INTERNATIONAL TELECOMMUNICATION UNION

TELECOMMUNICATION STANDARDIZATION SECTOR

STUDY PERIOD 2022-2024

SG20-C0351

STUDY GROUP 20

Original: English

Question(s): 5/20 Arusha, Tanzania, 13-22 September, 2023

CONTRIBUTION

Source: ITU-APT Foundation of India (IAFI)

Title: Proposed new work item – Development of a new technical report on use of Low Bit Rate Data Application through Satellite for connecting IoT devices, to be used in remote areas.

Contact: Mr. Bharat Bhatia
ITU-APT Foundation of India (IAFI)
India
Tel:+91 9810173737
E-mail: Bharat.bhatia@itu-apt.org

Contact: Mr. Misha Bajpai,
ITU-APT Foundation of India (IAFI)
New Delhi, India
Mob: +91- 9868136066
E-mail:mishabajpai@yahoo.co.in

Abstract:

The use of IoT devices in remote/hilly area are very much essential to extend the wide range of benefits to sparse populations and other establishments, for improving efficiency, increased safety, reduced costs, improved communication and many more. As terrestrial networks like 5G or Wi-Fi are very limited or unavailable in most of the remote/hilly area, satellite technologies can play vital role in connecting IoT devices, to be placed in such area.

One of the main benefits of using satellite for IoT connectivity in remote areas is that it can provide ubiquitous coverage. This means that devices can be connected to the internet, regardless of their location, a very important aspect for many applications, as sensors need to be deployed in remote and inaccessible areas. Now, after deployment of hundreds of LEO satellites, satellite internet connectivity has been revolutionized, reducing latency to as low as 50 milliseconds, making it suitable even for real-time applications.

IAFI through this contribution proposes to establish a new work item for development of a new technical report regarding the use of Low Bit Rate Data Application using Satellite for connecting IoT devices, to be used in remote area

Proposal for a new work item for a new technical report on use of Low Bit Rate Data Application through Satellite for connecting IoT devices, to be used in remote areas

Satellite connectivity is the best available connectivity option for providing internet in the unserved and underserved areas of the world. Following features of the satellite-based solutions are ideal for IoT traffic.

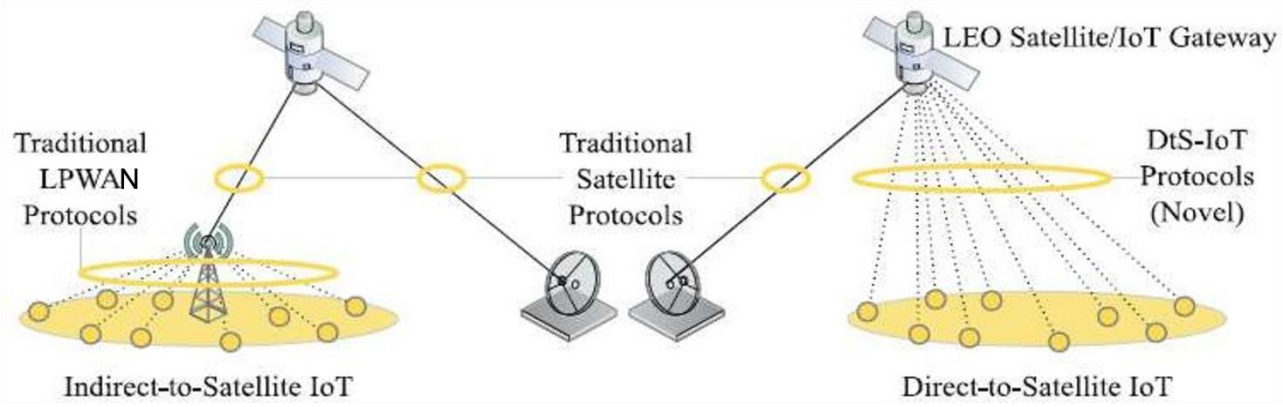
(i) Satellite networks can have global coverage allowing the IoT to be connected to remote locations, where terrestrial connectivity is not available or cannot be extended due to financial or terrain constraints.
(ii) The IoT ecosystem needs ubiquitous, resilient and seamless connectivity for the devices to run efficiently. Satellites, in conjunction with terrestrial services, have a proven track record of resilient services. Satellites can provide reliable connectivity, even in harsh environments.
(iii) Satellite communications have broadband, narrowband and broadcast capabilities. Accordingly, the global network of satellite operations can support the needs of IoT devices with different bandwidth and capabilities.
(iv) The latency requirements- Latency is the time it takes for data to travel from the IoT device to the cloud. The latency of GEO satellites is typically 500-700 milliseconds, while the latency of LEO satellites is typically 20-50 milliseconds.
(v) Some IoT applications can work even with higher latency, while some applications can work with low latency.
(vi) IoT Low-Bit-Rate applications require low power, low cost and small size terminals, so task of data transfer in remote area can be effectively perform using satellite. IoT devices that use satellite connectivity can have longer battery life than devices that use terrestrial connectivity.

IoT based applications through satellite connectivity can provide enterprises operating in remote/hilly area with newer opportunities to increase operational efficiency, reduce costs and simultaneously secure goods, personnel and assets.

Satellite Connectivity Models for Low-Bit-Rate Applications:

Two models are developed for provision of satellite-based connectivity for IoT and low-bit-rate applications.

(i) Hybrid model consisting of LPWAN and Satellite.
(ii) Direct to satellite connectivity.



a. In **Hybrid (LPWAN + Satellite) or Indirect Model**, each sensor and actuator in a network may communicate with the satellite through an intermediate sink node, i.e., Low Power Wide-Area Network (LPWAN) or LPWAN gateway. In LPWAN, a

network server coordinates several gateways through a reliable backhaul and in turn gateways interact through wireless links with potentially billions of low-power devices.

The LPWAN technologies have been standardized by 3GPP. The LPWAN technologies possess several characteristics that make them particularly attractive for applications requiring low mobility and low levels of data transfer (100s of bps to several 100s of kbps). Their main characteristics are:

- Low power consumption (to the range of nanoamp) that enable devices to last for 10 years on a single charge,
- Optimized data transfer (supports small, intermittent blocks of data),
- Low unit device cost,
- Simplified network topology and deployment,
- Improved outdoor and indoor penetration coverage compared with existing wide-area technologies,
- Secured connectivity and strong authentication,
- Integrated into a unified/horizontal IoT/M2M platform,
- Network scalability for capacity upgrade.

b. In **Direct-to-Satellite Model**, devices directly communicate with the satellite without the need of any intermediate ground gateway. The satellite receives data from IoT devices and transmits the data to the ground station nearest to the device and the data gets stored in the application server for further processing. This model can be used for wide area sensor network with sensors spread over wide geographical territory to provide low-cost, low-power, secured direct-to-orbit satellite connectivity for the Internet of Things.

Direct-to-satellite is a more preferred solution in challenging scenarios such as:

(i) During disaster or natural calamities in areas where fast deployments are required and not much hardware is available or possible to arrange
(ii) In areas where the devices are on the move, placement of a LPWAN node would not be economically viable and preferred.
(iii) In areas where only a few devices are to be connected and therefore, a LPWAN node is not economically viable.

However, many of the existing satellite networks are not commercially suitable for supporting millions of direct connections, which are required in IoT applications.

Use of various satellite orbits:

IoT applications being Low-Bit-Rate, require low power, low cost and small size terminals that can effectively perform the task of signal transfer with minimum loss. The selection of satellite orbit depends on the requirements of the IoT application. GEO satellites provide high density coverage and higher speeds of communication. On the other hand, LEO/MEO satellites can provide wider coverage and lower latency that is suitable for real time communications. Depending on the orbit chosen, the satellites can target a set of applications that is most suitable for the GEO/LEO or MEO orbits.

Proposal:

The proposed new work item is to develop a new technical report on the use of low bit rate data applications through satellite for connecting IoT devices in remote/hilly areas, considering a new and emerging area of study and there are many potential benefits to be gained from it.Use of IoT devices in remote/hilly areas very much necessary to extend the wide range of benefits to sparse population and other establishments, in improving efficiency, increased safety, reducing the costs, and improved communication due to automated data collection.

Study Group 20 (SG-20) of ITU-T is working to address the standardization requirements of Internet of Things (IoT) technologies, with an initial focus on IoT applications in smart cities and communities (SC&C).

Accordingly, IAFI proposes a new work item for a technical report documenting the use of Low Bit Rate Data Application through Satellite for connecting IoT devices, may be used in remote area in Asia Oceania Region. Requisite A.13 justification for commencing a new non normative work item and a draft work plan is enclosed.

IAFI urges ITU Members in all regions to support the creation of this new work item and actively contribute to it.

****