

Submitted by the experts from the United Kingdom

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Note: Tracked changes represent changes from CS-OTA Guidance document giving common provisions for UNR and GTR. The changes only adapt to ADS do not change the content. Addition of "owner or operator, as appropriate" after ADS User matches the definition of "vehicle user" from the original document.

"*Vehicle user*" means a person operating or driving the vehicle, a vehicle owner, an authorised representative or employee of a fleet manager, an authorised representative or employee of the vehicle manufacturer, or an authorized technician.

<https://unece.org/transport/documents/2022/04/working-documents/grva-proposal-recommendations-uniform-provisions>

Annex [Y] – Requirements for ADS software updates

1. ADS requirements for [ADS](#) software updates
 - 1.1. The authenticity and integrity of software updates shall be protected to reasonably prevent their compromise and reasonably prevent invalid updates.
 - 1.2. If dedicated identifiers are used to represent information about software of ~~Electronic Control Systems contributing to systems or functions on a vehicle that are specified in regulation or legislation~~[the ADS](#), each dedicated identifier shall be uniquely identifiable. When relevant software is modified by the ~~vehicle~~ manufacturer, the dedicated identifier shall be updated if it affects the ~~certification of the vehicle or its systems~~[ADS](#).
 - 1.3. The versions of the software ~~on Electronic Control Systems contributing to systems or functions on a vehicle that are specified in regulation or legislation~~[of the ADS](#), or dedicated identifiers used to represent information about that software, shall be easily readable in a standardized way via the use of an electronic communication interface on the vehicle.
 - 1.4. Information regarding the configuration of the software on ~~an ADS vehicle~~ shall be protected against unauthorized modification.
 - 1.5. Additional Requirements for Over-the-Air (OTA) Updates
 - 1.5.1. The ~~vehicle~~[ADS](#) shall restore systems to their previous version in case of a failed or interrupted update or that the ~~vehicle~~[ADS](#) shall be placed into a safe state after a failed or interrupted update.
 - 1.5.2. Software updates shall only be executed when the ~~ADS~~[vehicle](#) has enough power to complete the update process (including that needed for a possible recovery to the previous version or for the vehicle to be placed into a safe state).
 - 1.5.3. When the execution of an update may affect the safety of the ~~vehicle~~[ADS](#), the ~~vehicle~~[ADS](#) shall be in a state where it can be executed safely.
 - 1.5.4. The ~~vehicle~~[ADS](#) user, ~~owner or operator, as appropriate~~ shall be able to be informed about an update before the update is executed. The information made available shall contain:
 - (a) The purpose of the update. This could include the criticality of the update and if the update is for recall, safety and/or security purposes;
 - (b) Any changes implemented by the update on ~~vehicle~~[ADS](#) functions;
 - (c) The expected time to complete execution of the update;
 - (d) Any ~~vehicle~~[ADS](#) functionalities which may not be available during the execution of the update;
 - (e) Any instructions that may help the ~~vehicle~~[ADS](#) user, ~~owner or operator, as appropriate~~ safely execute the update.

- In case of groups of updates with a similar content one information may cover a group.
- 1.5.5. In the situation where the execution of an update while driving an ADS feature is active may not be safe, the vehicle-ADS shall either:
- (a) Be incapable of activating an ADS feature being driven during the execution of the update; or,
- (b) ~~Be~~ Be in a state ensuring that the driver-ADS user is not able to use any functionality of the vehicle-ADS that would affect the safety of the vehicle or the successful execution of the update.
- 1.5.6. After the execution of an update:
- (a) The vehicle-ADS user, owner or operator, as appropriate shall be able to be informed of the success (or failure) of the update;
- (b) The vehicle-ADS user, owner or operator, as appropriate shall be able to be informed about the changes implemented and any related updates to the user manual (if applicable).
2. Management system requirements for ADS software updates
- 2.1. The management system for software updates shall include processes to:
- (a) Document information relating to software updates.
- (b) Securely maintain the information documented in 1.2.1. part (a).
- (c) Make the information documented in paragraph 1.2.1. part (a) available to appropriate authorities upon request.
- (d) Uniquely identify all initial and updated versions of software on systems of the vehicle specified in regulation or legislation on the ADS including integrity validation data, and relevant hardware components.
- (e) Access and update information regarding any dedicated identifiers used to represent information about software on a vehiclean ADS, before and after an update, which includes the ability to update information regarding the software versions and their integrity validation data of all software relevant to each dedicated identifier used.
- (f) Verify that, where dedicated identifiers are used to represent information about software on a vehiclean ADS, the version(s) of the software present on a relevant component of the vehiclethe ADS are consistent with those defined by the relevant dedicated identifier.
- (g) Identify interdependencies of the updated system-ADS with other system(s).
- (h) Identify target vehicles-ADS for a software update.
- (i) Confirm the compatibility of a software update with the target vehicle(s)ADS's configuration before the software update is issued, including an assessment of compatibility between the last known software/hardware configuration of the target vehicle(s)ADS and the software update to be issued.
- (j) Determine whether a software update will affect any system that is subject to regulation or legislation, including whether the update will impact or alter any of the parameters used to define

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the systems the update affects, or whether it changes any parameters that are subject to regulation or legislation.

- (k) Determine whether a software update will add, alter or enable any function(s) that were not present, or enabled, when the ~~vehicle-ADS~~ was certified according to regulation or legislation, or whether an update will alter or disable any other parameters or functions that are subject to regulation or legislation, including consideration of whether:
 - (i) Regulated information (according to regulation or legislation) regarding the ~~vehicle-ADS~~ will need to be modified;
 - (ii) Results of previous tests conducted according to regulation or legislation will no longer cover the ~~vehicle-ADS~~ after modification;
 - (iii) Any modifications to functions of ~~in the vehicle-ADS~~ will affect the ~~vehicle's-ADS's~~ certification according to regulation or legislation.
- (l) Determine whether a software update will affect any other system required for the safe and continued operation of the vehicle, or if the update will add or alter functionality of the vehicle compared to when it was certified (~~if applicable~~).
- (m) Enable the ~~vehicle-ADS~~ user, owner or operator, as appropriate to be informed about a software update.

2.2. The ~~vehicle~~-manufacturer shall record and store the following information for each update:

- (a) Documentation describing the processes used by the ~~vehicle~~ manufacturer for software updates and any relevant standards followed.
- (b) Documentation describing the configuration of ~~any systems that are regulated by regulation or legislation~~ ~~the ADS~~, before and after an update. This shall include unique identification for the ~~system's-ADS~~ hardware and software (including software versions) and any relevant vehicle or system parameters.
- (c) If dedicated identifiers are used to represent information about software of ~~Electronic Control Systems contributing to systems or functions on a vehicle that are specified in regulation or legislation~~ ~~the ADS~~, an auditable register describing information about all the software relevant to each dedicated identifier before and after an update. This shall include information of the software versions and their integrity validation data for all relevant software.
- (d) Documentation listing target ~~vehicles-ADS~~ for the update and confirmation of the compatibility of the last known configuration of those ~~vehicles-ADS~~ with the update.
- (e) Documentation for all software updates describing:
 - (i) The purpose of the update;
 - (ii) What systems or functions of the vehicle the update may affect;

- (iii) Which (if any) of the systems or functions listed in [part b\)2.2.\(c\)\(ii\)](#) are required by regulation or legislation (if any);
 - (iv) If applicable, whether the software update affects the fulfilment of the requirements of any relevant regulation or legislation identified in [part 3\)2.2.\(c\)\(iii\)](#);
 - (v) Whether the software update affects any parameter specified in regulation or legislation for a vehicle or vehicle system;
 - (vi) If applicable, whether an approval for the update was requested from the relevant national authority;
 - (vii) How the software update may be executed and under what conditions;
 - (viii) Confirmation that the software update will be conducted safely and securely;
 - (ix) Confirmation that the software update has undergone and successfully passed verification and validation procedures.
- 2.3. The information specified in [1-2.2.\(c\)3](#) and [1-2.2.\(d\)4](#) shall be available from the [vehicle](#) manufacturer to relevant national authorities.
- 2.4. With regards to security for software updates, the [vehicle](#) manufacturer shall implement and maintain processes to:
- (a) Ensure software updates are protected to reasonably prevent manipulation before the update process is initiated;
 - (b) Ensure software update processes used are protected to reasonably prevent their compromise, including the development of the software update delivery system and;
 - (c) Verify and validate software functionality and code for the software used in the [vehicle-ADS](#) are appropriate.
- 2.5. For [vehicles-ADS](#) that support over the air updates, the [vehicle](#) manufacturer shall implement and maintain processes to:
- (a) Assess over the air updates to ensure they will not impact safety, if conducted [during driving whilst an ADS feature is active](#) and;
 - (b) Ensure over the air updates that require a specific skilled or complex action (for example recalibration of a sensor post-programming in order to complete an update process) can only proceed when a person skilled to do that action is present or is in control of the process.