WRC-19 Agenda Item 7, Issue A non-GSO Bringing Into Use

Xi'an, People's Republic of China

6 November 2018

Takahiro MITOME (Japan)

Background

- Under the preparation to WRC-19 agenda item 7, issue A (definition of non-GSO bringing into use), UK and Canada proposed new data item obligations which will request to include specific tolerance to non-GSO orbit parameters (see Option 1 for 11.44C.1 in Chapter 3/7/1.5.1.1 of ITU document CPM19-1/1), while current ITU practice does not require such tolerance data (this is reflected in Option 2 for 11.44C.1 in Chapter 3/7/1.5.1.1 of ITU document CPM19-1/1: in the current practice of ITU, the need of non-GSO orbit parameter tolerance is discussed only in the bilateral coordination).
- Since RNSS/GNSS satellites generally minimizes the orbit control operation to avoid the decrease of RNSS/GNSS signal availability (because RNSS/GNSS signals are not available during the orbit control maneuvers), the above restriction of non-GSO orbit parameters (if the actual satellite orbit go beyond tolerance ranges, such satellite would potentially lose the international recognition in ITU) would potentially impact on RNSS/GNSS satellites.

Proposed WG-S Action from Intersession Meeting in July 2018

1) to alert RNSS/GNSS providers about this potential issue.

2) to encourage RNSS/GNSS providers to analyze the potential impact on the operation of RNSS/GNSS satellites and regulatory status of RNSS/GNSS satellites

3) based on the above 1) and 2), to encourage RNSS/GNSS providers to contact their national administration for their national preparation process for WRC-19, as appropriate

(NOTE of ITU Meeting Schedule: CPM in Feb 2019, WRC-19 in October-November 2019).

Analysis of Potential Impact on QZSS

- **To analyze the potential impact, the actual operation of QZSS satellites is checked:**

	Inclination angle (degrees)	Apogee Altitude (km)	Perigee Altitude (km)	Argument of Perigee (degrees)
Values in ITU Filings (*)	45	39970	31602	270
Designed Nominal Values (**)	41	38316.7 to 39581.7	31992.0 to 33257.0	270 +/- 2.5
Current Operational Range	40.5 to 44.8	38872.9 to 39002.3	32598.2 to 32727.9	268.7 to 272.1

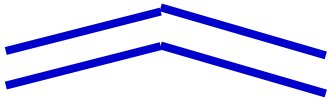
*: For the purpose of ITU filing, the expected maximum values are put for inclination angle and apogee altitude and the expected minimum value is put for perigee altitude.

**: From PS-QZSS-001 Draft Edition (August 31, 2018)

Analysis of Potential Impact

- **As shown below, currently proposed ranges for the orbit parameters tolerance in ITU-R are more stringent than the actual operation of RNSS satellites.**

	Inclination angle (degrees)	Apogee Altitude (km)	Perigee Altitude (km)	Argument of Perigee (degrees)
Canada Proposal	+/-1 to +/-2	XX	YY	+/-1 to +/-2
UK Proposal	+/-1	+/-50	+/-50	+/-0.2



Actual Operational Range	4.3 degrees range	1265 km range	1265 km range	2.5 degrees range

Proposed orbit parameters tolerance will significantly impact on actual operation of RNSS satellites.

Conclusion

- **Analyses of Potential Impact on QZSS showed potential threat for the international recognition of QZSS in ITU.**
- **Similar impact can be expected to other RNSS/GNSS systems.**
- **Thus, the proposed WG-S Action should be definitely supported.**
- **GNSS providers should now focus on the third Action "to contact their national administration for their national preparation process for WRC-19, as appropriate".**
- ***NOTE: QZSS provider already contacted to the Japanese administration. As the result, the proposal to APG meeting in January 2019 is approved, in order to submit a proposal to CPM19-2 in February 2019 from APT countries.***

Additional Information

- **There are other potential problems about orbital parameter tolerance in the Radio Regulations (RR);**
- **EESS: Because of the complexed mission requirements (no orbit control during EESS observation and precise orbit control for observation data mapping purpose) and limited propulsion resources, the introduction of the tolerance of orbit parameters would significantly impact the design and operation of space science satellites.**
- **Some SRS Mission: In some cases, brand new idea for satellite orbits are tested using space science satellites. In one example mission, the orbit altitude is intentionally changed during its mission life time. For this type of orbits, it is not possible to introduce the tolerance of orbit parameters**
- **Manned Space Missions (usually under SRS): When a space debris is found to collide with the International Space Station (ISS), the orbit of the ISS is changed for collision avoidance. But, if orbit parameter tolerance is introduced in the RR, such orbit control for safety would result in the loss of international recognition in ITU.**