

Global Access to Data without Internet Using Cubesats

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Abstract

Over half of humanity cannot regularly access the wealth of information available on the Internet despite the growth of cable, cellular technology a basic level of information and education remains unavailable to billions of people around world. Consequently the arrangement of every one of these issues is Outernet. This paper represents what is Outernet, how it works, data volume and similar technologies identified with Outernet.

Keywords – Outernet, Datacasting, Lantern, Cubesats Segments.

INTRODUCTION

Outernet is a global network of cube satellites (cubesats) broadcasting internet data all over the world. Outernet proposes to be a first-of-class broadcast solution uniquely enabled by advances in small satellite engineering. The planned endeavor will utilize a large constellation of nanosatellites. A non-benefit association named Media Development Investment Fund (MDIF), started a venture called OUTERNET. It is initiated in the year 2013. Project would involve data casting & user diagram protocol through hundreds of cubesats measuring 10cm (3.9 inch) each. It is a modern version of short wave radio or bit torrent from space and provides a basic level of information and education to the world for free. "The Primary Objective of the Outernet is to Bridge the Global Information Divide".



Fig 1- Outernet

The Outernet will connect the entire world with the information on various subjects. Wifi enabled devices would communicate with satellites in their region which in turn communicates with other satellites & ground based networks, thus forming the global network. The countries like America, Europe, Middle East, and North Africa have started getting Outernet access. Soon, the access will become worldwide.

OVERVIEW OF OUTERNET TECHNOLOGY

CubeSats

Cube satellites are regularly called CubeSats. It is a scaled down type of a satellite which is utilized for space research purposes, and has a place in the class of Nano satellites. Its framework measure as little as 10x10x10cm and 1 kilogram for a completely functional space vehicle.

Lanterns

A Lantern is a device that interfaces with the Outernet server to get the radio wave signals from satellite, and afterward, change over them into digital documents. To get to the advanced documents put away in the lantern, one just needs to turn on the Wi-Fi of his/her gadget and the put away data in the lantern can be seen in the Wi-Fi gadget. It consists of following part as illustrated in fig 2

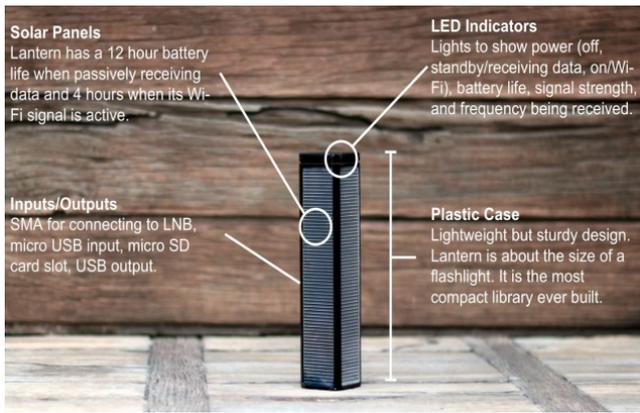


Fig 2- Lantern used for outernet

Antenna

Outernet utilizes a versatile L-Band fix receiving antenna. This directional radio antenna has a beam width of 40 degrees, so indicating is simple. It is simply pointing in the general direction of the satellite.

Specifications:

- 1525 - 1559 MHz
- 8dbi
- 4 inch SMA Male connector
- 12cm x 12cm x 1.5cm, 3.5 oz

Radio and Amplifier

Radio works on Ultra low phase noise 0.5PPM TCXO. Frequency scope of it is roughly 25MHz-1700MHz.

Smartphone/tablet/laptop/PC which has WiFi.

This gadget will be utilized to associate with Outernet Wi-Fi hotspot server running on Raspberry Pi 3 or CHIP.

WORKING OF OUTERNET

There are three segments – Space segment, Ground segment, and User segment. The Outernet works with the connectivity among all these three segments.

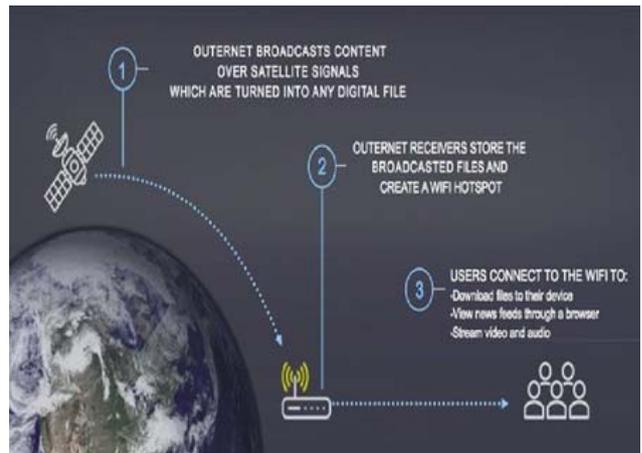


Fig 3-Working of Outernet

Satellites are the fastest and cheapest way to reach every person on Earth. Outer net’s Wi-Fi solution works by using hundreds of tiny 10cm cube shaped satellites called “Cubesats”. The plan is to launch hundreds of low-cost miniature satellites, known as Cubesats, into low Earth orbit (LEO). Each satellite receives data streams from a network of ground stations and transmits that data in a continuous loop until new content is received. In order to serve the widest possible audience the entire constellation utilizes globally accepted standards based protocols, such as DVB, digital radio mandible and UDP based wifi multicasting.

The Outernet downloads files from various sources like Khan Academy, Wikipedia, MIT open courseware and the like, and sends it to its servers. The satellite dish sends this data to the satellites. The satellite broadcasts information back to Earth all over the world. Ku/C-band dish antenna receives the information and sends it to the receiver, which decodes and saves it to its memory. The receiver then shares this information with other devices using Wi-Fi. Wi-Fi-enabled devices like laptops and Smartphone’s connect to the receiver access point and open any browser. Information is then displayed on the screen.

As appeared in figure 3, basic work of Outernet is as follows Outernet’s earth station sends any data request in the form of signal to cube satellites.

CubeSats get the information and process them and send back to outernet server, which is located at ground segment.

- Outernet server associated with lanterns.

- Lanterns get the radio signal and store the data in the form of digital file. It likewise emanates the Wi-Fi hotspot.
- Information put away in lanterns can be accessed by any client who has Wi-Fi empower devices. User turn on his/her Wi-Fi and get associated with lantern and get to the information.

The Outernet will be further extended as a two-way communication but only after successful implementation of one-way communication, and reaching enough funds for the same.

In two-way communication system, the user will be able to request information that is not available in lantern. The users will get access to that information by sending signals for the request, and in return, the requested information will be sent to the user.

DATA SERVICE

Data casting is the heart of Outernet. Data casting mean broadcasting data. Unlike session based internet protocol datacast do not have message acknowledgement or retransmission request. Delay/Disruption Tolerant Networking (DTN), an innovation being institutionalized by space organizations of the world, will be utilized to empower packetized information over Outernet space links.

Outernet characterizes four sorts of information which can be ordered by transient significance and relative data size.

OUTERNET CONTENT

Librarian" - Outernet's Content Application Librarian is what a user would have installed on their device that would receive Outernet content and act as their browser. Librarian decrypts the broadcast content that has been downloaded to the device. The current version does not provide any search capability. That feature is planned for future releases.

Librarian Implementation details are:-

- Multi-language support:- Librarian has been built with multi- language support.
- Content signature:- Each piece of content (HTML page and/or images) is sent in encrypted format using GnuPG and 2048- bit encryption key.

- Storage conservation:- In order to conserve bandwidth and storage, all content is broadcast as zip files

SIMILAR PROJECTS TO OUTER NET

Google Loon

This project aims to provide the internet in rural and remote territory utilizing high-altitude balloons. It is initiated by Google. Each balloon can placed in stratosphere and provide connectivity to an area of approximately 80 km in distance across utilizing an innovation called LTE remote communication [3]. It utilizes Li-Wi rather than Wi- Fi. Benefits of utilizing Li-Fi innovation is that its light waves cannot penetrate through walls and hence forth make a relatively more grounded range which is more secure than when contrasted and Wi-Fi for the assurance hacking dangers.

Internet.org

Facebook launches a project called the internet.Org to provide the internet in rural and undeveloped area in the world using drones [13]. Drones are working at 65000 feet [4]. At this altitude, drones can broadcast a powerful signal that covers a city-sized zone of the domain with a medium population [10]. Not at all like the Loon equipment, which is centered around connectivity, Zuckerberg and Facebook are accentuates the parts that transporters need to play in advancing and expanding access.

Nets Kuku

Nets kuku is a distributed network that provides uncensored and independent network. It supports 2128 nodes. Nets kuku aims to be a mesh network or a peer to peer protocol that creates and supports itself self-governing [12]. Nets kuku assembles just the course which interfaces every one of the PCs of the net. Nets kuku replaces the level 3 of the ISO/OSI display with another steering convention.

CONCLUSION

Outernet is an ambitious project that seeks to create a global WI-FI. Under the name "Outernet" a technological development is approaching which will profoundly Change our relationships with each other and with the objects around us in the world. Outernet is not Internet, but it will expand open doors for everybody to get to digital news and data,

permitting more noteworthy access to circumstance and instruction than anything that at present exists. Outernet is not only providing Global connect, but also uncensored and anonymous connection worldwide.

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