IAF SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Advances in Space-based Communication Systems and Services, Part 1 (1)

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ADVANCED SPACE-BASED INTERNET-OF-THINGS (IOT) CONSTELLATION BRINGING HIGH REVISIT & LOW LATENCY COMMUNICATION SERVICES

Abstract

Low-Earth-Orbit (LEO) satellite constellation for Internet of Things (IoT) is gaining momentum thanks to increasing market demand and new use cases. The IoT market size stood at USD 250.72 billion in 2019 and is projected to reach USD 1, 463.19 billion by 2027, a CAGR of 24.9 percent. Compared with traditional geostationary satellites, LEO constellation boasts global coverage and low. This paper introduces HEAD's Skywalker constellation, a LEO narrowband IoT satellite constellation with integrated payloads designed to provide advanced space -based IoT communication solutions.

The Skywalker constellation consists of 48 small satellites, with 12 deployed in sun-synchronized orbit (SSO) and another 36 in LEO, with 6 orbital planes and each plane deploying 6 satellites. Skywalker constellation has 5 on-orbit satellite and another 16 will be launched by 2021. The full constellation expected by 2023 will fly over intervals of 10 minutes or less with 60 north and south latitude.

All of the satellites will be equipped with multiple payloads including a customized LoRa Data Collection System (DCS) payload, an AIS, an ADB-B and a VDES payload. The constellation aims at serving those area without terrestrial GSM coverage for various applications such as river monitoring, smart agriculture, vessel monitoring, animal tracking etc. A low cost terrestrial IoT terminal (a handheld device) with a satellite module integrated and compatible with both terrestrial GSM and satellite network is designed to provide advanced narrow band communication services globally.

With the continuous satellite system expansion, it will open up more business opportunities as well for relatively latency sensitive applications. The terminal works on LoRa interface for connecting to sensors and has dual interface of GSM and satellite, which cuts down significantly the costs of mass IoT practices and ensures the best data transmission service via secure, strong anti-interference, low cost and highly reliable data transmission channels.

Some on-going pilot projects are carrying out in Africa, Southeast Asia and China to validate use cases in various vertical markets including animal tracking, vessel monitoring and logistical management. This paper will also present an elephant tracking pilot project which uses an ear-tag sensor on elephant that connects to the held-hand IoT terminal via Space-based LoRa DCS communication network and GSM network.