Real-Time PPP based on CONGO and RTCM's Multiple Signal Messages

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With the GLONASS constellation coming close to completion and other systems becoming operational in the near future, positioning with navigation satellites from two or more different satellite systems will yield increasing attention in the future. The global COoperative Network for GIOVE Observation (CONGO) has been jointly set up by Deutsches Zentrum für Luft- und Raumfahrt (DLR, Oberpfaffenhofen, Germany), Bundesamt für Kartographie und Geodäsie (BKG, Frankfurt, Germany) and Deutsches GeoForschungsZentrum (Potsdam, Germany) supported by several other institutes as station hosts. The network enables access to observations from GPS, GLONASS and the first Galileo test satellites GIOVE-A and -B as well as the future Galileo satellites. All 15 stations in this network stream their measurements in real-time via NTRIP transport protocol. In order to transmit the variety of new signals from these three satellite systems and minimize the required bandwidth for their transport, the stations are currently upgraded to transmit observations in the form of Multiple-Signal-Messages (MSM) as recently proposed for the RTCM Version 3 standard.

The paper introduces the capabilities of the proposed RTCM Version 3 Multiple Signal Messages at the example of the CONGO network. Advantages of the new stream format like increased resolution of the encoded measurements as well as full compatibility with the new RINEX Version 3 archiving format are introduced. Furthermore, the use of these new messages is demonstrated in a real-time Precise Point Positioning (PPP) with multiple satellite systems based on real-time orbit and clock products generated from CONGO data.