

## **Safety Alert**

***Siemens Trainguard 200 according to ETCS BL 2.3.0d (ESBO 07.50.30) and others***

**Subject: Rolling stock - other**

**Equipment: Siemens Trainguard 200 according to ETCS BL 2.3.0d (ESBO 07.50.30) and others**

On 7th of March 2023, a vehicle with wheel diameters known by the ETCS on board which were significantly smaller than the real physical wheel diameters drove on a Swiss ETCS L2 track. The radars have been declared as faulty by the ETCS on board and were therefore not considered for distance and speed measurement. The position reported to the RBC (full CI) was significantly different from the real, physical position of the vehicle. The vehicle did not consider balise groups announced by linking because they were detected outside the expectation window. Since the linking reaction on the specific track was set to “no reaction”, the accumulated error between real and calculated position increased with every meter of travel. Analysis has shown that the real front end of the vehicle was up 300 m beyond/ahead of the max safe front end calculated on board. The vehicle consequently passed the marker board representing its real End of Authority and entered a track section in Full Supervision for which no Movement Authority was granted. Since the full CI was virtually still well in rear of the virtual End of Authority, no transition to Trip was performed. The vehicle stopped > 200 m beyond its real target, when the calculated max safe front end reached the virtual End of Authority.

Our considerations:

In order for the odometry of an ETCS OBU to be reliable, the sensors (radar, wheel sensors, etc.) must be configured correctly. In particular, the case that wheel diameters are not adjusted in the ETCS OBU after a wheelset change represents a safety-critical scenario.

The ETCS OBU manufacturers known to us have all defined safety-relevant application conditions (SRAC), which require a “SIL4-compliant maintenance process”.

Reality shows that the implementation of this SRAC respectively the execution of this “SIL4-compliant maintenance process” regularly (several times per year) is not performed correctly. In particular, the case of wheel diameters not being corrected/adjusted after a wheelset change has repeatedly led to safety-relevant incidents (see, among others, SIS entries by NSA CH of 16.04.2020 and 02.09.2020). The Swiss sector has already been made aware of the problem on various occasions and with various letters. Nevertheless, such incidents continue to occur, for the last time on 26.05.2023 (this time a Alstom Ebi Cab 2000 OBU). We see this as confirmation that the definition of a SIL4 maintenance process, which is largely determined by human action, is not purposeful (even if this is not prohibited by the regulations).

From our point of view, an ETCS OBU has information that should allow it to detect at least the majority of such incidents. With linking information available, the distance between two balise groups is known and can be compared with the measured distance of the odometer. Unfortunately, the TSI doesn't contain any corresponding requirements/function, so that all ETCS OBU manufacturers implement corresponding measures by themselves (reaction not harmonized).

Furthermore, trackside measures (like more restrictive linking reaction) are considered for the Swiss Level 2 lines.

**Country: Switzerland**

**Issuer: NSA**

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**Załączniki: Correction of the wheel diameters in the ETCS OBU.pdf**