

Technical characteristics of MLIS and MNIS PTPDO 1.2

The names of the proposed software products are: **Multilingual local instrumental system of public transport passenger delivery optimization**, version 1.2 (MLIS PTPDO 1.2) and **Multilingual network instrumental system of public transport passenger delivery optimization**, version 1.2/upc (MNIS PTPDO 1.2/upc).

1. General characteristics of the products

1.1. Business benefits

Provision of an opportunity to any interested users who are related to passenger transportation to operatively solve tasks of finding the optimal strategies of delivering a passenger by public transport to the to required destination point.

1.2. Products positioning

Markets of software and network computing services to solve tasks of public transport passenger delivery optimization.

1.3. Information about users

Potential users of MLIS PTPDO 1.2 and MNIS PTPDO 1.2/upc are:

- guests and residents of cities using public transport for moving inside of them;
- city services, which are various reference services in places of congestion (stations, hotels, service centers, etc.).

2. Products overview

The programs **MLIS/MNIS PTPDO 1.2** are designed to find optimal strategies of passenger transportation by existing urban transport of the following five types: bus, fixed-route taxi, trolleybus, tram and metro. At that is minimized the travel time of a passenger between the given initial and final points, taking into account the possible restriction on the allowable number of passenger boardings onto different transport vehicles. To solve these tasks, you need the appropriate databases of routes networks (DBRN2s), the creation of which is provided in MLIS/MNIS.

MLIS/MNIS PTPDO 1.2 are multilingual programs. Alternative languages of their interfaces are stored in separate files, called *language shells*. These programs include two such shells: Russian and English, as well as a special program of version 1.0 called "**Генератор языковых оболочек (ГЯО 1.0)** (Generator of language shells (GLS 1.0))", that allows users themselves to create such shells for any languages in which they usually communicate.

MLIS PTPDO 1.2 is an offline program, designed for a particular user (the lite version of this program is free).

MNIS PTPDO 1.2/upc ensures the provision of network services to multiple users. This system consists of two parts: one remote module of optimization (MO), which is a part of the Universal processing center (UPC) 9 MNIS 1.0 (that is why the suffix "/upc" is indicated in the name of this MNIS), and numerous automated work places (AWPs) targeted at specific MNIS users. Each such AWP is designed to prepare by a separate user the input data of the tasks to be solved and to output the calculation results, and the synthesis of optimal strategies of delivering a passenger to the desired destination point takes place in the MO. Information link between AWP and MO can be carried out via the Internet, over the local network or even on the computer bus of a single user of AWP. In the first and second cases MO is located on the network server, and in the third - on the computer of the indicated user. At that, there is ensured the operativeness and full automation of the AWP interaction with this module.

MLIS/MNIS PTPDO 1.2 are created on the basis of a new science-intensive information technology of automation of control of discrete technological and information processes (IT AC DTIP), having many uses, the founder of which is the author of these multilingual programs. A set of lite version of MLIS PTPDO 1.2 can be downloaded from any of two websites of the author: "Promotion center of IT AC DTIP" (<http://dtip-burlakov.com/en>) and "Implementation center of IT AC DTIP" (<http://dtip-optim.com/en/main>). There also the user can solve remotely up to 10 test tasks in MNIS PTPDO 1.2/upc.

Areas of possible use of MLIS/MNIS PTPDO 1.2 are **transport and the sphere of public services**.

Year of release the programs MLIS/MNIS PTPDO 1.2 - 2018 (year of MNIS update to version 1.2/upc - the same). Place of development - Kiev (Ukraine).

3. Products functions

MLIS/MNIS PTPDO 1.2 allow to solve the tasks of finding such strategies for the delivery of a passenger to the desired place by city transport, at which the time of its delivery is minimized with a possible restriction on the permissible number of passenger boardings on different routes.

Input data of the task being solved:

- DBRN2 of a required city;
- the allowable for use types of transport routes;
- addresses of initial and final target points;
- walking speed of a passenger;
- allowable number of passenger boardings in different routes (optional parameter);
- minimum allowed transit time of a passenger between two neighboring nodes of the routes network (system restriction).

In the basis of solving the tasks of public transport passenger delivery optimization lies the method of numerical optimization of discrete processes of service, as well as a unique scheme to optimize such processes developed by the creator of MLIS/MNIS PTPDO 1.2.

4. Restrictions

- maximum number of transit sections in a roads network - **200000** (for lite version of the program MLIS PTPDO 1.2 - **10000**);
- maximum total number of entrances-exits of pedestrian crossings - **600000** (for lite version of MLIS - **10000**);
- maximum number of ground transportation stops - **65000** (for lite version of MLIS - **50**);
- maximum number of metro stations - **999** (for lite version of MLIS - **50**);
- allowable number of phase states of an optimizable process - **1000000** (for lite version of MLIS - **10000**).

5. Practical application

MLIS/MNIS PTPDO 1.2 were put into operation in April 2018 (MNIS was updated to version 1.2/upc in July of the same year). Now comes the stage of the search for potential dealers and users of these systems.

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