

QLTCnetTrafficAgent

System for traffic monitoring and traffic state reporting
through the QLTC-8C and QLTC-10C automatic traffic
counters



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The concept of the system

Traffic Agent® system is an application, which enables automatic traffic monitoring and reporting on traffic state through vehicle counter devices and represents an upgraded basic function of vehicle counting and classification. The concept of the system is based on a very capable and precise traffic counters, namely the QLTC serieses, and on modern telecommunications and information technology, which enables publishing of traffic data in real time on the worldwide web.

In a selected time interval the QLTC-8C traffic counters record following traffic parameters:

- number of vehicles,
- driving direction,
- class or type of detected vehicles, which are classified as follows: motorcycles, passenger cars, multi-purpose vehicles, light duty trucks, medium duty trucks (<7.5 t), heavy duty trucks (>7.5 t), duty trucks with a trailer, buses, articulated buses and unclassified vehicles,
- speed of vehicles,
- classification of vehicles into sixteen definable speed classes,
- time gap between vehicles,
- time occupancy of the carriageway.

Besides the interval recording of above-mentioned traffic data the before-mentioned traffic counters can automatically generate information on current real states of traffic on locations, where they are installed, and submit the data in real time to the data collecting center. Collected information on traffic states on observed locations can be used for traffic data, which can be published on the worldwide web.

System operating

The definition of a traffic state for each driving lane individually is based on measured values in a selected time interval according to:

- average speed of vehicles,
- average time between driving vehicles, and
- occupancy of the carriageway, given in promilles, as a ratio between the occupancy time of measuring sensors and time of interval observation.

When defining traffic states the values of previously defined parameters are also considered. The parameters are determined for each counting location and for each driving lane individually, based on empirical observations:

- low marginal speed of vehicles,
- normal marginal speed of vehicles,
- high marginal occupancy of the carriageway,
- low marginal occupancy of the carriageway,
- short marginal time between vehicles,
- normal marginal time between vehicles.

Based on “post-event” observations the device can calculate the traffic state from the obtained data in user-selected intervals and submit the state to the data collecting center.

In order to submit data to the purpose-based **QLTCnet server** program, a physical or wireless data connection has to be established. For the communication over GSM/GPRS system the counter unit is equipped with an integrated module, for the physical communication on the other hand, we can use an optimized RS-485 data connection. Besides the basic function of the program, which includes automatic storage and transfer of data from traffic counters, the program also collects and submits data on current traffic states on measuring points that are included in the Traffic Agent System. From data, which are stored in internal database, the program forms a report, which includes relevant data on traffic state for individual measuring point as well as data on individual measuring point (road number and category, driving directions of each lane, speed limit prescribed for the measuring point concerned, GPS coordinates of the measuring point concerned etc.). The report is formed in a standard **geoRSS** format, which is submitted to the online application. The online application can publish data on current traffic state on the worldwide web.

Traffic states

GREEN – Normal traffic

The system detects the state **normal traffic** when the rate of the vehicles in a queue is low or when there is no queue at all. The speeds of the vehicles are within the average speed of the measuring point or higher.

BLUE – Increasing traffic

The system detects the state **increasing traffic** when the number of vehicles is increased; however, the average distance between the vehicles remains relatively big. The speeds of the vehicles are within the average speed of the measuring point or higher.

YELLOW – Dense traffic

The system detects the state **dense traffic** when the majority of the vehicles is driving in a queue, however, the speeds of the vehicles are within the average speed typical of the measuring point concerned or even higher.

ORANGE – Heavy traffic

The system detects the state **heavy traffic** when vehicles are driving in a queue with a speed that is a little bit lower than the average speed typical of the measuring point concerned.

RED – Heavy traffic with traffic congestions

The system detects the state **heavy traffic with traffic congestions** when vehicles are driving in a queue with a very low speed or when vehicles fully stop from time to time on the measuring point.

BLACK – No traffic

In case no vehicle passes the measuring point in a selected interval (5 minutes), the device submits the state *No traffic*.

BLACK – No data

If more than 30 minutes have passed since the last traffic state detection for an individual measuring point and there isn't any new information due to eventual communication outage or traffic counter error, the system erases the last traffic state and gives the value "No data".

The form of the report on traffic state

For each measuring point, for which the traffic state is published, following values are given:

- road number and category,
- location of the measuring point with a link to the location shown on the map,
- driving direction,
- lane, to which data relate,
- date and time of the traffic state count,
- traffic state in form of six-stage descriptive state,
- average speed of vehicles in an assigned interval in km/h,
- number of vehicles in an assigned interval, calculated according to the number of vehicles unit per hour,
- average gap between vehicles in seconds,
- occupancy of the carriageway, given in promilles, as a ration between the time of the measuring sensors occupation and time of interval observation, given in percents.

Defining marginal parameters

In order to determine the traffic state, which reflects a real situation, it is of crucial importance to define following marginal parameter values:

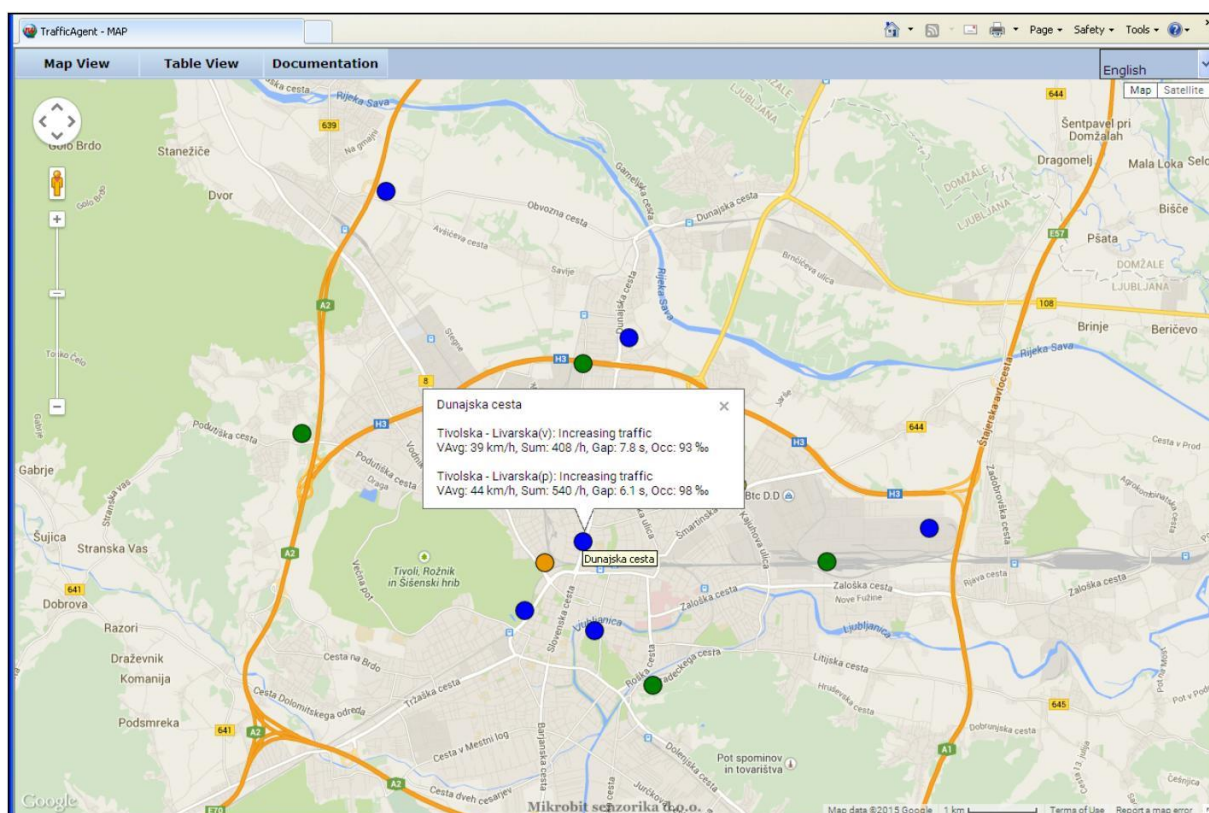
- low marginal speed (Speed Red),
- high marginal speed (Speed Green),
- high marginal loop occupancy (Occupancy Red),
- low marginal loop occupancy (Occupancy Green),
- short marginal gap between vehicles (Gap Red),
- normal marginal gap between vehicles (Gap Green).

Traffic Agent system enables you to define the above-mentioned parameters individually for each measuring point as well as individually for each lane of the measuring point. Empirical studies have shown that it is reasonable to adjust the parameters to the type of the road and to the speed limits that are prescribed on individual measuring point. Thus, it is reasonable to create at least three sets of marginal parameters according to the type of the road.

Web application to show actual traffic states

The figure below shows real time traffic states on map which is measured and calculated with QLTC-8C and/or QLTC-10C devices. Each circle on the map presents one location where traffic state is measured. By clicking selected circle a detailed description of traffic state is displayed. The color of the circle is selected according to the actual traffic state:

- Green – normal traffic
- Blue – increasing traffic
- Yellow – dense traffic
- Orange – heavy traffic
- Red – heavy traffic with traffic congestions



Data are refreshed every 5 minutes with actual traffic states.

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