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Researcher: Juliette Marais **Institute:** IFSTTAR
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EGNOS service evaluation in railway environment for safety-critical operations

The use of the European Geostationary Navigation Overlay Service (EGNOS) in railway environments faces difficulties such as visibility or technical constraints as shown in past projects.

However when received, EGNOS shows its benefits on accuracy and integrity. Several issues for EGNOS have been identified:

- EGNOS visibility in constrained environment is not guaranteed. This is one of the reasons of ground-based augmentation solutions developed as a complementary system in Sardinia.

- EGNOS integrity monitoring concept has been developed for aeronautics and relies on the definition of phases of flight or modes. Such phases do not exist in railways.

- EGNOS integrity monitoring concept relies on the comparison of Protection Levels with Alert Limits. Alert Limits bounds tolerable errors around the estimated position that are not defined in railway specifications.

- Propagation conditions in a railway environment differ from the open-sky environment encountered by a plane. Thus EGNOS error models have to be compared to real error model in order to evaluate their suitability to the application context.

As a consequence of the above discussion:

- User positioning equation needs to be specified
- User integrity equation needs to be specified
- User local environment needs to be characterized
- Certification process need to be addressed

In order to request EGNOS performances that are measurable, it is highly desirable that performances required from EGNOS by ERTMS/ETCS are defined at the output of a user receiver presenting what is considered as the Minimum performances needed for railway applications •