CLEPA
European Association of Automotive Suppliers

EDR

Implementation experience with UN-R160 – Proposal for Step 2

Tokyo, April 10th 2024

EDR EXPERIENCES WITH UN-R160

Inconsistencies observed in footnotes in Annex-4

reference: UN Regulation No.160 Revision 1 - Amendment 1

1. Footnote-4 “Accuracy requirement only applies within the range of the physical sensor. If measurements captured by a sensor exceed the design range of the sensor, the reported element shall indicate when the measurement first exceeded the design range of the sensor”
   - This is applied to “Accuracy” column heading and thus give impression that is relevant for ALL data elements. However, explicit indication of exceeding measurement range (clipping) is often discussed for post-crash acceleration data only.
   - This creates confusion as to whether explicit indication is required for all analog range signal (e.g., vehicle speed, roll rate)

2. Footnote-13 (Accuracy) “Relative to the full range of the sensor”
   - This is specified for “Vehicle roll rate” only. Instead, this should be applicable to all data and hence specified at “accuracy” column heading
   - “Yaw rate” accuracy is specified as “± 10% of the full range of sensor”. Instead it can simply be “± 10%” with footnote.

3. Footnote-9 "If recorded" means if the data is recorded in non-volatile memory for the purpose of subsequent downloading”
   - This footnote number is missing on several data elements with “If Recorded” as condition for requirement.
   - Footnote number can be assigned to column heading instead.

EDR EXPERIENCES WITH UN-R160

Inconsistencies observed in footnotes in Annex-4

reference: UN Regulation No.160 Revision 1 - Amendment 1

4. Footnote-12 “The manufacturer will indicate the direction of positive roll/yaw rate”
   - This shall be applicable to “vehicle roll angle” data as well
   - Footnote of “yaw rate” shall be changed from 13 to 12

5. Footnote-14 “List this element n - 1 times, once for each stage of a multi-stage air bag system”
   - Footnote at “Frontal air bag deployment, time to nth stage, driver” must be changed from 15 to 14

EDR EXPERIENCES WITH UN-R160

Time zero, recording trigger and locking trigger of VRU Events

reference: UN Regulation No.160 Revision 1

For systems with “wake-up” airbag control systems, Time zero and recording/locking trigger provisions of VRU Events are inconsistent with that of Other Events.

Time zero condition at [5.3.3.1] states For systems with "wake-up" air bag control systems, the time at which the *occupant restraint control algorithm* is activated.

This excludes possibility to apply similar condition to VRU Events, even if VRU secondary safety control system is also “wake-up” type.

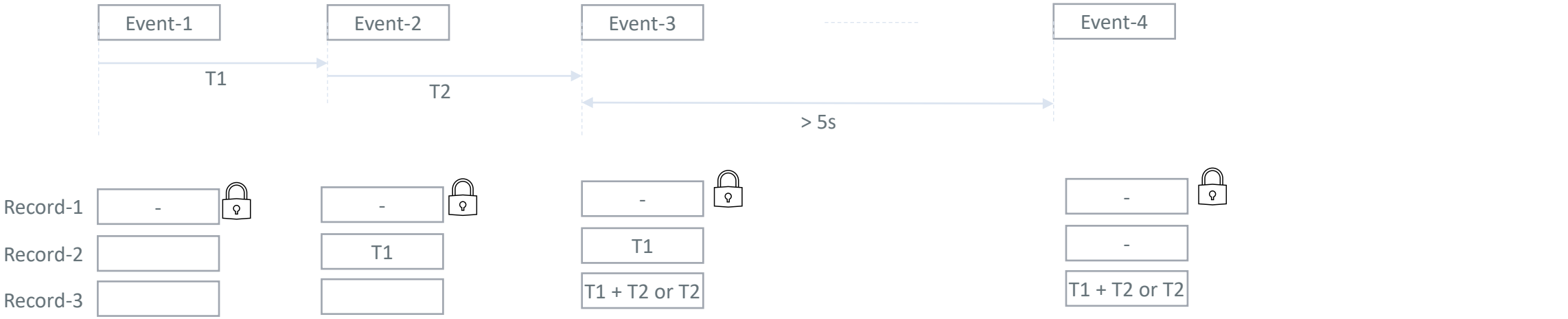
EDR EXPERIENCES WITH UN-R160

Time from event 1 to 2

reference: UN Regulation No.160 Revision 1

Definition: means the elapsed time from time zero of the first event to time zero of the second event of a multi-event crash.

1. This definition falls short in multi-Event crash with more than 2 Events.
2. If some of Event(s) from multi-Event crash are overwritten by subsequent Events, then time relation between recorded Events is lost



- There is no reference Event for T2
- There is no relative time between Events in 3 records

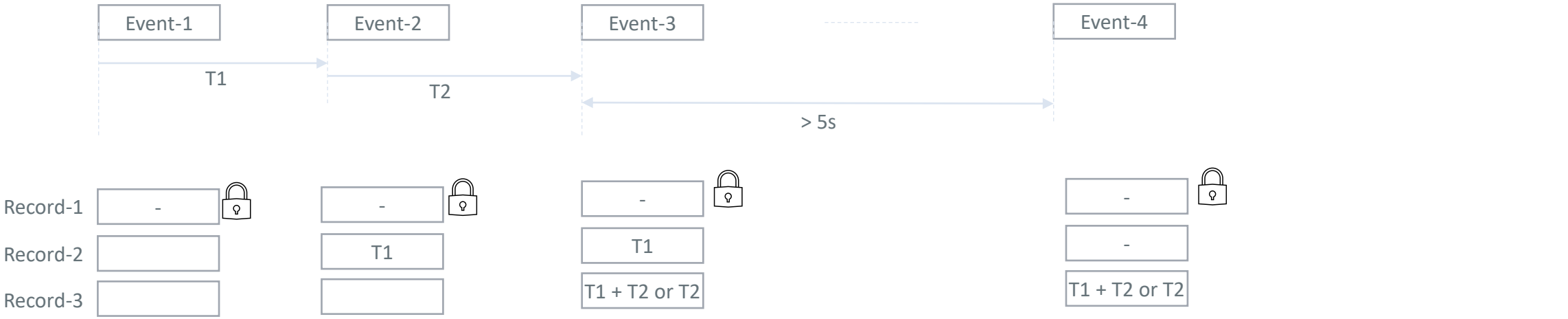
EDR EXPERIENCES WITH UN-R160

Time from event 1 to 2

reference: [UN Regulation No.160 Revision 1]

CLEPA wants to initiate a discussion of the Multi-Event storage

1. Pro / Con of the current approach
2. What is intended by the current regulation and where does the Multi-Event topic come from
3. Common agreed language to avoid ambiguities



- There is no reference Event for T2
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EDR EXPERIENCES WITH UN-R160

Sample time accuracy of pre-crash time history data

reference: UN Regulation No.160 Revision 1 - Amendment 1

Footnote-3 ”Pre-crash data and crash data are asynchronous. The sample time accuracy requirement for pre-crash time is -0.1 to 1.0 sec (e.g., T = -1 would need to occur between -1.1 and 0 seconds.)”.

- This footnote is gives clear information on sample time accuracy of all pre-crash status / snapshot data such as “Airbag warning lamp”, “Safety belt status” which have recording time specified as -1.0 sec.
- Similar timing accuracy requirement for time history data such as “vehicle speed”, “ABS activity” is missing.

Sample time accuracy of such data is equal to sample period i.e., “-0.5sec to 0sec” (e.g., T = 0 would occur between -0.5sec to 0sec”.

SAE J1698 and GB39732 acknowledge this explicitly in form of note (SAE J1698) or “Pre-Event Sync time” data (GB39732).

EDR EXPERIENCES WITH UN-R160

Passenger airbag suppression status, front

reference: UN Regulation No.160 Revision 1

Definition: means the status of the passenger airbag (suppressed or not suppressed)

- GB 39732 and 49 CFR Part 563 have primarily looked at this data as means to capture “Suppression switch” status.
- Definition in UN R160 is not descriptive enough to specify what is required and what is the purpose.

Suppression of airbag deployment could happen either because of conditions outside restraint control algorithm (e.g., suppression switch, occupant classification information) or because of decisions made within restraint control algorithm.

EDR EXPERIENCES WITH UN-R160

Accident emergency call system status

reference: UN Regulation No.160 Revision 1 - Amendment 1

Definition: means a system that is activated either automatically via in-vehicle sensors or manually, which carries, by means of public mobile wireless communications networks, a set of crash-related data and establishes an emergency audio channel between the occupants of the vehicle and an answering point.

Resolution: Faulted, On but emergency call not automatically triggered, On – Emergency call automatically triggered

- While definition includes both automatically and manually triggered system, resolution fits only for automatically triggered system.

Note: Typically, airbag control unit detects crash and send trigger to emergency call unit to place e-call.

EDR EXPERIENCES WITH UN-R160

Vehicle roll angle and roll rate

reference: UN Regulation No.160 Revision 1 - Amendment 1

Recording interval: 0 to at least 250ms.

Data sample rate: 10 samples per second

- Minimum required time interval of 250ms is not multiple of sample rate (100ms per sample).
- If only 2 samples are recorded, recording interval is effectively reduced to 0 to 200ms.

EDR EXPERIENCES WITH UN-R160

Steering input

reference: UN Regulation No.160 Revision 1 - Amendment 1

Minimum range: -250deg CW to +250deg CCW

Resolution: 1%

Accuracy: 1%

Range specification is in absolute degree while resolution is in %. It is not clear if resolution is 1% of EDR data range or 1% full range of sensor.

Keeping, resolution also can be in absolute degree will avoid this confusion.

If one wants to convert % value to absolute value, then knowledge of range (of EDR data or full range of sensor) is required in addition.

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Thank you!

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