doubtful attributes. Doubtful attributes will result in warnings that you can ignore. This happens if some of your link attributes are set to null. Duplicate ids will result in errors causing the export to abort. In each case a validation layer will be added showing the origins of warnings and errors. It is possible to automatically fix the duplicate id issue. Click on the error in the validation results toggle dialog and click “Fix”. The id will then be reassigned to the ways in that way that the id will be appended by brackets and an ascending number. For example two ways with the id of “7” will then have the ids “7(1)” and “7(2)”.

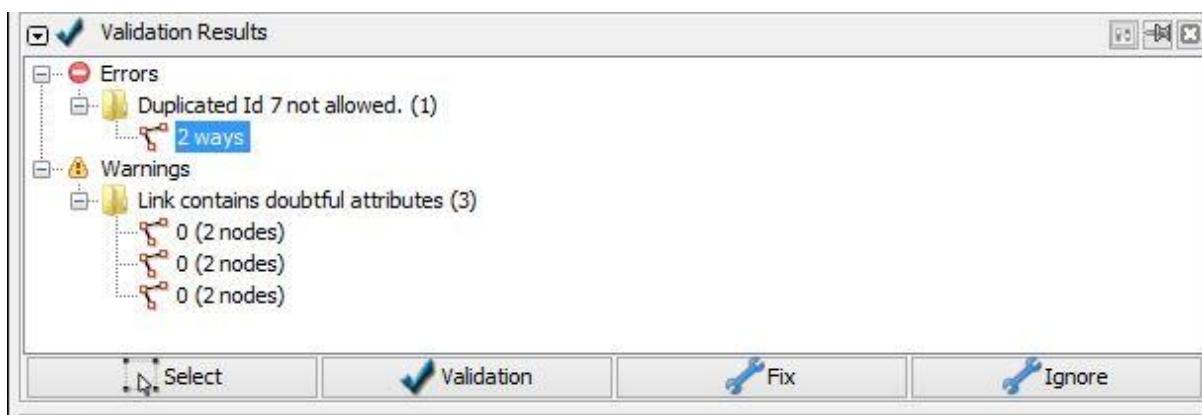


Figure 6: The validation toggle dialog

3.3. Importing Networks

To import existing networks use the “Import MATSim network” entry in the tools menu. A file opener will show up in which you can choose the network you want to import. You are then asked to choose the coordinate system that describes the selected network. Use the dropdown menu to do this. A new layer showing the network will open.

NOTE: Not all listed coordinate systems work properly yet. You will get informed if an error occurs while importing. Known problems exist with “GK4”. While you can still view networks of that coordinate system, changes on the map data will not be recorded in the actual network.

3.4. Creating a New Network

If you want to draw a new network from scratch (e.g. for scientific reasons) you can create a new layer with an empty network by clicking on “New MATSim network” in the tools menu. A new layer with a blank map and an empty network will be created.

3.5. Editing Networks

You have several options for editing the current network of a layer (given that the layer was created by conversion, import or via the new network creation tool).

To add nodes to your network simply draw nodes onto the map. Each node that is added to the map will also be added to the network. If you delete a node on the map it is removed from the network also. A unique ID will be assigned for each node that is added. However, if you want to set the id by yourself you need to add a tag with the key “id” and set the value to the ID you wish to assign. Please note that duplicate IDs are not allowed when exporting. On import, nodes will be assigned an id tag whose value is described in the .xml file.

As the links of your network are represented by ways you need to draw a way first if you want to add a new link. Remember that your way must be defined by **exactly two nodes** to be able to represent a MATSim link.

NOTE: You might notice that JOSM automatically tries to extend an existing way if you want to add another way that shares the same start or ending node. To avoid this, press the ALT-key while drawing the way.

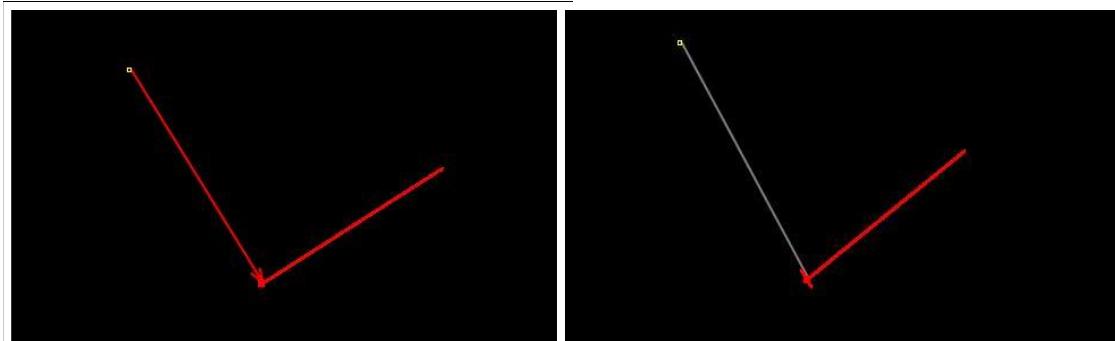


Figure 7: To avoid extending existing ways (left), press the ALT-key while drawing (right)

After the way has been drawn you need to add information that is relevant to MATSim. Therefore several tags are required. JOSM offers the possibility to use presets for tagging schemes on selected objects. The plugin provides an own tagging preset for links that can be found in the Presets menu (Presets -> MATSim -> Link). In the preset you can adjust the values for the tags freespeed, capacity, permlanes (permanent lanes), modes and, optionally, length. All but the modes tag are numeric values. To set the modes select the desired values from the list (hold CTRL key for multiple selection). While the length attribute is optional, all other values have to be set. If no length is set, an automatically estimated distance is assigned, based on the beeline distance between start and ending node (it will show in the MATSim toggle dialog when the link is selected).

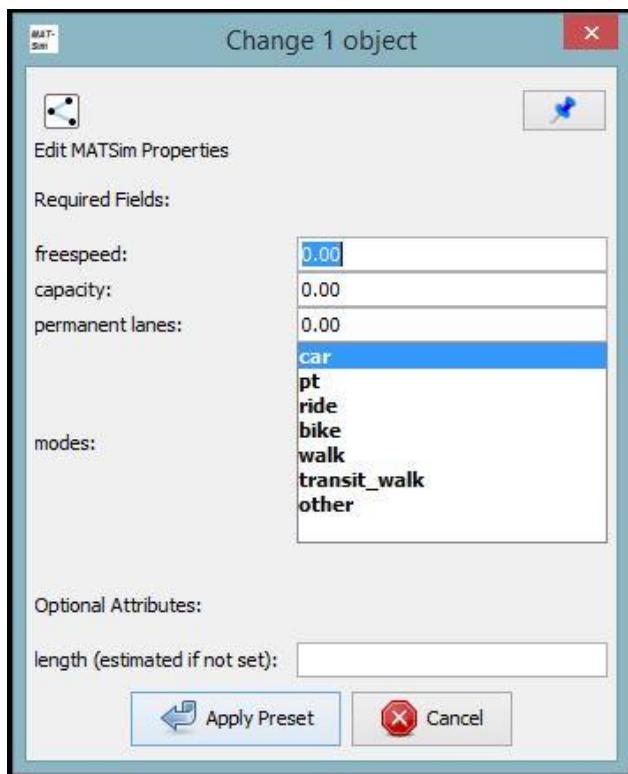


Figure 8: Presets for a MATSim link

Click apply to add the tags to the way and generate a link out of it. If you check the title bar of the MATSim toggle dialog, the total amount of links in the network should now have increased.

Select your way to see that all the tags are now visible in the tagging toggle dialog. You can now edit them like any other tag. You can even ignore the preset and just manually add all the tags one after one to create a link (multiple values for modes are separated by ";"). Notice that if you delete any of the required tags the link will vanish from the network. If you add the tag back in, the link will reappear in your network. That is also how you can edit links that origin from imported or converted networks.

As long as the length tag is set the link will use this as a fixed value. If no length tag is set and the length is estimated by the program, the length will also readjust when the start or ending nodes are moved.

The id of the link will automatically be generated when added. You can optionally set an id tag to set the id by yourself. Imported links will cause an id tag to be set on the ways, showing the value of the network .xml file. The following table shows an overview of the used tags in the plugin.

tag		used on	mandatory
key	allowed values		
id	alphanumeric	nodes, ways	no
fressspeed	numeric	ways	yes
capacity	numeric	ways	yes
length	numeric	ways	no
permlanes	numeric	ways	yes
modes	“car”, “pt”, “ride”, “bike”, “walk”, “transit_walk”, “other”	ways	yes

Figure 9: tags used in the network editor plugin

3.6. Visualization

To differ normal ways from ways that represent a MATSim link the plugin offers an own renderer that draws “MATSim ways” in a familiar blue color. Go to the plugin specific preferences and open the “Visualization” tab. Check “Activate MATSim Renderer” to enable this option. Additionally you can check “Show Ids” to draw the MATSim ids on top of the ways. It is useful to quickly identify which links are represented by the shown ways. You can also adjust the offset between overlapping ways with the help of the slider. The option “Show internal Ids in table” will cause an additional column to be shown in the MATSim toggle dialog. In this column the internal ids are shown. This is more of a debugging and development functionality that you should not be interested in.

NOTE: The offset function as well as the showIds function will only work with the actual MATSim renderer activated.

Another nice feature that is provided by JOSM is the possibility to set the background to satellite or OpenStreetMap-map images. To do this click on “Imagery” on the main menu. There you can find different backgrounds. This can be useful to compare your own drawn or converted network to real world data and can be used as a template to add in missing ways by manually drawing. It is also useful for orientation.

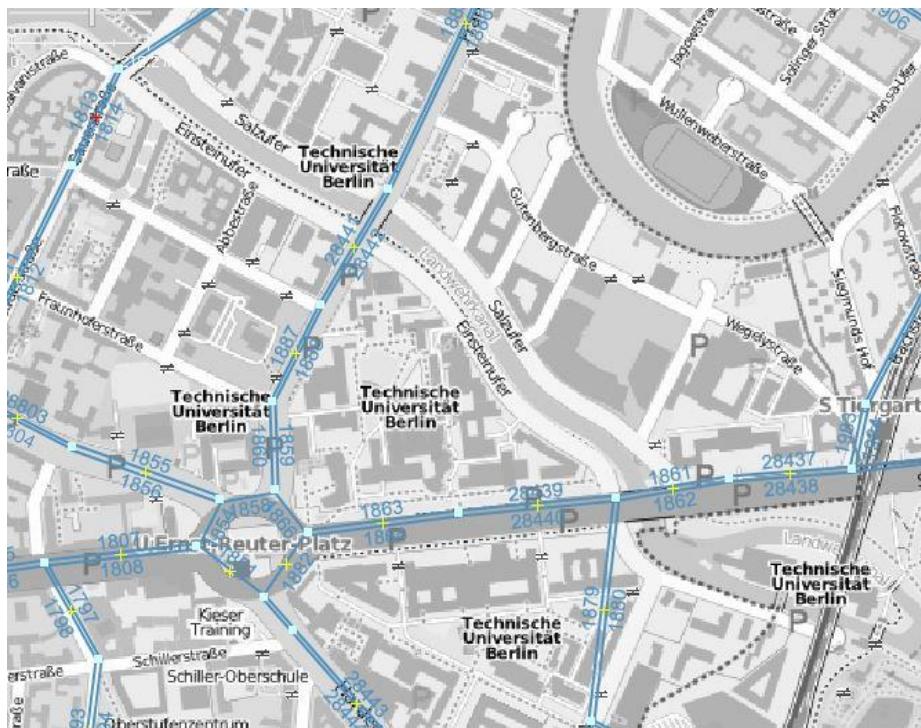


Figure 10: A converted network (blue) and a background set for orientation and comparison