

Relations between Type Approval and post-sale over-the-air software updates for automotive related systems.

I. Introduction

1. At its 120th session, (March 2016), AC.2 had an initial discussion on Over The Air (OTA) software update initiated by one Contracting Party.
2. In September 2016, the Federal Automated Vehicle Policy was issued by US Department Of Transportation and its National Highway Traffic Safety Administration in September 2016. It is addressing among others the question of software updates and provides input on this matter. Some elements are paraphrased in chapter II below.
See: http://www.nhtsa.gov/nhtsa/av/pdf/Federal_Automated_Vehicles_Policy.pdf
3. AC.2 discussed again this subject and recommended that a document would be submitted to the IWG on ITS/AD.

II. Software update – State of art.

4. To date, an increasing number of vehicle functions are electronic and software based. They can be activated and controlled automatically and remotely so that vehicle performance capabilities can be quickly and substantially altered after its manufacture and its initial certification or type approval, via software updates, incl. Over The Air (OTA).
5. As more and more vehicles are connected vehicles, a number of traditional OEMs already use the OTA software update technology. New actors in the market also use the technology as applied in the ICT sector (smartphones updates) and one of them provided new functionalities, such as an auto pilot.
6. To address problems and to improve or expand performance capabilities in the coming years, manufacturers and other entities will likely provide software updates for motor vehicles well after they are manufactured and type-approved or certified. Some of those changes will substantially alter the functions and technical capabilities of those vehicles.
7. The statute underlying the FMVSS as well as the regulatory frameworks for Type Approval (TA) provide for manufacturer certification or approval of a motor vehicle prior to its manufacture. Subsequent software updates could affect the basis for that certification or approval. In addition, such updates would themselves constitute new items of motor vehicle equipment, subject to the certification/approval requirements and verification, to the extent there are applicable regulations/federal standards.
8. The type approvals being the administrative basis for a vehicle registration, some stakeholders may interpret that the vehicle registration might not be valid any longer, if a vehicle receives an update for items subject to approval or certification, which may cause a legal and/or an administrative issue that might need to be addressed or clarified.
9. The next chapters describe some thoughts about ways to integrate OTA software updates ("system updates") in the type approval framework, in case WP.29 would wish to clarify their relevance for the purpose of Type Approval.

III. Software updates and UN Regulations

A. The system update is not type approval relevant

10. Contracting Parties might decide that no action is requested if they consider OTA software update as not relevant for the purpose of Type Approval.

11. In case Contracting Parties would consider that OTA software might have relevance, the simplest case is when an OTA software updates might impact automotive products in such a way that the product modification would not be relevant for the purpose of type approval.

B. How to address OTA software update within the TA system

(a) Extension and revision, replacement parts and retrofit

12. There is a usual situation related to the upgrade of a model, over the time, due to customer demands, modifications imposed by Regulations, improvements etc. The administrative procedure addressing this situation is well established and based on the extension of approvals. If a vehicle type is modified after it was already approved, the vehicle is receiving **extensions** to existing type approvals, when applicable, and following the regulated provisions. For a number of Regulations, as described in the guideline ECE/TRANS/WP.29/1044/Rev.1, a Type approval Authority may grant **revisions** to type-approvals.

13. There are similarities between OTA software updates and the "replacement part" and "retrofit" cases, for which Approvals are granted in accordance with UN Regulations e.g. UN Regulations Nos. 59 (replacement silencing systems), 90 (Replacement braking parts), 92 (replacement silencing systems for motorcycles) 103 (Replacement pollution control devices), 114 (Airbag module for a replacement airbag system), 115 (LPG and CNG retrofit systems) and 124 (Replacement wheels for passenger cars). Approvals are granted for systems that are fitted on a vehicle after it left the plant and is already in use.

14. An idea proposed is to deal with a OTA software update as if it was both a model update in its production life cycle, and as if the upgrade would correspond to a replacement part or a retrofit:

15. Contracting Parties may decide that a vehicle or system receiving an update shall be subject to approval, provided that the update concerns a matter of relevance for type-approval extension or revision. Process wise, the approval extension or revision shall be granted before the software update takes place and would be both an extension for products leaving the manufacture with the new software and a "retrofit" approval for the vehicles already in use and benefiting from the update.

16. Some more thoughts may be necessary to define potential follow-ups of such approval extensions. As system updates and their approval extensions may impact the whole vehicle type approval, WP.29 may decide that this matter is addressed in the development process of Regulation No. 0 / DOC.

17. In some cases, the matter might not be resolved by the process of type approval extension or revision, especially if the system update provides a new function subject to type approval, which was not initially type-approved.

(b) Modification of type-approval values

18. The system update might have an impact on type approval values (engine power, CO2 emissions, pollutant emission level etc.) used for purposes such as taxation or the implementation of transport policies such as low emission zones etc. What if the engine power is increased by 10% because of an OTA update, what if the CO2 emissions are modified? Contracting Parties might face situations in which a vehicle would pass from one taxation category to another one. This might justify the need to carefully consider OTA software updates and their implications on the Type Approval system.

19. WP.29 may need to develop additional regulatory tools and rules to regulate the compliance verification of such post-sale software updates especially when the modification of the vehicle has an impact on type approval values especially when these values are used for the purpose of the implementation of policies and tax collection.

IV Introduction of innovations and new technologies

20. The schedule 7 in the Rev. 3 of the 1958 Agreement provides a process for the exemption approval for innovations and new technologies. When a new function corresponding to a new technology or innovation is introduced post-sale in a vehicle, Contracting Parties may decide that schedule 7 strictly applies.

V OTA update as a corrective action against safety and security risks

21. OTA updates are used, among others, as a mean to deploy software updates addressing safety and security risks incl. cyber security and data protection. WP.29 may wish to define specific procedures addressing both the emergency of such update deployments and the Authorities involvement principle. (The emergency character may raise the question whether or not the authority involvement shall precede the deployments of security patches through OTA updates.)

