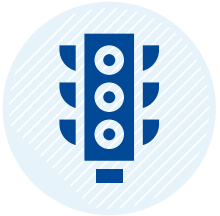
SEA | INNOVATIONS & EFFICIENCY

SEA TRAFFIC CONTROL SYSTEM (SEA TCS)

The main tasks of applying the automated traffic control system

reduction of congestion of urban roads, traffic jams that create numerous problems for road users in metropolises;



providing communication with traffic lights and operating control;

consistency of traffic lights` operation modes, which reduce the throughput and speed of traffic flow;

reducing the load on the road surface;

reducing the concentration of exhaust gases in places of vehicles' accumulation;

improving road safety.

Traffic management with SEA TCS

The issues of organising traffic regulation in a city can be solved using a modern automated traffic control system SEA TCS, which allows to simultaneously traffic control, monitor the performance of traffic lights and control street lighting.

The introduction of traffic control system allows:

- Reduce the likelihood of traffic jams and reduce vehicle delays by 15-30%
- Reduce the noise level caused by the congestion of vehicles & reduce exhaust emissions by 10-20%
- Significantly improve safety as well as the efficiency of traffic control

SEA TCS was developed in accordance with DSTU 4157, 4158 standards and modern methods for building road automation systems.

Main functions of SEA TCS

SEA TCS provides the following functions:

- Local and coordinated traffic management at road network facilities;
- Dispatch management of separate traffic light objects or groups of objects;
- Continuous monitoring of the state of peripheral equipment (road controllers, traffic lights, etc.), existing malfunctions;
- Displaying the status of traffic lights and cyclograms in real-time;

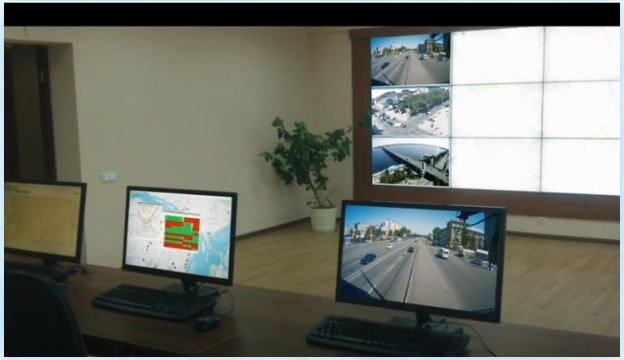
Ability to control a group of traffic lights simultaneously (named dynamic mode "green wave"), which allows to display on the installed special electronic boards the recommended speed for drivers so that vehicles do not linger at traffic lights (control is carried out by traffic lights, information boards, electronic road signs and lighting of pedestrian crossings).

These functions are managed by officials through the WEB-interface of automated workstations and the WEB-interface of road controllers.

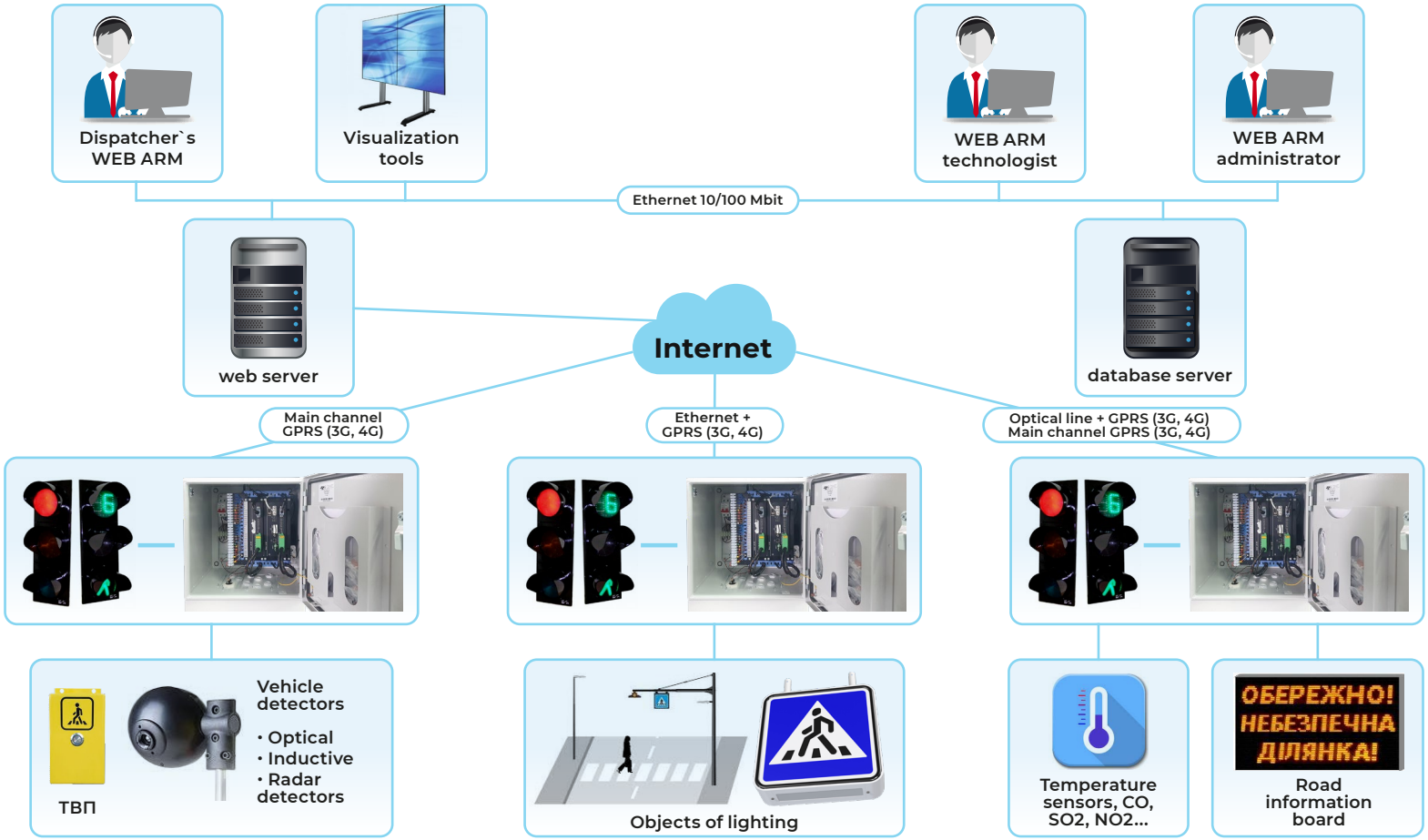
WEB ARM dispatcher

WEB ARM technologist

WEB ARM administrator



SEA TCS structure



The structure of the SEA TCS software

The SEA TCS software is built on a client-server architecture.

Clients are:

- Road controllers
- TCS users automated workstation
- Software modules and objects of TCS software

The server part includes:

- Database server - provides storage of accumulated data and their exchange with clients;
- Internet server - ensures the performance of system-wide and service functions, as well as the storage and operation of program modules, the operation of the WEB server.

Central level

The software level of the WEB-portal interfaces of automatic user workplaces

The software is designed to provide users with access to manage TCS functions

Server Software Level

The software is designed to ensure the performance of all the TCS`s upper level functions

Control commands
Completion confirmation
Incidents, communication control
Self-test, Telemetry
Updates of built-in firmware
Certificates

Open exchange protocols: SEA RTC; OCIT

Local level

The level of built-in firmware of road controllers (RTC)

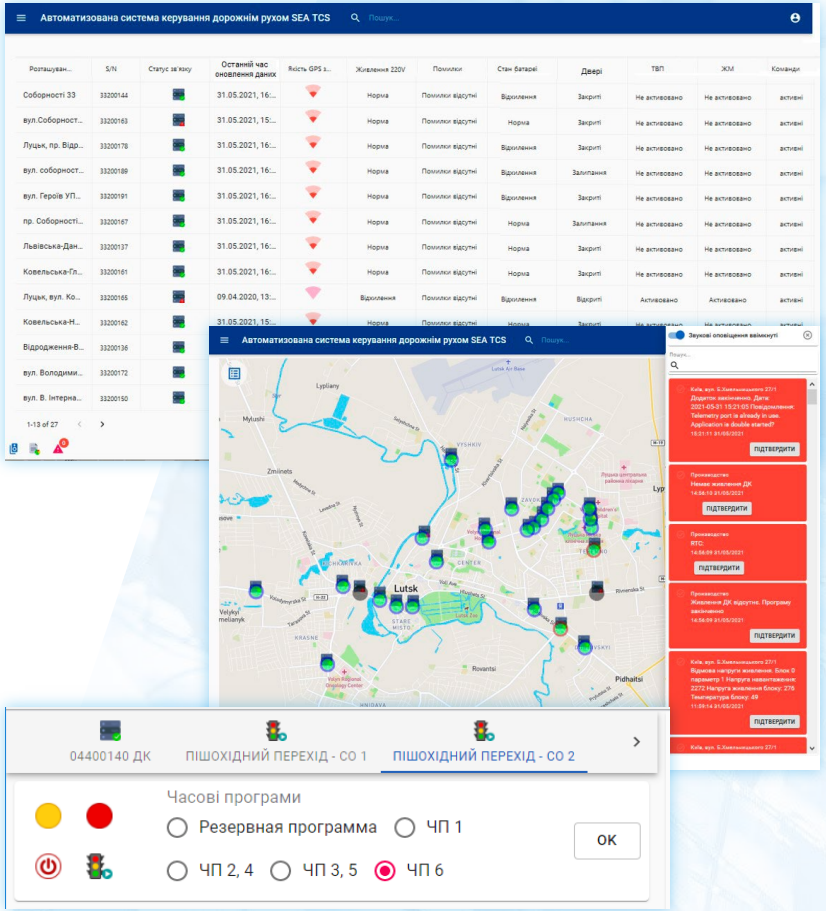
The software is designed to ensure the performance of all RTC functions

Configuring, diagnosing and monitoring the functioning of the RTC is carried out by the WEB interface

The interface of the traffic management system. Dispatcher's automated workplace.

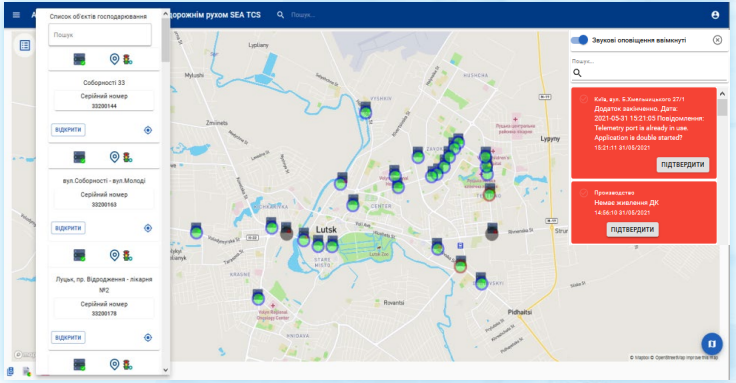
Key features:

- monitoring the state and parameters of the road controllers and other objects of TCS;
- management of priority travel routes (enabling/disabling route segments);
- management of coordination highways;
- managing the state of intersection groups;
- managing the state of one selected intersection through direct control by the dispatcher of the selected road controller;
- visualisation of the cyclogram and simulation of the object operation in real time;
- recording of all messages and operator actions;
- viewing protocols of TCS operation.



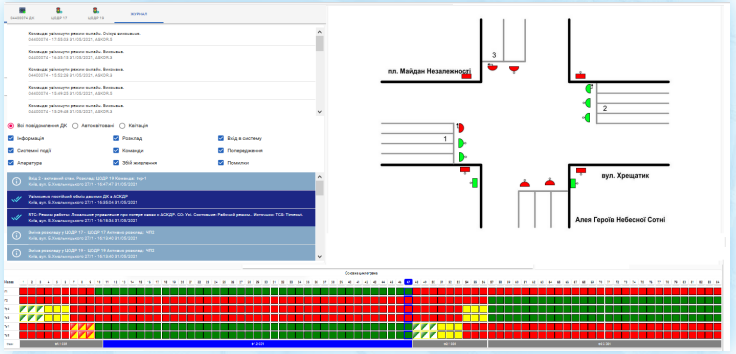
The interface of the traffic management system. Dispatcher's automated workplace.

The map of the controlled and selected object provides complete information about the selected road controller and operating modes of traffic lights. Also, the map displays the existing cyclograms of the selected traffic light, the log of sent or executed commands and other operating notification of the object.



To search for the necessary road controller or traffic light for further detailed control and analysis of their operational status, the interface has a convenient menu with the ability to search by number and address with a transition to the position of the selected object on the map.

Dispatchers are notified about all critical events, other operational messages by an audible signal and simultaneous display on the critical messages sidebar of the dispatcher's interface.

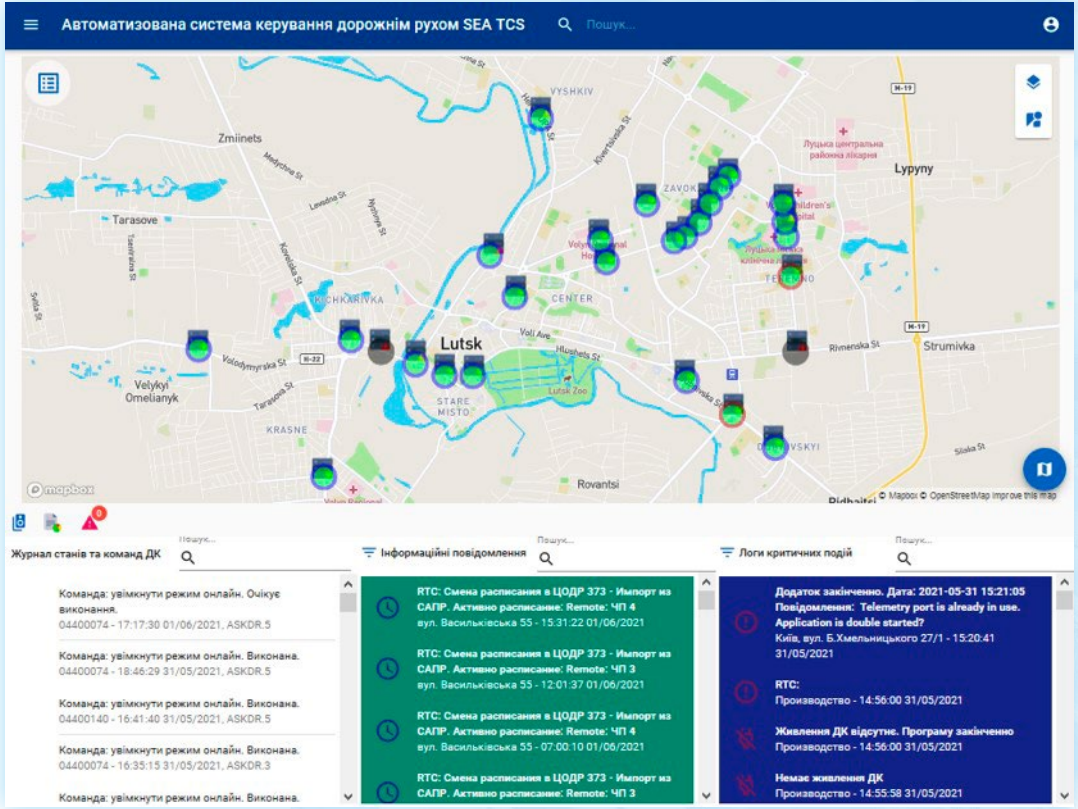


After acknowledgment and making comments (if necessary or in accordance with the job description), these notifications could be removed from the panel, but they remain in the general log of the system.

The interface of the traffic management system. Dispatcher's automated workplace.

Notification bar is designed to display, what happened in the TCS. The panel is located at the bottom of the working area of the interface.

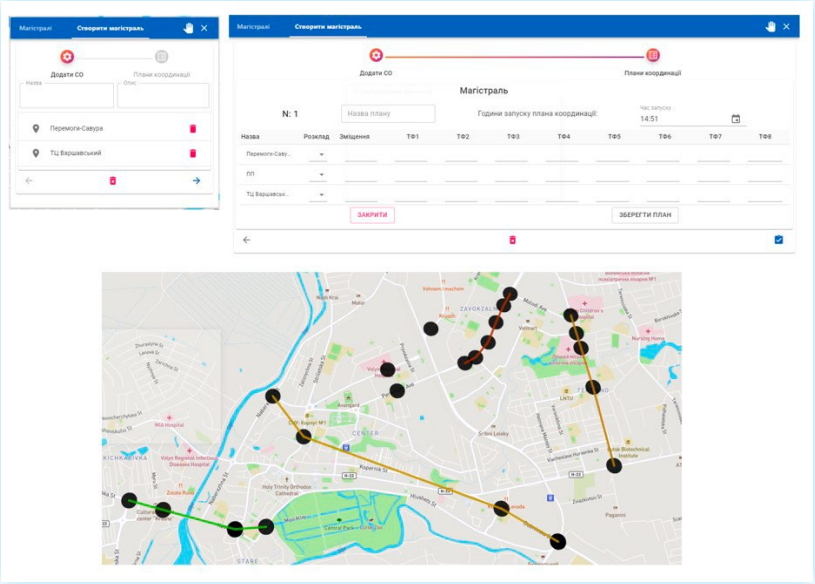
In the case of using high resolution video walls, the information flow can be processed by several dispatchers at the traffic control centres of a megacity with a large number of road traffic controllers (RTC), traffic lights and other auxiliary equipment.



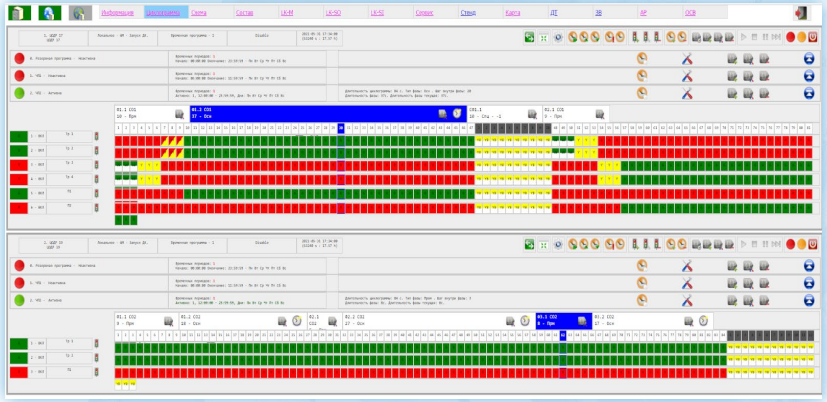
Interface of the traffic control system Technologist`s automated workplace

Key features:

- configuring time programs for traffic lights and preparing configuration files for road controllers for their further application;
- adding road controllers to the system after their installation at road network facilities to create coordinated traffic highways and coordination trunk plans;



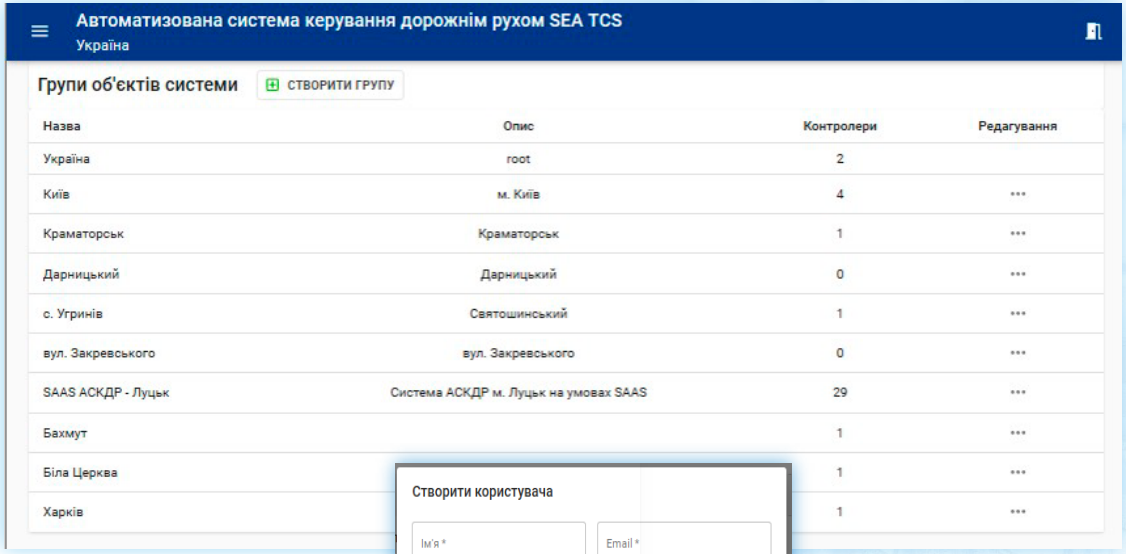
- road controllers SEA RTC can manage one or more independent traffic light objects depending on the topology of the object;
- setting up road controllers allows you to enter an unlimited number of daily programs;
- daily program settings are flexible with the functionality of working with different types of phases (basic, intermediate, adaptive, "green wave", special, technological). The number and duration of cyclogram cycles are not limited.



Interface of the traffic control system Administrator's automated workplace

Key features:

- adding/editing and blocking user accounts;
- creation of user groups in the case of a branched staffing structure of the enterprise serving SEA TCS;
- setting up the operation of the system server and database management system;
- carrying out periodic archiving of the database and technical service of the system.



WEB ARM administrator

Benefits of SEA TRAFFIC CONTROL SYSTEM

Information security. All information circulating in the system is encrypted using modern cryptography methods. The TCS users have access to the functions provided by the pre-set system access rights. All user actions and all system events are logged and recorded in real time.

Equipment safety. The condition of the equipment is controlled by hardware and software, locally and remotely according to algorithms that exclude the possibility of dangerous operation state of traffic lights and additional equipment (peripheral devices).

Coordination and adaptability. Implemented traffic control according to coordination plans in automatic mode. The traffic controller is equipped with traffic detectors, therefore, the operation of traffic signalling is ensured in adaptive control modes.

Stable communication with control objects. Modern communication channels between equipment: wired and fiber optic lines of local networks, mobile Internet channels (2G, 3G, 4G).

Advanced features. Possibility of controlling the software and hardware of one road controller by several functionally different control objects. This provides ample opportunities for upgrading and automating the work of existing and future peripheral devices (lighting objects, barriers, information boards, etc.).

Interface convenience. Instantaneous response to changes in the state of the system or its individual elements, critical events and situations is provided using the ability to customize the interfaces of user workstations, the presence of sound signals, the informativeness of conditional labels.

Comparison of existing solutions of road traffic controllers involved in the construction of other automated traffic control systems and SEA TCS

Indicator	Other ATCS	SEA TCS
Types of controllers	Diverse, some controllers do not have the opportunity to be involved in the certain TCS in the future and require additional costs for their replacement	The SEA road controllers are standardised with flexible configuration capabilities to meet the requirements of control object projects, equipped and ready to operate as part of the automated traffic control system.
Necessity of additional equipment for road controllers	Requires additional communication units, GPS receivers, which leads to significant additional costs for their acquisition	SEA road controllers do not need additional equipment. They are already equipped with GPS receivers, 3G modems, RJ45 ports for connecting to TCS
The minimum number of controllers for the organisation of TCS	Relevant for small towns. A relatively small number of controllers makes it economically inexpedient to purchase and install automated control systems.	The purchase by the Customer of even one of any controller (including the minimum configuration) makes it possible to connect it to the SEA TCS on SaaS terms (subscription fee)
Configuration Services (road controllers for specific traffic lights)	Provided for an additional payment (up to 2..5% of the cost of road traffic controllers), or not provided	Included in the cost of road traffic controllers
Remote technical support	No remote support option for road controllers	Technical support can be remote without visiting the facility
Support for open exchange protocols within TCS	Not supported (limited support)	Supports open exchange protocols. Built-in road controler software provides, if necessary, adaptation to existing and future protocols

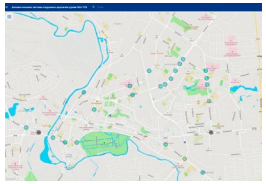
Application options of SEA TCS

1. SaaS based access. Deployment on the basis of the SEA Company server, providing access to users based on a subscription fee. The option is relevant for small towns.

2. Software acquisition. Deployment of TCS is carried out on the basis of a physical or virtual server of the Customer.

SaaS based access

Client's SEA TCS control point



Combined workplace:
- dispatcher/ technologist/ administrator

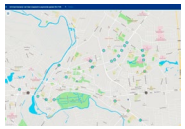
Equipment option:
PC with browser

The SEA company provides the customer with access by prepaid subscription (Saas):

domain name of the server and details of access to the cluster (group) of customer objects;

provides maintenance.

Internet



Access to a cluster of customer objects

Mobile Internet operator (provides the Customer the main communication channel with the road traffic controller)

Internet provider (provides the Customer a communication channel with a cloud service and a backup channel with the road traffic controller)

Acquisition of TCS software

Customer's SEA TCS control centre

Workplaces:
- dispatcher
- technologist
- administrator

Equipment option:
PC with browser, visualisation tools (video wall), local area network

Internet

Virtual server located on the basis of hosting:

SEA TCS software core, WEB server, domain name for access to SEA TCS

Hosting provider

Mobile internet operator (provides the Customer the main communication channel with the road traffic controller)

Internet provider (provides the Customer a communication channel with the cloud service and a backup channel with the road traffic controller)

Domain Name Provider

Physical server located on the basis of the Customer:

SEA TCS software core, WEB server, domain name for access to SEA TCS, external fixed IP address

Equipment for SEA TCS

road
controllers

LED road traffic lights (transport and pedestrian) - can be additionally equipped with a countdown timer and sound notifications.

pedestrian crossing
lighting

road signs and
information boards with
variable information

video cameras, traffic
detectors

SEA Road Controllers (RTC)

The SEA company offers certified road controllers SEA RTC (Road Traffic Controller) of its own production to control traffic light objects. These devices meet all the requirements of **DSTU 4157:2003 "Peripheral technical means of automated traffic control systems".**

Design features:

- block construction;
- three options (small, medium, large) of metal cabinets for placing controller units and additional equipment;
- three options for installing a road controller (on the foundation, on the support, combined);
- equipped with an electricity meter (optional), voltage relay, arresters, uninterruptible power supply, cabinet lighting, heating element with thermostat (RTC01, RTC03);
- a sufficient number of sealed cable glands for connecting traffic lights and other loads;
- the ability to install a WI-FI USB adapter and other additional equipment (vehicle detectors, various sensors, etc.);
- ensuring moisture protection and dust protection of the controller at the level of IP56 (DSTU EN 60529);
- combined vandal-resistant GPS + 3G antenna;
- controller service life: ≥10 years.

Model range

RTC02-08-002-0-0-GPRS ..... 8 outputs, 2 inputs

RTC02-16-002-0-0-GPRS ..... 16 outputs, 2 inputs

RTC01-24-010-0-0-GPRS ..... 24 outputs, 10 inputs

RTC01-32-010-0-0-GPRS ..... 32 outputs, 10 inputs

Transport and pedestrian traffic lights

- The parameters of the traffic lights comply with the norms of DSTU 4092 and DSTU EN12368
- Availability of an external diffuser lens specially designed for an optical system with a central light source and a Fresnel lens built into the light source
- The ability to equip traffic lights with a countdown display ensures the safety and comfort of road users.
- The average power consumed by one traffic light section does not exceed 12 W.
- The front lenses of the modules are discoloured and completely exclude phantom illumination.
- The enclosures are made of high quality black polycarbonate, which guarantees a 10 year life limit under the most adverse environmental conditions.
- Degree of protection of traffic lights and modules - IP65
- Operating temperature: from -40°C to + 70°C
- Traffic light weight - from 7 kg to 11 kg (depending on the version)
- The design of the traffic light implies the attachment of additional sections to it, and also allows you to install the device on all types of consoles, walls and extensions.
- The warranty period is 5 years

Transport

Pedestrian

Devices for sound notification and control of the pedestrian phase of the traffic signal

- Designed for sound accompaniment of the pedestrian traffic light phase.
- The use of sound warning devices can reduce the risk of accidents at pedestrian crossings.
- Allow people with disabilities to fully participate in daily traffic.

Devices for sound notification and control of the pedestrian phase of the traffic signal can be mounted inside pedestrian and traffic lights. It is equipped with an external additional 15 W speaker, a USB interface for editing settings and replacing the played audio mp3 files with street names, and a 0.8 metre input signal cable. Power supply 220 V AC is carried out from the red and green signals of the road controller.

LED Pedestrian Crossing

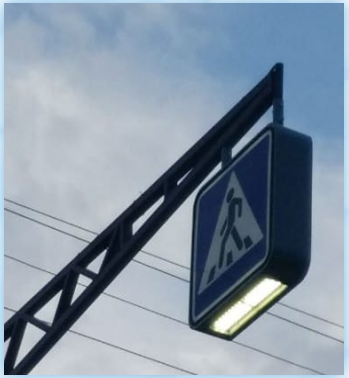
Carried out with the help of modern LED road signs "pedestrian crossing" and console lamps of a special design.

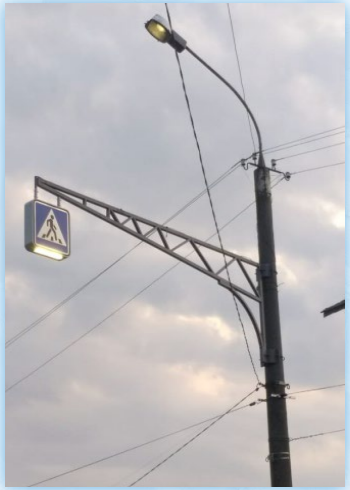
The parameters of the LED road sign manufactured by SEA comply with the DSTU 4100 and DBN V.2.5-28-2018 standards.

Features:

- double-sided LED illumination and built-in LED lamp with asymmetric optics;
- mains powered 100-305 V or autonomous power supply (from solar panels);
- power consumption 80 W;
- power of the built-in lamp 60 W;
- luminous flux 7000 lm;
- climatic zone UHL1 (operation in the range from -40°C to +50°C);
- size I, II according to DSTU 4100-2014;
- protection against environmental influences at the level of IP65;
- the possibility of installation both on a support and on a console a removal or using a suspension on a cable.

The secondary optics of the built-in lamp allows the sign to cope with the lighting of 1-3 traffic lanes.

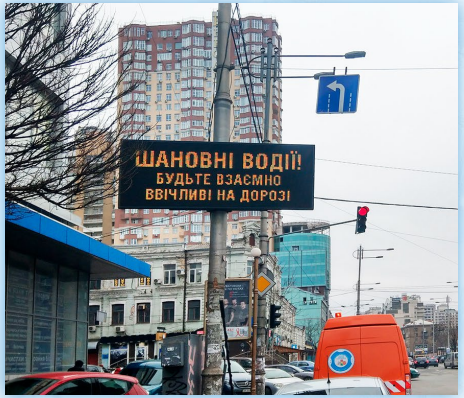




Road signs and information boards with variable information

LED road information boards and road signs with changing information produced by SEA Company are full-colour LED boards designed to inform road users about the conditions and traffic modes on public roads, roads and streets of urban and rural settlements.

The characteristics of the board comply with DSTU 4241 and EN12966.



Overall size of the board: ..... at the request of the Customer
Pixel Pitch: ..... 10 mm, 8 mm, 6 mm
Brightness: ..... ≥ 5500 nt
Horizontal viewing angle: ..... not less than, 120°
Vertical viewing angle: ..... not less than, 60°
Guaranteed service life: ..... 80 000 hours
Protection class: ..... IP 65
Power consumption, maximum: ..... up to 900 W/m²
Board supply voltage: ..... 220 V, 50 Hz
Board weight (with fastening system): ..... up to 50 kg/m²
Operating temperature: ..... -40...+70°C

The information board is managed centrally.

AUTOMATED URBAN LIGHTING CONTROL SYSTEM

UNIFIED PARKING SPACE SYSTEM

WIM - DYNAMIC WEIGHING SYSTEM FOR VEHICLES IN MOTION

MANUFACTURED BY

SEA COMPANY

ELEVATOR DISPATCHING SYSTEM

WATER DISTRIBUTION AND CONSUMPTION ACCOUNTING AND MONITORING SYSTEM WITH DISPATCHING

SEA TRAFFIC CONTROL SYSTEM (SEA TCS)

Thank you for your attention!

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