SWARCO

C-ITS OVERVIEW

SERVICES & INFORMATION SHARING BETWEEN VEHICLES, INFRASTRUCTURE AND PEOPLE

SWARCO | The Better Way. Every Day.

SWARCO's leading idea is to improve quality of life by making the travel experience safer, quicker, more convenient and environmentally sound.

For this purpose, the Austrian traffic technology corporation produces and provides a large range of products, systems, services, and turnkey solutions for road marking, urban and interurban traffic management, parking, and public transport. Cooperative systems, infrastructure-to-vehicle communication, e-mobility, and integrated software solutions for the Livable City complement the group's future-oriented portfolio.

3800 traffic experts are keen to shape together with all stakeholders in the traffic industry the transition from conventional traffic management to value-added services fit for the traveller in the digital age.

The SWARCO Group is present in more than 70 countries and generates revenues of over 750 million euros.

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The Better Way. Every Day.

WHAT IS C-ITS?

Cooperative Intelligent Transport Systems

C-ITS describe technologies and standards that connect vehicles with other vehicles (V2V) and infrastructure (V2X). The idea originally comes from the car industry with the aim to increase road safety. However, with the same standards, a number of functions and different tasks in traffic control can be implemented.

Challenges

- Passenger **transport** in the EU **will increase by 42%** by 2050.
- **24% of greenhouse gas emissions** come from transport (EU in 2016).
- **Road congestion costs nearly EUR 100 billion** annually – that's 1% of the EU's GDP.
- **1.35 million people die** every year in traffic accidents all over the world.

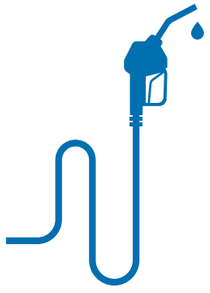
Benefits

-20%

Traffic flow can be optimised by 10% to 20%.

-10%

Fuel consumption can be reduced by 10%.



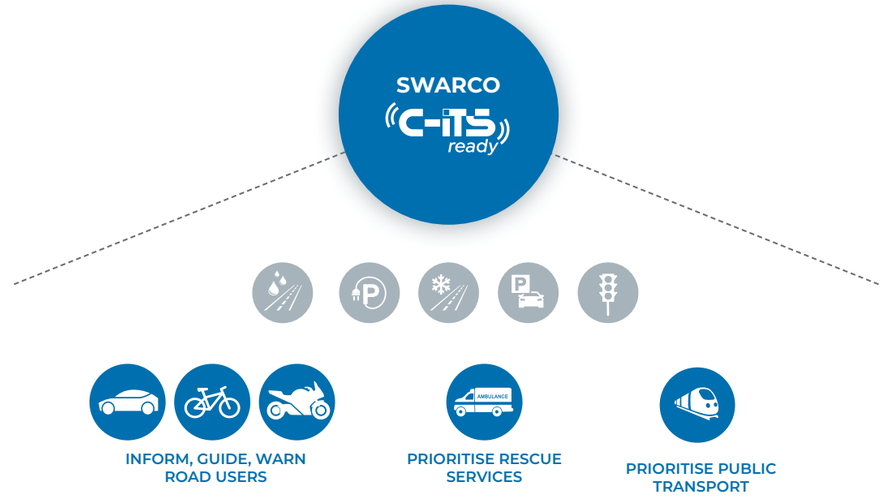
+Safety

Early warnings of dangerous traffic situations avoid accidents and improve traffic safety.

Save lives

by prioritising emergency vehicles over regular traffic.

Solutions



THIS IS WHAT C-ITS CAN DO.

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Position based information in an instant.

Making travelling safer and smoother with less emissions.

GIVE ROAD USERS BETTER INFORMATION

With the help of C-ITS, information on the current and future signalling of a traffic light system can be communicated. When road users know about their individual green wave, this will result in energy savings, significantly less pollution and minimised stops. It also leads to a positive city image and a more attractive driving experience for cyclists and other road users.

PRIORITISE RESCUE SERVICES

Through C-ITS technology, road users can be informed about an approaching rescue service vehicle, which facilitates the formation of an emergency corridor. Moreover it can trigger a program at signal-controlled intersections to switch the traffic lights to green in the travel direction of the rescue vehicle. Then its driver knows that it is safe to enter the intersection without other vehicles or pedestrians crossing the way.

PRIORITISE PUBLIC TRANSPORT

By using C-ITS, a bus can send out a priority request for intersections and receive information about when to drive. Thus C-ITS offers the possibility to track the vehicle movement, adapt the signal phase and give feedback to the vehicle.

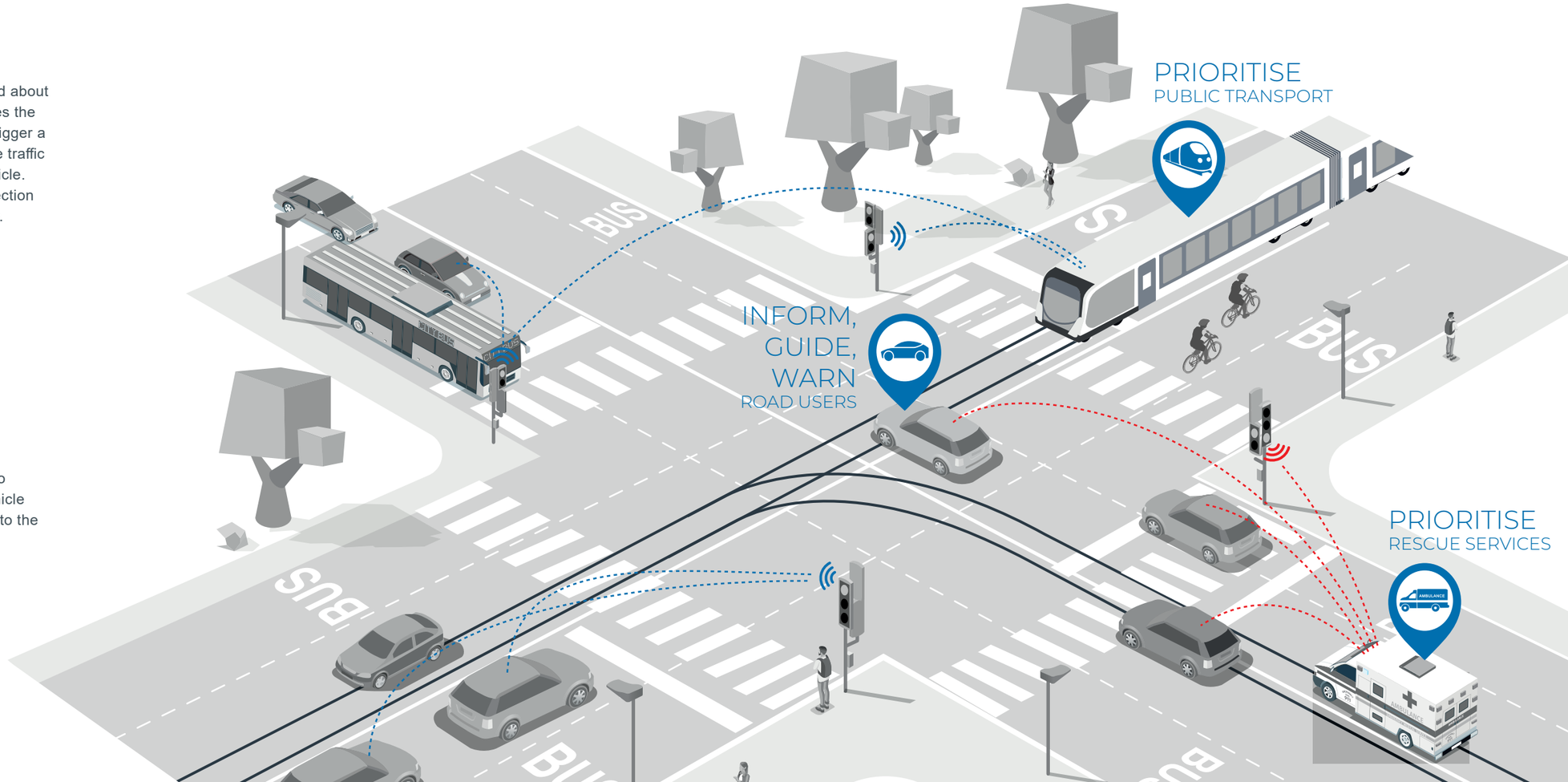
BETTER TRAFFIC FLOW

BETTER INFORM ROAD USERS

REDUCE AIR POLUTION AND EMISSIONS

WARN OF HAZARDS

IDENTIFY AND COUNT VEHICLES AND MEASURE TRAFFIC



C-ITS USE CASES AT A GLANCE

Connected road users are on the way of becoming the next technological revolution. There is a need for new services and cooperative solutions to improve the overall road safety, the efficiency of the transport network and urban quality of life. This can also make the drivers' journeys safer and more convenient.

THE DIGITAL GREEN WAVE FOR TRAFFIC FLOW

Traffic light forecast is a service that improves safety and convenience for drivers by assisting them at intersections. This includes services like Time To Green (TTG) that provides real time information about the traffic light cycles and Green Light Optimised Speed Advisory (GLOSA) that calculates the optimum approach speed to get a green light at the upcoming intersection.

PRIORITY FOR EMERGENCY SERVICES

Using C-ITS, the response of emergency services can be both faster and safer. It can reduce the congestion spillback that hinders emergency vehicles to proceed fast. Additionally, intersections can stop conflicting traffic streams by red lights. This gives more safety to both the emergency vehicles driver and the conflicting drivers.

PARKING GUIDANCE

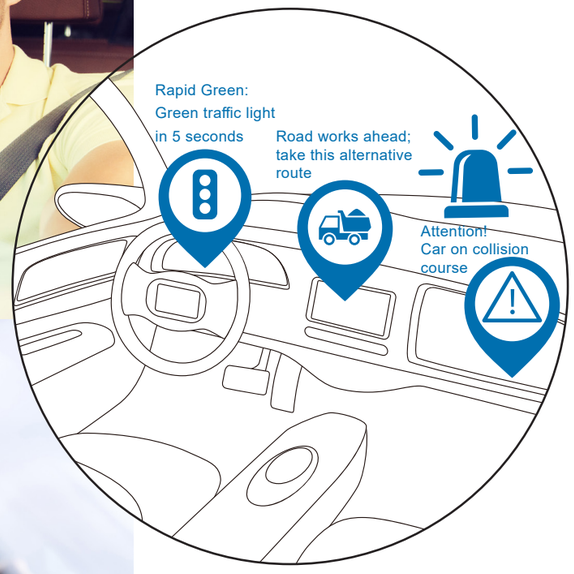
Up to one third of drivers in downtown areas are looking for parking space. This leads to increasing congestion on the access roads and causes noise and environmental pollution. Targeted information on the location and number of available parking spaces can lead drivers to the nearest free parking space, without unnecessary detours.

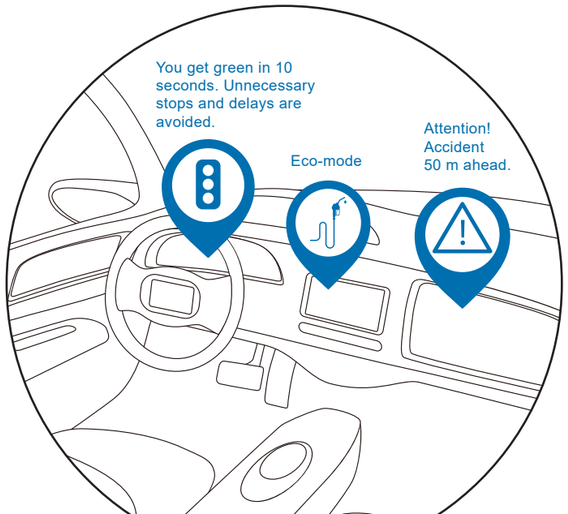
WARN OF HAZARDS

C-ITS can warn of hazards such as road works, slow or stationary vehicles, traffic jams ahead, and black ice or heavy rain. Messages sent out via traffic lights or variable message signs on highways, can inform and warn everyone, even without mobile internet.

REDUCE AIR POLLUTION AND EMISSIONS

The fuel consumption strongly depends on the number of times vehicles stop and accelerate. Efficient and well-coordinated traffic signals can help reduce fuel consumption and CO2 emissions by 10-20 percent.





"C-ITS will result in improved traffic safety, a better traffic quality and capacity utilisation. On top of that, **drivers** will benefit from shorter travel times and a more relaxed travel."

"For **emergency vehicles**, C-ITS means a fast and safe ride to the site of operation. This can save lives."

"For **public transport**, C-ITS means a fast and punctual service. This makes public transport in cities more attractive and thus protects the environment."

Technology

The system technology consists of several building blocks. Decisive elements such as message formats or communication channels are standardised.

The devices, the software and their integration into existing technologies are available on the market. The most important elements are listed in the following overview.

COMMUNICATION STANDARDS

STANDARDISED MESSAGES*

CAM
Cooperative Awareness Messages (CAM) contain information about the vehicles such as type, position, speed (e.g. message from the car)

DENM
Decentralized Environmental Notification Messages (DENM) contain information about the occurrence of potential dangerous (traffic) situations (e.g. red light violation warning)

SPAT
Signal Phase And Timing (SPAT) messages contain information on the status of a traffic light controller and its signal groups at an intersection. (e.g. Traffic light is red and will turn to green in 10 seconds)

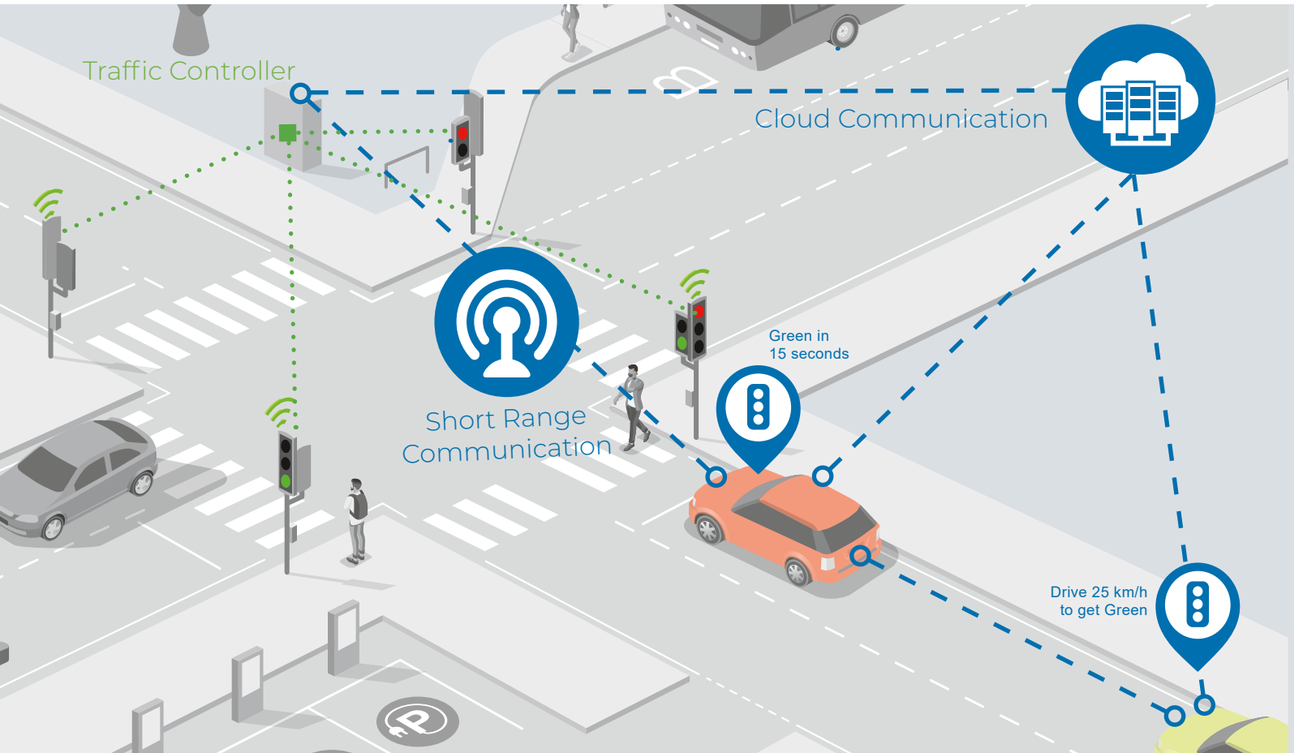
MAP
Map Data (MAP) messages contain the exact topology of the intersection. (e.g. location of lanes or stop lines)

IVI
"In-Vehicle Information“ (ISO 19321) regulates the coding of traffic signs, including, for example, dynamic speed limit signage.

SRM
Signal Request Messages (SRM) are sent by a vehicle to the traffic light to request priority at a signalised intersection. (e.g. request for priority from a bus)

SSM
Signal Status Messages (SSM) are sent by a traffic light to inform vehicles about the status and activation of previously made prioritisation requests (e.g. acknowledgement of priority to an ambulance)

*European Standardised Messages (ETSI) are used to deliver services that inform, warn and optimise the traffic.



CLOUD COMMUNICATION

- COMMUNICATION FOR ROAD USERS & CONNECTED VEHICLES
- REAL-TIME TRAFFIC DATA
- SPAT/MAP, CAM

SHORT RANGE COMMUNICATION

- COMMUNICATION FOR ROAD USERS & CONNECTED VEHICLES
- Wifi-P, C-V2X
- SPAT/MAP, DENM, CAM, SRM/SSM

SWARCO References

SETTING THE STANDARD FOR THE FUTURE

Talking Traffic is improving the everyday traffic in the Netherlands

Talking Traffic is a collaboration aiming to improve the everyday traffic in the Netherlands. The partnership includes the Dutch Ministry of Infrastructure and Water Management, 60 regional and local authorities and national and international vendors. Within Talking Traffic, road users communicate with the infrastructure.

It includes a new generation of intelligent traffic light installations that can support different use cases, like emergency vehicle preemption, traffic light forecast, vulnerable road users and many other use cases.

Talking Traffic has developed useful apps with information that helps road users navigate through traffic safely and efficiently. The apps can be used with a smartphone and take the data and turn it into personal advice, such as:

- individual speed advice;
- warning of hazardous situations;
- warning of rear-end collision, sudden braking, slippery road conditions, local fog bank, accidents and road works;
- advice on the best route in case of road works or accidents.

The support also makes sure that cars and heavy goods vehicles drive more economically, thus reducing the cost of driving and the environmental impact.

BETTER AIR QUALITY AND TRAFFIC FLOW IN AN URBAN ENVIRONMENT

Individual green wave in Hamburg

In the City of Hamburg, on a route comprising more than 70 traffic light controllers, drivers can now see individual forecasts for the speed needed to surf the Green Wave. Until now, green waves were static. This means that all the recommended speed limits on the stationary displays were based on assumed average speeds of all vehicles. This often results in red phases which lead to deceleration, stopping and acceleration. In a longer perspective this means increased fuel consumption and pollutant emissions.

The new solution includes an individual prediction algorithm based on real-time online analysis of current signalling and detection data via the SWARCO Central Traffic Light Forecast (TLF) system. This joint project is a collaboration between the City of Hamburg, SWARCO, HERE, LSGB and Audi.

The City of Hamburg provides raw data for traffic signal timing and detection at intersections via a newly created interface. SWARCO creates individual forecasts for each vehicle, which HERE then transmits via its communication interface with the navigation devices to Audi vehicles. The forecast is universal, transferable, self-learning and evaluates itself. It can process all types of intersections and controls without knowing exactly what the individual intersection looks like or how it is programmed.

The Intelligent Green Wave was implemented in the city of Hamburg in 2018, as a preparation for the ITS World Congress 2021. This is the first time it has been implemented in real operation. This new type of Green Wave is valuable for many reasons as it contributes to:

- economical and fuel-saving driving;
- improved traffic flow;
- reduced travel times;
- less stress for drivers.

Starting and stopping processes constitute the largest share in nitrogen dioxide pollution, making the individual traffic light assistant an effective measure to reduce such emissions.

MAKING EMERGENCY SERVICES FASTER AND SAFER

Green wave for fire engines in Ludwigsburg

The city of Ludwigsburg wanted to ensure that fire engines can pass intersections fast and safe with minimum impact on traffic. Ludwigsburg introduced new technology for prioritisation of fire engines at traffic lights. The solution uses V2X communication (V2X = Vehicle to Everything) where the fire engines communicate directly with the traffic lights using short range radio. Every second, the emergency vehicles send their position and speed directly to the traffic light controller. If the system detects an approaching emergency vehicle, the programmed signal sequence is started: the traffic light controller switches over to the prioritisation program, creating a so-called green wave for the firefighters and stopping the oncoming traffic with a red light.

As soon as the firefighters have passed the intersection, the traffic light controller switches back to normal to minimise traffic disturbance.
The solution includes

- integration of Roadside Unit (RSU) for sending and receiving signals at each intersection;
- On-board Unit (OBU) for short range radio signals at each of the fire engines;
- prioritisation programme for the intersection;
- installation and maintenance service.

C-ITS makes fast travel across intersections possible. It is also a way for the city of Ludwigsburg to set a basis for intelligent traffic lights and digital traffic control technology in an effort to reduce emissions and make traffic flow smoother and safer.


Ludwigsburg | Germany


Hamburg | Germany


Amsterdam | The Netherlands