From smart tachograph version 1 to version 2 – Amendment to Annex IC

Group of Experts on AETR
13 October 2020
Legal background

• Mobility Package I requires additional functionalities to be implemented in the smart tachograph
• Need to amend Annex IC by August 2021
• A version 2 of the smart tachograph to be implemented by August 2023 in newly registered vehicles
• Vehicles engaged in international road transport to be retrofitted by end 2025
Deliberations in the EU Council about AETR

• EU Member States have been debriefed by European Commission about the state of the play of the negotiations in AETR. A formal EU position will be submitted to AETR soon.

• 4-year transitional period in the AETR would mean:
  ➢ **By the end of 2025, the full international EU fleet will be fitted with the smart tachograph v2**
  ➢ **While smart tachograph v1 would only start in newly registered non-EU AETR vehicles as from 2026**

• This was not considered acceptable for EU Member States: not compatible with the objectives to improve road safety and to create a level playing field between EU and non-EU AETR countries
Deliberations in the EU Council about AETR

- Position of the EU Member States:

  - The smart tachograph version 2 should be implemented in AETR (without the “intermediate” step of smart tachograph version 1)

  - AETR to be granted a reasonable transitional period, which will not jeopardize the objectives of the smart tachograph. Compared to the requirements imposed on EU hauliers, non-EU AETR hauliers could be granted two additional years (to equip new vehicles with the smart tachograph 2 and to retrofit the fleet of vehicles used in international transport)
New functionalities

From Mobility Package I
• Border crossing detection
• Recording of the vehicle position when load/unload takes place
• Enforcement of driving times and rest periods from 28 to 56 days – increase of records to be stored
• Recording of the type of load (goods/passengers)
• Transmission via DSRC of maximum driving time being exceeded

Others
• OSNMA (Open Service Navigation Message Authentication)
• Software update
• Internal motion sensor
• Automatic selection of beginning/end driving place
• Bi-directional ITS interface communication
1. Border crossing detection

- A map must be stored in the tachograph
  - NUTS 0 (EU MMSS, EEA, Candidate countries and UK)
  - Link to the map available at JRC website for download by tachograph manufacturers
  - JRC will create a hash that will be used by tachograph manufacturers to verify the authenticity of the map
  - Tachograph manufacturers will be responsible for storing the map with a secured procedure.
  - Map updates shall be carried out in authorised workshops, according to the secure procedure set up by each manufacturer.
Border crossing - recording

- Data recorded: position, time, country of origin and country of destination. Country not included in the map will be “rest of the world”
- Border-crossing will be stored in both VU and card
- Storage capacity: VU (20/day - 365 days), card (20/day - 56 days)
2. Recording of the position at load/unload

• The operation shall be manually entered through the tachograph menu
• Three possibilities load/unload or simultaneous load-unload
• To be entered, at the latest, when the operation has finished
• GNSS position and time shall be stored together with the operation type
• Storage capacity: VU (25/day - 365 days), card (25/day - 56 days)
3. Type of load (goods/passengers)

- A by-default load type (goods/passengers) will be stored in the tachograph upon activation and first calibration.
- The by-default setting in the tachograph may be changed by a workshop.
- The by-default load type will be stored in the card upon card insertion.
4. Increase of records from 28 to 56 days

- Impact in terms of card storage capacity
- The simple approach would be to double the current size of all files, but optimisation is necessary
- For instance, the current maximum number of activity changes can be kept

<table>
<thead>
<tr>
<th>n</th>
<th>Description</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>n1</td>
<td>NoOfEventsPerType</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>n2</td>
<td>NoOfFaultsPerType</td>
<td>12</td>
<td>24</td>
</tr>
<tr>
<td>n3</td>
<td>NoOfCardVehicleRecords</td>
<td>84</td>
<td>200</td>
</tr>
<tr>
<td>n4</td>
<td>NoOfCardPlaceRecords</td>
<td>84</td>
<td>112</td>
</tr>
<tr>
<td>n6</td>
<td>CardActivityLengthRange</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 544 bytes (28 days * 93 activity changes)</td>
<td>13 776 Bytes (28 days * 240 activity changes)</td>
</tr>
<tr>
<td>n7</td>
<td>NoOfCardVehicleUnitRecords</td>
<td>84</td>
<td>200</td>
</tr>
<tr>
<td>n8</td>
<td>NoOfGNSSCDRecords</td>
<td>252</td>
<td>336</td>
</tr>
<tr>
<td>n9</td>
<td>NoOfSpecificConditionRecords</td>
<td>56</td>
<td>112</td>
</tr>
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</table>
Increase of records from 28 to 56 days

<table>
<thead>
<tr>
<th></th>
<th>Records</th>
<th>Records/day</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current records</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Place beginning/end daily driving period</td>
<td>112</td>
<td>2</td>
</tr>
<tr>
<td>3-hours accumulated driving time</td>
<td>336</td>
<td>6</td>
</tr>
<tr>
<td>Driver activity</td>
<td>6,552</td>
<td>117</td>
</tr>
<tr>
<td><strong>New records</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Border crossing records</td>
<td>1,120</td>
<td>20</td>
</tr>
<tr>
<td>Load/unload records</td>
<td>1,400</td>
<td>25</td>
</tr>
<tr>
<td>Load type changes</td>
<td>336</td>
<td>6</td>
</tr>
</tbody>
</table>
### DSRC indication - exceeding driving time

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTM20</td>
<td>Continuous driving time</td>
</tr>
<tr>
<td>RTM21</td>
<td>Daily driving time</td>
</tr>
<tr>
<td>RTM22</td>
<td>Weekly driving time</td>
</tr>
<tr>
<td>RTM23</td>
<td>Accumulated driving time during the current and last week</td>
</tr>
</tbody>
</table>
6. Automatic selection of begin/end driving place

- Pending issue not implemented due to the absence of a digital map in the VU
- The VU will automatically propose a begin/end place, which can be confirmed or modified by the driver.
7. Galileo authentication service (OSNMA)

- OSNMA provides trust in the signal
- Galileo transmits encoded messages that are decoded by the receiver
- OSNMA is time-dependent
- OSNMA needs an external source of time which is reliable: tachograph clock (security-certified)
- Maximum automatic time adjustment is 1 sec/day (currently is unlimited)
- The accuracy of the clock has been increased from 2 to 1 sec/day
- Accuracy of the clock will apply in the full temperature range of operation of the clock (-20°C to 70°C)
- “time conflict” event recorded when GNSS time and tachograph time differ by more than 1 sec/day.
Determination of the position

• How can we combine Galileo with other constellations, whilst still keeping the trust in the signal?
• Chipset compatible with Galileo, GPS and Glonass.
• Galileo is the only constellation providing authentication
Additional measures to prevent simultaneous tampering of GNSS signal and motion sensor

• GNSS receiver will be able to detect and inform the VU about possible RFI attacks
  ➢ The VU will store the attack as “GNSS anomaly”
  ➢ The attack will be recorded as either “jamming” or “other attacks (spoofing)”

• Addition of two new conditions triggering “motion conflict” event:
  ➢ Conflict based on speed: motion sensor speed vs GNSS speed
  ➢ Conflict based on distance: distance between two consecutive GNSS points and motion sensor distance
  ➢ Conflict based on movement detection: between motion sensor vs internal sensor
9. Internal sensor

- Independent from GNSS and motion sensor
- Lodged inside the VU
- “motion conflict” event will be triggered if motion sensor does not detect movement and the internal sensor detects movement.
- Type of sensor, condition of movement and period to trigger an event are manufacturer dependent
- Period of reaction no longer than 3 hours
10. Software update

- Software update will cover:
  - Modification of all functionalities referred to in point 2.2 of Annex IC
  - The addition of new functionalities directly related to the enforcement of EU legislation on road transport
  - Modification of the modes of operation referred to in point 2.3 of Annex IC
  - Modification of the file structure (e.g., size increase)
  - Deployment of software patches to address software defects or reported attacks on the functions of the recording equipment

- Software update requires the implementation of additional hardware: 40% in usual hardware resources and 65% for map updates or enlargements (additional capacity that would cover for 3 MPI’s and current AETR countries)

- Provided that no new hardware is needed