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INTRODUCTION

WHAT IS BNET?

BNET is a vehicular ad hoc network, designed to be used in motorized vehicles in traffic. The main purpose of the developed software is to assist drivers by providing them detailed information about the vehicles and other entities surrounding them in traffic. The software uses GPS data which provides geographical coordinates, speed and heading as well as a wireless transceiver which enables vehicles to exchange information.

SCOPE OF DOCUMENT:

This document describes how to use BNET. It also explains a sample run of it and the functionalities it is capable of in detail.

DESCRIPTION OF MENUS AND FUNCTIONALITIES

SYMBOLS USED AT BNET

- **A** (Ambulance)
- **Ав** (Automobile)
- **Г** (Car park)
- **О** (Coordinator)
- **Ф** (Fire Truck)
- **Г** (Hospital)
- **Ф** (Pharmacy)
- **П** (Police)
- **П** (Self)
CONNECTION:

With this menu the user can connect to a mobile ad hoc network and can send and receive information.

When the menu is clicked, two options appear. The first option “connect to network” asks the user for a hostname /IP number and a port number for connection.

By using this submenu the user can establish a connection with a server. This option was used for testing purposes before and during demonstrations.
The second option is “Start Serial Connection”. By using this submenu the user starts the validation of the XBee module connected to its port. The module then establishes the connection to a mobile ad hoc network.

**CONFIGURE:**

- The first field, “type”, identifies the type of the vehicle using BNET. Some of the types are Ambulance, Car Park, Pharmacy, Police etc.

- The second field, “Network Unique ID” is a static field which shows the id of the network in connection with.
• The third field, “GPS File”, is used for loading GPS files.

• The fourth field, “Destination”, stores the latitude and longitude data of the destination of where the user is willing to go.

• The fifth field, “Extra Info”, stores a message of which the user would like to broadcast together with the other information it sends to other vehicles.

• If “Broadcast Emergency” is clicked, an emergency message is appended to the “Extra Info” field. This will actually be implemented by another system which handles emergency signals in case of accidents. But this option was added for demonstrational purposes.

MAP:

This menu is used for adding layers to the map. Also, by using the “Center Myself and Lock” option once a connection is established, the user can lock the display of the vehicle’s position on the center of the map. By this setting the user always appears on the center and the map
display is arranged accordingly. Setting this option is only possible at a zoom level of 1:22500 or under.

LAYERS:

This menu gives the user a chance to switch off layers if not wanted. The “Edit Layers” submenu gives the user the ability to do this option in a more detailed way.

EDIT LAYERS:
As seen above, each layer has two icons on the left of them. The first one is a bulb figure, which indicates whether the layer is turned on or off. Clicking the figure can adjust this property. For example the layer named “Street Names” is on in the figure but “Richmond County” is off.

The second one changes drawing parameters like colour, line width, dash pattern, cap decoration and joint decoration related to a layer. These parameters change how a layer is displayed on the map.

FIND:

Using the find menu the user can display the shortest paths to the nearest hospital, pharmacy, police station and car park.

ICONS:

The first three icons below all the menus can be used to navigate through the map and change zoom level. The “Layer Controls” icon is a shortcut for the “Edit Layers” submenu under the “Map” control menu. The mouse icon displays the shortest path of a clicked location on the map to the vehicle. The question mark icon sets a destination on map when a location is clicked. The “Navigation” and “Pan” icons are again used to navigate and change the displaying map. Lastly, “Overview Map” shows the user an overview of the map displayed.
AN EXAMPLE RUN:

First the Test Server should be run to establish a connection on port 4444. Then we start BNET and connect to the localhost on port 4444. The TestServer.java file should be located under the directory src\edu\metu\ceng\bnet\comm.

Now we must validate our vehicle.

For demonstration purposes let’s write “Help!” into the “Extra Info” field and check the “Broadcast Emergency Signal”.

For demonstration we will use the “long_trip0.gps” file under the directory share/data/GPSfiles.

After finalizing the validation process, a red triangle shape appears on the map. This represents our vehicle. Let’s zoom in to the level 1:11250.
In our figure we have our vehicle, a hospital, the streets and their names. If we now check the “Center Myself and Lock” option, we will see that each time our vehicle moves the display is adjusted accordingly.

Now let’s select the mouse symbol located in the icons and click left a nearby location on our map.

We see a blue line starting from the street our vehicle is in ending at the location we just clicked. This is the shortest path between these two locations given our street layer. To clear this shortest path off the map the user just has to right click anywhere and select “Clear Shortest” when appeared.

Now let’s find the shortest path to the nearest hospital. On the “Find” menu click “Find Nearest Hospital”.

We have located the nearest hospital on our layer. If the layers for pharmacies, car parks or police stations are also added, this functionality can also be applied to them too. But for demonstration purposes only the hospital layer has been loaded.

Now by using the mouse mode, if we click on our hospital we will achieve the shortest path to it.

Now let’s use the question mark icon to set a destination. Once the icon is selected and a location on map is left clicked, we tell BNET that location will be our destination. Also automatically the mouse icon will be selected after this operation.
Now let’s keep our mouse pointer on the red triangle.

When the mouse points to our vehicle, the red triangle is put into a blue box as seen above. Information like, the name of the vehicle, the latitude and longitude coordinates, speed and destination can be seen.

Now when our vehicle is picked, if we click right on it, a menu will be displayed.

Clicking each of the options result in the following displays:

The Properties Option

The Messages Option
The Show Destination Option

The destination clicked before appears as a red box on the map. The message displayed is what we entered during the validation process, with the emergency signal appended to it. Deselect is used to deselect our object once clicked.

Lastly, when we right click the destination after being shown on the map, a pop-up menu is displayed.

If we click “Select Whose” in the pop-up menu, our map is redrawn around the vehicle whose destination was used. The vehicle is put in the center of the map initially.