Sitraffic ESCoS
The cooperative traffic system for the digital road of the future
Sitraffic ESCoS: The new benchmark for cooperative traffic systems!
The ongoing digitalization known in the industrial context as “Internet of Things” or “Industry 4.0”, is taking to the world of road traffic under the name of “Car2X” technology. This networking technology enables cars to communicate and cooperate with each other and with the traffic infrastructure. The digitalization of our roads and streets is already in full swing!

With Sitraffic® ESCoS, Siemens is now offering the first technical platform for real-time data exchange between vehicles and traffic control equipment, via dedicated roadside units. ESCoS is short for EcoSystemCooperativeSysteme. With Sitraffic ESCoS, road traffic is a big step closer to cooperative mobility, and the implementation of the “digital road” off to a brilliant start.

**Tomorrows transport will be networked. And tomorrow starts today.**
In the future, cars will warn each other of potential hazards such as accidents or black ice. They will know about the location of roadworks and the switching phases of traffic lights and be able to react accordingly. This will make for safer and more convenient travel and faster arrival at the destination. But there is an essential condition: Situation-relevant information about coordinated green phases/switching times, congestion, roadworks, wrong-way drivers etc. must be made available directly to the car – in urban traffic as well as on the motorway. With Sitraffic ESCoS, Siemens has now developed a benchmark product that provides the required technical platform for this.

More information = less congestion, fewer casualties!
The experts of the German Association of the Automotive Industry (VDA) are convinced that networked driving will reduce congestion in Germany by 20 % and that the use of the “weather hazard alert” function alone would prevent 5 % of traffic casualties by warning road users of dangerous conditions such as torrential rain, black ice and crosswinds.
The Siemens system for cooperative solutions is an integral part of the most extensive traffic management system landscape currently available worldwide: Sitraffic. This means that all Sitraffic ESCoS components are optimally designed for meeting the special requirements of today’s traffic engineering equipment. Communication technology and traffic technology are carefully matched for seamless integration, based on the wealth of expertise of the global market leader in this field.

Sitraffic ESCoS: Two-way communication
The new Siemens platform for cooperative traffic systems ensures that everybody and everything involved is provided with the necessary information – directly and in real time. On the technical level, the system consists of RoadSide Units (ESCoS RSU) and Central Management System modules (ESCoS CMS).

1. At any point of the route, the ESCoS RSUs can provide passing cars with tailored real-time information (e.g. red/green switching times, congestion information, hazard warnings) that help shorten travel times and increase safety.

2. The ESCoS CMS modules, in turn, collect data that the cars are transmitting via the RSUs. The constantly updated data help generate a more precise picture of the current traffic situation and initiate targeted traffic management measures. Thus the RSUs turn the vehicles on the road into mobile detectors that provide the single-car data needed for improved traffic data quality.

The RSU roadside unit: Link between vehicle and infrastructure
Sitraffic ESCoS RSUs act as ‘messengers’ between the vehicles and the infrastructure. The RSUs are WLAN-based radio modules that can be mounted on sign gantries, mobile roadworks trailers or traffic light masts. Every RSU is both a transmitter and a receiver. It transmits real-time information to passing vehicles, for instance speed limits or black ice and congestion warnings. And it receives data from cars, environmental detectors, traffic controllers and traffic control centers. It collects data on the speed and type of passing vehicles, for instance, and autonomously counts the number of vehicles per hour. Thus the RSU is also a full-fledged traffic detector – an ideal multi-purpose solution. The environmental sensors transmit data on temperature, humidity and light intensity data etc., while the traffic controllers and traffic control centers provide the RSU with information on congestion, speed limits and recommended diversion routes.

The CSM modules: Managers of the RSU roadside units
Special management modules – Sitraffic ESCoS CMS (Central Management System) – have been developed to take over the configuration and management of the RSU roadside units. Such modules can be integrated in existing Siemens traffic control centers such as Sitraffic Scala and Concert, or deployed as ASP solutions. Their basic function is to manage the field-level equipment, i.e. the RSUs, from A to Z:
• equipment monitoring
• remote support function
• hazard alert support function

The HMI is as user-friendly and clearly structured as operators of Sitraffic equipment worldwide have come to expect: A range of task-tailored screens such as Map, List, Detail and Problem Management make it easy to configure and manage the RSUs. Communication with the RSUs can run over-the-air or via existing cabling.
Sitraffic ESCoS system components: The real-time data link between road, infrastructure and vehicles
Information on mobile roadworks
ESCoS RSUs mounted on mobile roadworks trailers transmit
the relevant information – in real time – to the vehicles as well as
to the traffic management center. This helps improve road
safety at and around roadwork sites. (In Germany there are plans
in place to equip all roadworks trailers with cooperative
technology.)

Remaining red time and remaining green time
Approaching vehicles are informed of the time that remains
until the next phase change. This information allows the driver
(or the vehicle’s semi-autonomous system) to adapt the speed to
the current situation, e.g. for profiting from coordinated green
phases along an extended stretch of road. New vehicle models are
able to use this information directly in their start-stop function.

Intelligent parking space management
The real-time data transmitted by the RSUs can pilot a car
directly to the next available parking space. This helps minimize
parking-related traffic and optimizes the utilization of
municipal resources.

Wrong-way driver alert
The RSUs are able to detect any wrong-way driver almost
immediately and warn upcoming drivers in real time of the
danger. At the same time, the ESCoS CMS modules send out an
early warning to all drivers approaching an interchange to
the motorway section in question.

Sitraffic ESCoS:
A selection of applications for safer,
faster and more convenient travel
Dynamically coordinated green phases
The RSU relays all relevant information from the traffic signal system to the approaching cars so that the latter can adapt their speed to the coordinated green phases. This helps smooth the traffic flow and reduces overall pollutant emissions.

Priority for emergency vehicles and public transport
ESCoS RSU cooperative technology supports the available Car2Car technology in preventing accidents at intersections – by enabling real-time communication between emergency vehicles and other road users. In addition, the cooperative technology of the ESCoS RSU makes it possible to give priority to all types of PT vehicles.

Pedestrian presence alert
ESCoS allows for added protection at traffic lights or pedestrian crossing, for instance near schools. The RSU warns approaching motorists of the presence of pedestrians on the roadway.

Flow control for trucks
ESCoS enables central multimodal transport management in and around ports, airports and other logistics hubs – for smooth traffic flows and maximum efficiency. All relevant data, such as information on the general traffic situation or the arrival times of trucks, trains and ships, can be collected, processed, coordinated and optimized.

This QR code leads you to animated videos with detailed descriptions of the different applications and their functions.
Sitraffic ESCoS is already in use on Europe’s roads. In the scope of several major projects, our systems are currently proving their suitability for supporting everyday traffic in the real world – from Newcastle in the UK right across to Vienna in Austria.

**Newcastle, UK:**
**First steps towards automated road traffic**
The European Compass4D project has been set up to investigate various applications of Cooperative Traffic Systems in seven cities, one of which is Newcastle-upon-Tyne in the north-eastern region of Great Britain. In cooperation with the university and with Siemens, the city council has implemented remaining-red/green-time systems, dynamically coordinated green phases, and a prioritization scheme for emergency vehicles.

A total of twelve vehicles of a patient transport service, two electrical vehicles operated by the university and 20 traffic signal systems have been equipped with cooperative technology. Via their on-board units, the vehicles issue ten status reports per second, which the Siemens RSUs pass on to the traffic control center. Motorists can use an app installed on a tablet computer to access the information distributed by the traffic control center. The project has been set up to investigate how the information exchange between cars and the infrastructure can help increase safety and efficiency in road traffic. The results of the project are expected to be available in spring 2016.

**ITS corridor Rotterdam-Frankfurt-Vienna:**
**More safety and better traffic data across national borders**
In an ongoing project, the Netherlands, Germany and Austria are developing a “cooperative corridor” linking cities from Rotterdam to Vienna. Step-by-step, all motorway sections along this corridor are being equipped with a cooperative infrastructure based on RSUs and CMS modules. Among the objectives: providing motorists/vehicles with early warnings regarding roadworks, and transmitting single-vehicle data from the car to the RSUs and ultimately to the connected traffic control centers.

The motorway sections covered by the project are among the busiest in Europe so that any incident can cause massive congestion resulting in dramatically higher fuel consumption and pollutant emissions. Conversely, every backlog prevented means less pollution and less time lost. The eSafety Forum established on the initiative of the European Commission expects a potential for reduction of up to 15 % and an achievable increase in energy efficiency by roughly 20 %.

**A58 testing field in the Netherlands:**
**“Talking traffic” on a high-congestion route**
The A58 motorway between Eindhoven and Vlissingen is a very busy east-west corridor in the southwestern region of the Netherlands and reaches right across the Walcheren peninsula in the Scheldt estuary. So-called “out-of-the-blue” or “shockwave” traffic jams are a regular occurrence on this route.

“Talking traffic” is a new concept for providing motorists with personalized up-to-the-minute information delivered directly to their car. To date, Siemens has equipped the route with 17 ESCoS RSU roadside units and the associated ESCoS CMS modules. The RSUs are reliably relaying information such as speed limits, fog or black ice alerts, roadworks or congestions warnings in real time to passing vehicles and/or the traffic control centers. The recommended speed information sent directly to the vehicles leads to an important reduction of the shockwave effect.
Sitraffic ESCoS in actual use: Networked driving in seven cities, from Newcastle to Vienna
Sitraffic ESCoS: Fit for the future intermodal dialogue on the road ...
... and in the air and on the water...

The technology for Car-to-Car and Car-to-Infrastructure data exchange has already arrived on our roads. In the future, new car models are generally equipped with the required technical systems. The implementation of the corresponding road infrastructure and traffic management systems is under way, with Sitraffic ESCoS playing a key role.

But this is by no way the endpoint of the development, which will lead from technology-supported driving (driver-assistance systems) to networked driving (Car-to-X) and autonomous driving (self-driving cars) right up to piloted driving. And ultimately to the data integration of all transport systems: Airplanes, trains, trams, buses, ships, parking lots – all of them will generate data for use in a wide range of applications that will help make mobility safer, easier and less stressful for everybody. Sitraffic ESCoS CMS is already fully equipped for supporting this intermodal dialogue!
<table>
<thead>
<tr>
<th>Key terms, key technologies and their benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Car-to-Car communication (C2C)</strong></td>
</tr>
<tr>
<td><strong>Car-to-Infrastructure communication (C2I)</strong></td>
</tr>
<tr>
<td><strong>Car-to-X communication (C2X)</strong></td>
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<tr>
<td><strong>Vehicle-to-X communication (V2X)</strong></td>
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<tr>
<td><strong>Cooperative traffic technology</strong></td>
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<td><strong>Infrastructure</strong></td>
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<tr>
<td><strong>Networked driving</strong></td>
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</tbody>
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