RaPPPid

Today conventional GNSS point positioning in difference mode allows establishing site coordinates with an accuracy at the mm-level in case of longer site occupation times. Even in real-time (or close-to-real-time) the site coordinates can be established at the cm-level within a couple of seconds (RTK-positioning) utilizing dual-frequency phase and code observation data as well as correction information usually forwarded by a regional GNSS service provider. However, this method reveals on the other hand a series of shortcomings as for example the necessity of a relatively dense reference station network. Moreover the user is conditioned by the reference frame of the correction data provider, a high requested data bandwidth and last but not least due to network effects.

On the other hand Precise Point Positioning (PPP) is a GNSS based single point positioning technique which has been employed in a permanently increasing number of applications over the past years. PPP offers a 1 dm coordinate accuracy but currently lacks from a not negligible coordinate convergence time. In this context first of all the planned space based Galileo Commercial Service shall be noted which represents a classical basic float PPP approach. Here the realized SSR (State Space Representation) to forward global models for orbit and clock corrections does not allow for integer ambiguity fixing. Therefore the PPP approach suffers from the noted large convergence time. The project RaPPPid (Rapid Precise Point Positioning with integer ambiguity resolution) aims on the significant reduction of this convergence time down to 2 minutes or less.

RaPPPid investigates two different models, which accelerate integer ambiguity resolution. On the one hand regional information about the ionospheric delay is introduced and on the other we make use of the nowadays available new signals (GPS L1/L2/L5; Galileo E1/E5/E6) for building beneficial linear combinations of 3 carriers. Both approaches promise a considerable reduction of the noise of the utilized signal linear combinations and therefore an accelerated determination of so-called phase calibration biases (UPDs) and of the subsequently derived integer phase ambiguities will be possible. In the last part of the project stability and quality of the determined UPDs and rover coordinates will be investigated. Finally a thorough analysis of the achieved reduction in coordinate convergence time even under consideration of different satellite geometries (signal obstruction) will be conducted.

The algorithms developed in this project can be used in a later step to improve the current GNSS Sensor Software by a competitive PPP approach.