RTKRelay+ - Flexible GNSS Stream Recasting to Improve RTK Availability

Rui Fernandes, Fernando Geraldes, Rúben Carvalho, Paul Crocker (Portugal) and Yaw Poku-Gyamfi (Ghana)

SUMMARY

In many parts of the world, especially across developing regions, access to real-time GNSS correction data remains limited. The absence of dense national reference networks restricts surveyors and engineers from using high-accuracy RTK positioning services. Even where data are available, their use can be constrained by rigid stream definitions—the data source fixes its metadata (e.g., reference coordinates), message structure, and format. As a result, users are often unable to receive corrections in the necessary reference frame or to adapt existing data streams for local applications.

This paper introduces a middleware concept that provides a new layer of flexibility for RTK data dissemination. The proposed system operates between GNSS data sources and NTRIP casters, allowing controlled modification of stream metadata in real time. It can adjust the coordinates associated with the reference station, alter mountpoint identifiers, or adapt the RTCM message set to match network requirements, without affecting the raw GNSS observables. The application can also function as a stand-alone caster, receiving RTK data directly from a GNSS receiver or another caster, applying the required adjustments, and forwarding the modified stream to new mountpoints at the same or at other casters.

Such capability offers several advantages for the surveying community. A single station can broadcast RTK data simultaneously in different reference frames, ensuring compatibility with both international and national datums. The approach also enables controlled redistribution of streams from semi-restricted or private sources, supporting authorised re-use while maintaining data integrity. This can be particularly valuable in regions without formal CORS networks, where regional or institutional initiatives may wish to share existing GNSS stations to deliver reliable correction data more

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effectively.

Implementation is being carried out in collaboration with the MIRASpaco initiative, integrating the system within the MIRAnet caster environment. This partnership allows real-world testing of interoperability with NTRIP v2 and RTCM 3.x formats under realistic operational conditions, including mixed public and private data sources. Current development focuses on optimising metadata handling and evaluating performance in real-time streaming environments.

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