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Recent Developments in the Open Traceable Time Platform

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The Open Traceable Time Platform (OTTP) project [1] was conceived as integrated open source hardware and software to support timing applications that needed traceability to a national metrology institute's (NMI's) UTC realization. These include applications such as a frequency standard operated in a calibration laboratory and the timestamp source for an electronic notarization service. The project was initially funded as a Technical Committee Initiative by the Asia Pacific Metrology Programme in 2015. Prototype systems were delivered to participating NMIs in 2017. Development of the OTTP has continued since.

The core of the OTTP is a GNSS time-transfer subsystem which enables remote traceability. The first version of the OTTP used a NVS Technologies NV08C-CSM GNSS receiver but this subsequently became difficult to source in small quantities. The ublox ZED-F9T was identified as a suitable replacement and this was the preferred OTTP receiver for a number of years.

Recently, the mosaic-T receiver was introduced by Septentrio, offering for the first time the possibility of a low-cost carrier-phase time-transfer system. A hardware simplification became possible too, since an external counter/timer was no longer needed (later versions of the ZED-F9T firmware introduced timestamping of an external 1 PPS, also potentially eliminating the need for a counter/timer). The availability of software from Septentrio to produce RINEX observation files and CGGTTS time-transfer files also reduced the software development burden.

The latest version of the OTTP uses the mosaic-T and the host computer is a Raspberry Pi. Septentrio's software only runs on x86 CPUs however. To keep the system standalone, a program to convert the receiver's proprietary binary messages to RINEX was written. For completeness, a RINEX to CGGTTS converter is also available. Currently the software only supports GPS but we plan to add support for Galileo.

At this conference, we will describe the new OTTP hardware and software. GPS carrier-phase and code-based time-transfer performance will be characterized. Performance of the OTTP as a Network Time Protocol server will also be presented. Some new applications will be discussed.

1. http://openttp.org