Speed Limits for Intelligent Speed Assist (ISA) mandatory application in the EU

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1. What is Intelligent Speed Assistance (ISA)

Intelligent Speed Assistance (ISA) is an in-vehicle safety system that displays the legally enforced Speed Limit and supports drivers' compliance on any given road. It prevents the driver from over-speeding beyond the legal Speed Limit. The ISA implementation can be:

1. Advisory: The driver is alerted when the speed exceeds the Speed Limit
2. Voluntary: The driver is alerted when he/she is exceeding the Speed Limit and can choose whether the system can restrict acceleration or not, as higher pressure is required on the accelerator pedal to accelerate.
3. Mandatory: The acceleration limiting functionality is enabled by default, with the possibility for the driver to overrule in certain conditions.

The newly revised General Safety Regulation (661/2009/EC), adopted on November 2019 has made Intelligent Speed Assistance (ISA) mandatory in new vehicle types, from M and N categories (cars, vans, trucks and buses), starting in 2022. Besides, starting 2024, all vehicles types sold should be equipped with ISA. The European Commission is currently drafting ISA technical requirements and future test procedures in a related ISA delegated act.

Tackling excessive speed is fundamental to reducing the number of road casualties every year across the world. Mass adoption and use of ISA is expected to reduce collisions by up to 30% and deaths by 20% in Europe alone[1]. The overall accident injuries are expected to be reduced. The benefits for drivers are reduced speeding tickets, reduced fuel expenses by higher fuel efficiency. Besides, the environmental benefits of adopting ISA are reduced CO2 emissions. It can also lead to traffic calming effect also for non-equipped legacy fleet surrounding and ISA equipped vehicle.[2]

Figure 1 - European Transport Safety Council ISA – implementation and benefits

Throughout the journey, speed limit information is displayed to the drivers in the vehicle and compliments what they observe from posted traffic signs on the road, or informs them when they fail to observe these signs

[1] https://etsc.eu/briefing-intelligent-speed-assistance-isa/
[2] https://ec.europa.eu/transport/road_safety/sites/roadsafety/files/pdf/vehicles/speed_limitation_evaluation_en.pdf

2. What is needed to comply with the new requirements?

Intelligent Speed Assist uses information about the road to determine the applicable Speed Limit. This Information can be obtained from knowledge of the vehicle position using GPS (Global Positioning System) in combination with a digital map. ISA functionality can be enhanced by interpreting road features such as signs using forward facing cameras.

Figure 2 - HERE Speed Limit Solutions

Currently, most of the vehicles sold in the EU already have GPS built in. This is a mandatory requirement of the eCall emergency calling system in the EU3. This aids the different types of ISA solutions for gathering speed limit information with location information. While the European Parliament and council (EU member states) requires Speed limit information to be available to the driver as the bare minimum, there are different mechanisms to provide this in the vehicle. This is possible by having an embedded map, which can provide the Speed Limit information based on the system in the vehicle. This is also possible by updates received via a service. ISA can also be done in combination with a camera and a map-based system.

The advantage of using a map-based ISA system is that it can always provide Speed Limit information irrespective of the environmental conditions. Some typical challenging situations that might arise for camera only systems are summarized in points hereby:

1. When Speed Limits are not visible: because of various reasons, like foliage growth, lack of infrastructure maintenance etc.
2. When Speed Limits are not sign posted: e.g. default country level Speed Limits for Motorways, Urban roads, Built up areas etc. Border changes and change in Speed Limit rules based on country level requirements.
3. When speed limits are conditional: based on time, weather e.g. default Speed Limit for France on Motorway when it rains is 110km/hour instead of 130 km/h

EU Performance level requirements are expected to be similar to the EURO NCAP (A European car safety performance assessment programme) system, based on capabilities. These performance requirements are expected to be outlined by June 2020.

[3] https://europa.eu/youreurope/citizens/travel/security-and-emergencies/emergency-assistance-vehicles-ecall/index_en.htm

3. What does HERE offer to comply with the regulation?

HERE technologies offer various building blocks to create a range of solutions to for OEMs (Original Equipment Manufacturers) to meet the ISA mandate on all models and trim levels.

1. Static sign posted and implicit Speed Limit information including modifiers like time, weather for all EU countries.
2. Country level regulation that affect Speed Limits for all passenger cars and commercial vehicles for all EU countries
3. Advisory Speed Limits for commercial vehicles
4. Variable Speed Limit information and messages displayed on gantries
5. Platform to integrate vehicle Sensor data from OEMs to update Speed Limit information
6. Connectivity information i.e. cellular signal strength and coverage along the route for all EU countries.

HERE can create different combinations of these building blocks to create solutions that meet OEM specific requirements for complying with the regulation as well as enabling a safe and comfortable driving experience. The below table is indicative of offerings based on availability of various vehicle system.

	Vehicle System				
	In-Dash Navigation System	**Front facing Camera**	**Vehicle Sensor data**	**ADAS**	**Vehicle Cellular Connectivity**
Available	Speed Limit included as part of the HERE Turn-by-turn navigation map and/or HERE Road Sign Service	Map-based Speed Limit and/or HERE Road Sign Service complements camera	Map-based Speed Limit and/or HERE Road Signs Service	Speed Limit is included as part of the HERE ADAS packages	HERE Road Signs Service
Not Available	Speed Limit included as part of the HERE map data and/or Speed Limit provided standalone via HERE Road Signs Service	Map-based Speed Limit and/or HERE Road Sign Service	Map-based Speed Limit and/or HERE Road Sign Service	Map-based Speed Limit and/or HERE Road Sign Service	Map-based Speed Limit

Figure 3 HERE Solutions for ISA based on vehicle functionality

Please get in touch with your HERE representative to understand which solution is suitable for you

FAQs

Q: I have a camera-based Traffic Sign Recognition (TSR) system in the vehicle already. Do I still need a map?

A: A map complements a camera based TSR system, in several real-world situations. Camera based image recognition leads to ambiguity when the camera cannot correctly recognize signs beyond its capabilities. e.g. incorrectly identifying Speed Limits on the back of commercial vehicles, or misclassifying lane level speed limit. This is also applicable to situations of implicit speed limits (a highway sign, city sign without an attached speed limit and times when the performance is affected by external factors like adverse weather conditions, heavy traffic or night-time reducing the line of sight.[4] If road signs are not clearly visible to the car's camera sensors, it will reduce the performance of life-saving technologies such as Intelligent Speed Assistance (ISA).

Signs might not be readable because they are obstructed by foliage or road-side objects. Knocked-over traffic signs may not be repaired for several weeks after the damage is done. Similarly, some road signs differ slightly from country to country, or become unreadable due to poor maintenance. A map-based system can optimize the speed, based on the route and by knowing beforehand the Speed Limit information. This means if a system knows the speed limit changes in 500 meters the speed can be optimized for energy and engine efficiency despite no sign in sight. In situations when there are no posted signs, a map-based system recognizes Speed limit change based on road type or classification instead of only relying on the last observed sign by the camera sensor. Similarly, the Speed Limits are subject to change when crossing borders. A camera-based system is not equipped to identify border crossings in all scenarios unless sign posted. Conditional Speed Limits based on vehicle, time or day or weather parameters are different in different countries, a camera-based system may not be fully equipped to support such conditions. There are many more examples where a sensor only based system may not suffice to fully meet the safety regulations. See on the next page in figure 4 the percentage of vehicles passing the EURO NCAP Speed Limit testing using vehicle cameras+ HERE Map versus vehicles with camera only. [5]

[4] https://etsc.eu/updated-euro-ncap-tests-reveal-advances-in-traffic-sign-recognition-technology/

[5] https://www.mcafee.com/blogs/other-blogs/mcafee-labs/model-hacking-adas-to-pave-safer-roads-for-autonomous-vehicles/

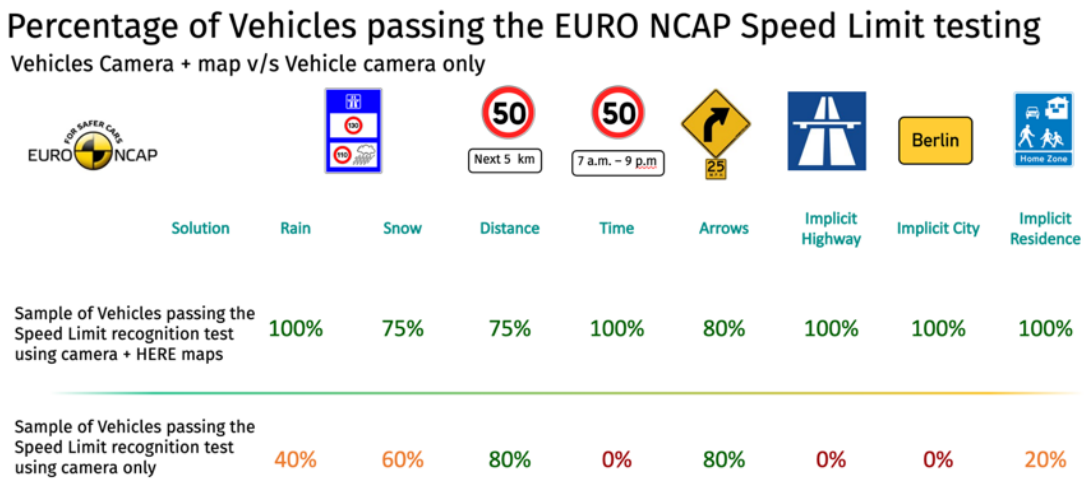

Figure 4 Source:https://etsc.eu/updated-euro-ncap-tests-reveal-advances-in-traffic-sign-recognition-technology/

Q: How can OEMs update vehicles with the changes in Speed Limits in the real world?

A: HERE offers different options to update Speed Limit information. For the connected vehicles, continuous or near real-time updates are possible. For non- connected vehicles the update frequency depends on the various cadence options you select from e.g. updates on a monthly basis

Q: What happens if a connected vehicle experiences loss of connectivity

A: Connected vehicles can benefit from a caching strategy that is able to store Speed Limits for the route ahead, in case of such a loss in connectivity. HERE provides information on cellular signal strength along a route to enable this functionality. Updates to Variable Speed Limits displayed on gantries or temporary Speed Limits might be impacted if there is a prolonged loss of connectivity. HERE will monitor ISA performance requirements to highlight any implications related to loss of connectivity.

Q: I am a Truck/Bus OEM, does this mandate apply to me as well?

A: Yes, ISA is mandatory for vehicle categories M_1, M_2, M_3, N_1, N_2 and N_3. (Please refer the vehicle category definition in the appendix) which covers most Trucks and commercial vehicles. HERE also provides advisory Speed Limit for Trucks and Country level regulation for commercial vehicles.

Q: Do I need an in-dash Navigation system to meet the requirements of ISA?

A: No, while an in-dash navigation systems provides the Speed Limit information, a fully navigable map is not essential for ISA. A Speed Limit feed or service can provide Speed Limit information to the vehicle either based on the vehicle position or the route.

Q: What is the quality requirement for the ISA mandate?

A: The specific quality requirements are yet to be defined; this is expected by June 2020.

Q: Does this have any impact on my EuroNCAP rating?

A: EuroNCAP promotes installation of ISA systems that support drivers to control their speed. The EuroNCAP assesses the Speed Assistance systems accuracy and additional points are awarded for advanced functionalities. Systems that are able to properly identify conditions and act accordingly can attract up to 20 points based on the advanced functions which are typically enabled using a map.[6]

Q: The majority of vehicle owners and drivers tend to use after-market and/or brought-in solutions like, smart phones, PNDs for navigation and Speed limit information. Is this ISA compliant?

A: The mandate requires vehicles to be fitted with ISA as part of vehicle specification and not as an after-market and/or brought-in solution. You will need to have an ISA solution as a standard line fit.

[6] https://www.euroncap.com/en/vehicle-safety/the-ratings-explained/safety-assist/speed-assistance/

Appendix:

Vehicle category wiki: https://en.wikipedia.org/wiki/Vehicle_category

vehicle category definition: https://www.unece.org/fileadmin/DAM/trans/main/wp29/wp29resolutions/ECE-TRANS-WP.29-78r6e.pdf

Resources:

HERE Road Sign services: https://www.here.com/products/automotive/road-sign-recognition

HERE Map Data: https://www.here.com/products/mapping/map-data

European commission on ISA: https://ec.europa.eu/transport/road_safety/specialist/knowledge/speed/new_technologies_new_opportunities/intelligent_speed_adaptation_isa_en

In depth cost-effectiveness analysis of the identified measures and features regarding the way forward for EU vehicle safety: https://op.europa.eu/en/publication-detail/-/publication/77990533-9144-11e7-b92d-01aa75ed71a1#

EuroNCAP: https://cdn.euroncap.com/media/43373/euro-ncap-assessment-protocol-sa-v901.pdf

EU press release: https://www.europarl.europa.eu/news/en/press-room/20190410IPR37528/parliament-approves-eu-rules-requiring-life-saving-technologies-in-vehicles

ETSC Briefing: Intelligent Speed Assistance (ISA): https://etsc.eu/briefing-intelligent-speed-assistance-isa/

Vehicle category definition - https://ec.europa.eu/transport/road_safety/sites/roadsafety/files/pdf/isa_faqs_2013.pdf

MacAfee Safer Roads for Autonomous vehicles: https://www.mcafee.com/blogs/other-blogs/mcafee-labs/model-hacking-adas-to-pave-safer-roads-for-autonomous-vehicles/

European Automobile manufacturers association: https://www.roadsafetyfacts.eu/themes/ACEA-Road-Safety-Facts/img/ACEA_Road_Safety.pdf

World Health Organization: https://www.who.int/violence_injury_prevention/publications/road_traffic/world_report/speed_en.pdf

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