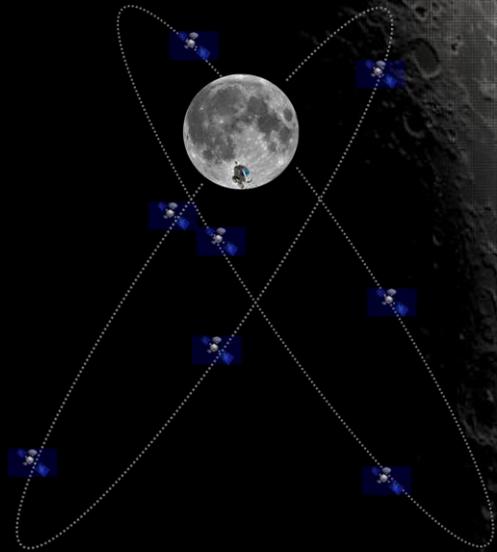


2nd Joint ICG-IOAG Multilateral Cislunar PNT Workshop@Vienna

LNSS perspective on lunar time

Japan

Lunar Navigation Satellite System



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Lunar time definition from the LNSS perspective



- 1. Lunar PNT users will be primarily on the Moon surface and space agencies are also planning to place atomic clocks on the Moon surface. The lunar time definition of the Moon surface minimizes the time discrepancy against those users, compared with the lunar time definition at the center of the Moon, which leads to the minimal number of the necessary clock steering for the users on the Moon surface. Moreover, the atomic clocks on the Moon surface will realize the lunar time definition on the Moon surface**
- 2. The LNSS or the other lunar PNT systems are expected to be eventually monitored and operated by lunar surface monitoring stations for which their system times will be realized on the Moon surface, respectively, in a similar way to the GNSS**

Therefore, the lunar time definition on the lunar geoid (equipotential surface), i.e., TL, is necessary from both the user and the LNSS perspectives.

What we would like to ask for the Timing Community



- 1. The tractable high-accurate mathematical relation between the UTC and the TL, hopefully also the relation between the GPST and the TL, so that we, providers and lunar PNT users, can use the common time transformation around/on the Moon. The time transformation accuracy should be nanosecond-level from the lunar PNT perspective**
- 2. The consideration of minimizing the necessary number of the clock steering on the Moon because the frequent clock steering on the Moon is troublesome for users and potentially causing problems during the lunar exploration missions**
- 3. The encouragement of the satellite-based timing system on the Moon that is similar to the Earth GNSS because humans are already used to the GNSS-based time synchronization on the Earth and lunar navigation satellite systems will be soon deployed around the Moon through the international collaboration**