Intelligent Traffic Systems in a world shaped by the COVID-19 pandemic

Sustainable answers to current challenges

July 2020
Siemens Mobility has been a leader in transport solutions for more than 160 years and now employs around 36,800 people worldwide. The organization is constantly innovating its portfolio in its core areas of rolling stock, rail automation and electrification, turnkey systems, intelligent traffic systems as well as related services.

With digitalization, it enables mobility operators worldwide to make infrastructure intelligent, increase value sustainably over the entire lifecycle, enhance passenger experience and guarantee availability.

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Safe, forward-looking and sustainable

Eco-friendly, innovative road traffic solutions support the changed mobility behavior and minimize the risk of virus transmission

Dear readers,

The COVID-19 pandemic has clearly impacted our mobility behavior. We have made the deliberate choice to travel less and in different ways. Many of us have switched from public transport to individual means in order to minimize the risk of contamination. Even though the restrictions have been considerably eased, it is doubtful that we will return to our former mobility behavior. Siemens Mobility is well positioned to provide cities and communities with the best possible solutions for public transport and road traffic. This will help you to operate efficiently, economically and sustainably – whilst mitigating risks.

In the future, the choice of our transport mode will be determined not only by speed, price and comfort, but also by the perceived risk of infection. As a result, the focus is shifting on means and technologies that allow a greater physical distance between people while on the road. These include cycling and also – as a long-term trend – autonomous driving.

We all have a clear part to play in incorporating answers to the new requirements into the existing road traffic systems, for instance implementing ‘green waves’ for cyclists, establishing connected e-bike sharing schemes, or installing detectors that enable contactless and hence infection-proof activation of pedestrian green lights.

With innovative software for simulating different traffic scenarios and solutions for dynamic tolling, environment-sensitive traffic management and holistic traffic control Siemens Mobility is able to meet the needs of all road users. This helps to reduce environmental pollution and to enhance the quality of life for the future. These solutions are available for you to make road traffic pandemic-proof, increase its sustainability, and reduce congestion and pollution caused by private transport.

Even after the pandemic, urbanization, sustainability and reduction of pollutant emissions will remain the trends of the future. We must not neglect the challenge of protecting our environment. The climate crisis will still be there after the corona crisis. We see it as our task to combine effective solutions for both current and long-term challenges.

Our offerings may vary from country to country, but what they have in common is that everywhere in the world we respond quickly and reliably whatever the task – whether expanding a traffic management system, integrating remote service at intersections to minimize the need for the presence of a service technician, or providing online training.

We support our customers with road traffic solutions that address current needs and offer them added value beyond the crisis.

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Our mission is to help you!

Markus Schlitt
CEO Intelligent Traffic Systems, Siemens Mobility GmbH
Global COVID-19 transport trends

The Corona virus has not gone away yet – even if the COVID-19 containment measures are gradually being relaxed. And even after the eventual end of the “Corona crisis” many major challenges for our future will persist. Surveys in Germany and Great Britain, among others, show that COVID-19 is causing long-term changes in the choice of transport mode.

Public transport crisis
Even post COVID-19, people will probably continue to use buses and trains less often than before the Corona shock. For many, the private car or the bicycle is now the preferred means of transport: They simply feel safer. This change in mobility behavior has an impact also on traffic management.

Sustainable solutions for our future
The situation is made more complex by the fact that cities and municipalities need not only short-term answers to current problems, but also sustainable, future-oriented solutions to address increasing mobility demand and growing environmental pollution. Today, eco-friendly traffic management and digital solutions from Siemens Mobility help reduce the risk of virus transmission. Tomorrow, they will secure the mobility of the future.

Holistic, safe and environment-oriented
The following pages list a number of measures that can help you to address the new challenges – and offer benefits that reach far beyond COVID-19 times. Systems from Siemens Mobility make traffic more environmentally compatible and safer for motorists, cyclists, pedestrians and public transport users.
In these current times, how do you feel, resp. how would you feel about using each of the following modes of transport?

<table>
<thead>
<tr>
<th>Mode of Transport</th>
<th>Clearly more at ease than before</th>
<th>More at ease than before</th>
<th>Same as before</th>
<th>Less at ease than before</th>
<th>Clearly less at ease than before</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bicycle</td>
<td>5%</td>
<td>9%</td>
<td>21%</td>
<td>76%</td>
<td>11%</td>
</tr>
<tr>
<td>Car</td>
<td>2%</td>
<td>77%</td>
<td>58%</td>
<td>18%</td>
<td>1%</td>
</tr>
<tr>
<td>Car sharing</td>
<td>5%</td>
<td>11%</td>
<td>21%</td>
<td>34%</td>
<td>1%</td>
</tr>
<tr>
<td>Mass transit</td>
<td>7%</td>
<td>8%</td>
<td>36%</td>
<td>2%</td>
<td>1%</td>
</tr>
<tr>
<td>Train (long distance)</td>
<td>1%</td>
<td>7%</td>
<td>36%</td>
<td>19%</td>
<td>1%</td>
</tr>
</tbody>
</table>

Source: DLR survey “Impact of COVID-19 on our mobility”, May 2020
Respondents aged 18 and over, without regard whether the person actually uses the means of transport; figures in percent
Offerings to increase COVID-19 resilience

Passengers and operator staff members are making their way to the new normal – many innovative products and solutions can support them along their intermodal journeys.

Associated high-risk situations that these solutions address:

- **Social distancing is compromised with unmanageable volumes of passengers**
- **Increased exposure of vulnerable groups and key workers**
- **Increased likelihood of airborne transmission**
- **Increased risk of surface transmission with contact payments**

Associated opportunities that our mobility solutions offer:

- **Full transparency and direction of passenger flows**
- **Automated/contactless operations**
- **Remote support**
- **Intermodal mobility management**
It is time for us all to move beyond the current COVID-19 restrictions and consider the way forward.
Passenger journey

**Rebuilding trust**
People have changed their routines. Today they prefer traveling by bike or by car since with these modes they feel safer than on public transport. Now it is time for the transport sector to counteract these fears and mental fences and regain the public’s trust. Siemens Mobility’s solutions help make travel on road and rail more convenient and eliminate potential sources of virus transmission – whatever means of transport is used.

**Strong trend back to the bike**
Boosted by the crisis, bike use will shift further into the focus of future travel planning projects. The SiBike solution makes this form of transport even more attractive and can motivate more people to switch to their own two-wheeler or to bike sharing schemes. For the latter, Siemens Mobility offers connected systems that cover both conventional and e-bikes and provide many benefits over uncoordinated micro-mobility services.

**Keeping a safe distance**
For some time to come, the rule of not getting too close to each other physically will continue to govern everyday life across the world. With the help of detectors, green waves can be implemented also for cyclists. Pedestrian lights can be switched to green as required without people having to touch a push-button. This prevents the formation of crowds, minimizes contact with potentially contaminated surfaces and facilitates compliance with social distancing policies.
Green wave for cyclists
Cycling is very climate-friendly and presents a relatively low risk of contamination. Making this transport mode more attractive is an ideal strategy for cities and municipalities wishing to reduce high traffic volumes and to address traffic-related environmental problems. Hitherto, so-called ‘green waves’ used to be aligned exclusively with the speeds of car traffic. With Sitraffic SiBike, authorities can now ensure smooth travel also on cycling paths, cycle highways and fast tracks as well as on roads in general. This will not only help the environment, but the resulting minimized waiting times at traffic lights will also reduce the risk of contamination for cyclists.

Easy implementation, immense benefits
The system is designed for integration in the existing traffic control and guidance system. Only the programming of the traffic lights needs to be changed. Cyclists are given priority at traffic lights via a smartphone application that uses GPS to determine the cyclist’s location, speed and direction of travel. When the cyclist passes a virtual trigger point, this is reported by the app to the control center, which then sends a switching command to the traffic light controller. This cost-effective solution helps reduce traffic-related pollutant and CO₂ emissions and hence the overall environmental impact of traffic.

Tailor-made solutions for bike sharing systems
The integrated use of transport modes is of increasing importance for cities. In Lisbon, Siemens Mobility and a local partner have introduced the world’s first bike-sharing system that offers easy switching from conventional bikes to e-bikes and vice versa. The modular design makes it possible to tailor bike-sharing solutions to the specific needs and transport concepts of each city. Equally important is the user-friendly implementation of every component, from the mobile app to Wi-Fi hotspots and intelligent billing administration.
Contactless activation eliminates potential source of infection
The availability of high-accuracy data is essential for effective traffic management and safe travel. Today, “safety” includes not only accident prevention, but also the elimination of potential touch points. The required contactless solutions can be realized by installing traffic detectors also for pedestrians and cyclists, so that they will not have to touch a push-button to get the green light.

Overhead sensors for contactless mobility
The compact overhead sensors blend into the streetscape and provide with a high detection rate. Modern detectors like those of the Heimdall series or the MLR radar detector offer made-to-measure functionality for any requirement. The detection of pedestrians and cyclists makes it possible to steer the travel flows in such a way as to minimize the overall number and length of personal encounters.

Detectors instead of push-buttons – Lower risk for pedestrians and cyclists

Cognitive pedestrian crossing
With its unique dual-antenna design, Siemens Mobility’s Heimdall detector reliably senses pedestrians and/or cyclists waiting to cross the street at signalized crossings. The use of two integrated antennas ensures excellent detection performance at a wide range of crossing types – without the need for complex and expensive set-up software. What is more, it eliminates a point of contact and hence a potential source of contamination in times of COVID-19.

Optimized pedestrian green phases
The standard duration of pedestrian green phases can be set to a minimum and then extended as required by the situation, for instance when the detector recognizes that a pedestrian is crossing at a rather slow speed. Compared to traditional fixed-time signalization, this will significantly enhance signaling quality and efficiency at the crossing.
Operator journey

More cars, more environmental impact
While travelling by bike or on foot is obviously eco-friendly, the other means of transport currently favored by most people cannot boast a positive life cycle assessment. The majority of people are feeling most at ease in their own car, using it more often than before the crisis. Hence motorized individual travel is on the rise. Yet, more car traffic means more pollution. At the same time, climate protection is still a top priority for many people.

Environmentally sound traffic management
Technological developments are part of the solution needed to address environmental and air pollution challenges. Innovative software enables cities to simulate and analyze the effects of different scenarios in order to adapt their mobility plans to the post-COVID-19 world. Traffic flow optimization as part of environmentally sound traffic management strongly contributes to minimizing the environmental impact of traffic. Pioneering deployments such as the Siemens Mobility solution in Potsdam demonstrate effective ways of reducing pollution. Holistic traffic management enables network-wide monitoring, integration and control of all transport modes as well as internal and external infrastructure.

Online instead of on-site
In the current situation, digital solutions have proven the tool of choice for keeping up communication. And virtual rooms, not conference rooms, are the place to go for a meeting if we want to prevent the virus from spreading. This applies also to the existing – and proven – remote service solutions that deliver efficient support without the need for personnel to be on site. Web-based training allows the transfer of know-how without physical presence at the same location. Also for Siemens Mobility, protecting employees and customers is always the top priority.
Finding the best post-COVID-19 mobility plan

Simulation and prediction software
During the pandemic finding a new way of operating was very much in focus, however it is also necessary to prepare post-COVID-19 plans. Innovative software enables cities to simulate and study the impact of different schemes or operational plans to adapt their post-COVID-19 mobility plans.

Aimsun (a Siemens Mobility business) software has dedicated simulators to model pop-up bike lanes, social distancing on pavements, and to study modified public transport capacity/schedules and increased demand for micro-mobility options. By estimating demand and testing different scenarios, such as diminished demand or peak-demand reduction strategies, authorities and operators can optimize response plans. Over 6,000 users in more than 85 countries worldwide already use this software to fine tune their operations.

Flexibly changing the prioritization of traffic modes

AI-driven traffic flow optimization
During the pandemic, cycling and the use of personal transport has increased. So, cities and municipalities have to continuously adapt to changing situations, particularly using intelligent traffic management systems.

Our adaptive traffic management system is an artificial intelligence powered development that allows cities to actively manage traffic demand according to mobility policies. Using this system, operators can easily select and change the priority of different road users and desired quality parameters.

It is able to optimize the traffic flow, for example, for bikes or individual vehicles. Well-managed traffic reduces congestion and, as a result, CO₂ emissions.
Dynamic tolling
With a perceived higher risk on public transport, in some cities the number of car trips has significantly increased. To rebalance the system, more sustainable mobility options as well as smart demand management will be required. The implementation of dynamic tolling solutions decreases this traffic as well as supporting much-needed resource in budget-constrained environments.

Dynamic tolling solutions enable cities to implement measures like environmental traffic management, peak-hour pricing, clean air zones or congestion charging.

Siemens Mobility has a strong record in tolling systems – involving multiple technologies, such as on-board-unit-based or fully video-based – and currently pioneers the next generation of dynamic Road User Charging (RUC) technology for cities with a “bring your own device” solution, enabling drivers to easily understand and pay the current charges – which are defined according to the cities objectives.

Any Siemens Mobility tolling solution can be dynamically tailored to a city’s requirements, and, depending on the chosen technology, supports different charging structures according to the actual distance traveled by a vehicle, the type of vehicle and other parameters such as traffic demand or ambient pollution levels.

Dynamic tolling provides the basis for impactful and efficient traffic demand management – and in the case of “bring your own device”, it provides this without the need for significant hardware investment.

Case study
In 2019, the Mayor of London launched the world’s first ‘Ultra Low Emission Zone’ (ULEZ) in the existing Central London. The purpose of the Congestion Charge Zone in London is to improve air quality. ULEZ operates 24 hours a day, every day of the year. Vehicles must meet strict emission standards to drive in this zone. The system uses a network of Automatic Number Plate Recognition (ANPR) cameras to enforce compliance. Older, more polluting, non-compliant vehicles are required to pay a daily charge or incur a penalty charge.

After six months of operation, NOx emissions from road transport in the central zone had reduced by 31 per cent and CO₂ emissions from road transport had reduced by 9,800 tons.
Intelligent traffic management will help you toughen your mobility system for today and tomorrow. When it comes to preparing the future of mobility, one of the most important tasks for cities and municipalities is to bring the demand for mobility into balance with the requirements of environmental protection and safety. The solutions to be developed must answer a multitude of mobility challenges and trends: congested roads, environmental pollution, increasing mobility and the growing number of travelers. Integrated traffic management systems enable holistic control of the entire mobility ecosystem – in line with the principle that the whole is more than the sum of its parts.

Automation and coordination
The comprehensive control solutions deliver a higher degree of automation, more transparency and faster reaction times in the event of incidents – and also minimize the carbon footprint of mobility.

Network-wide connection and control
Today’s traffic centers are hubs that interconnect all kinds of data sources and players, from road users and administration to police, emergency services and media. The Advanced Traffic Management System from Siemens Mobility enables you to steer traffic, manage data flows, interface with external data sources, develop incident plans, implement measuring points and monitor all traffic events right in the traffic control center.

Modern mobility
Holistic traffic management has already become a reality: The Berlin traffic management center (VMZ) operated by Siemens Mobility is Europe’s most modern traffic monitoring and information center. It allows proactive and demand-oriented utilization of available capacity while at the same time addressing economic, safety-related, environmental and informational requirements.

Redesigning mobility – With network-wide integrated transport management
Fewer airplanes, less individual travel

The worldwide lockdown periods due to the Corona pandemic were accompanied by a significant reduction of CO₂ and particulate matter emissions. However, as many people are switching to cars as a safety measure, it is now important to prevent a rapid rebound of pollution levels. An effective tool: environmentally friendly traffic management on the basis of solutions from Siemens Mobility.

Addressing urban challenges

Rising pollution levels in urban centers are prompting cities to take measures aimed at cutting CO₂ and particle emissions. With the environmentally friendly traffic management solutions from Siemens Mobility, you can reduce pollutant emissions before they threaten to exceed the limits – for example by smoothing the flow of traffic, adjusting signal switching times or setting up dynamic low-emission zones.

Reducing emissions

Effective emission reduction can be achieved using a range of data, e.g. on traffic, weather and air quality, and defining so-called trigger criteria for manual or automatic strategy selection. In combination with traffic modelling, the Advanced Traffic Management System helps to positively impact the air quality in the city as required by the current environmental situation. For this purpose, the system continuously calculates the current emission and immission values across the road network (modelling) and checks and adjusts the related strategies.

Achieving success

Berlin, Potsdam and Braunschweig are already reaping the benefits of implementing traffic management solutions from Siemens Mobility. In Potsdam, for example, traffic control measures applied during 10 percent of the system’s operating time have been shown to result in a reduction of pollutants by 2 to 4 percent.

Environmentally sensitive traffic management – Fewer pollutants, higher quality of life
Digitalization trend accelerated by Corona pandemic
Meetings and training sessions have moved to the digital world. Online consultation is replacing personal visits. Siemens Mobility is continuously developing new digital service methods that increase service efficiency. During the current pandemic, the main objective is to prevent contamination, but these solutions will offer also numerous benefits in post-pandemic times.

Powerful and secure
Digital systems draw on data delivered by products and processes to provide valuable additional information. Our Digital Services are based on the powerful Siemens Mobility platform architecture, which serves already more than 300,000 devices and systems. The holistic security concept of Siemens Mobility reliably protects your systems against IT security threats.

Targeted data use, optimized performance
Innovative technologies such as remote interventions via the common Remote Service Platform (cRSP), Smart Light Management, Smart Guidance and Smart Access allow you to increase your systems’ reliability, availability and cost-effectiveness and to detect problems even before they become manifest.

Remote maintenance and telephone consultation
Remote services are perfect for reliable, fast and contactless troubleshooting in an emergency. Problems can be solved by remote maintenance or telephone consultation without the need for a service technician to travel to site. Our regional Service Operation Centers (SOC) are always at your service. Remote services help reduce costs and minimize direct contact.

Increasing importance of comprehensive services
The need to assure trouble-free operation 24 hours a day, 7 days a week, 365 days a year can be a challenge for cities and municipalities – at both technical and economic levels. With ITS-as-a-Service you can outsource the entire spectrum of services.
Safe and without the risk of contamination
Also during the Corona pandemic, it is important to keep your employees’ knowledge up to date. Flexible and modular training courses on traffic systems and infrastructure topics are an efficient way for your staff to acquire valuable knowledge — right from the source. Siemens Mobility’s comprehensive training program is available as web-based courses.

Your road traffic experts
Siemens Mobility traffic engineers are highly experienced in developing sustainable and innovative ITS solutions. And they love to pass this knowledge on — to you! The training and consulting services offered by Siemens Mobility provide in-depth knowledge about today’s road traffic systems in a clear, practice-oriented way. You can choose among a wide range of training courses that cover the entire service spectrum, from operation right up to spare parts and maintenance.

Modular and professional
For beginners and specialists alike, the modular course units are the perfect opportunity to benefit from the Siemens Mobility experts’ wealth of knowledge. Whether on-site course or web-based training, your employees will acquire knowledge and practical skills directly from the manufacturer. This advantage cannot be rated too high, since nobody has a more profound knowledge of the products and solutions.

Theory and practice
Our online training courses combine the delivery of in-depth knowledge with practical exercises. We also offer training units certified by external bodies (e.g. TÜV). Among other things, this gives you the opportunity to use the certification center for the “road traffic technology specialist”.

Online training – Know-how as the key to success
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