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"PROJECT LOON" - INTERNET TO RURAL AND REMOTE AREAS

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Abstract

In this advance world where everything is associated together with the help of Internet it has been genuinely said that Internet has become a part of human life. At present we use the service of Internet Service to connect to the global network. This internet service is been provided through the telecommunication operators. This connection is reachable only to one third of the world's population. So the remaining people are not able to get the internet access mostly in Rural and Remote areas. To overcome this type of problem a well know company "GOOGLE" came up with a solution called LOON. Project Loons are the connection of balloons travelling on the edge of space. It is designed to connect rural and remote areas where the internet facility is not available. This Project Loon balloons are been places in the stratosphere, twice the high of airplanes and been controlled by rising or decreasing to an altitude with winds moving in desired direction. In this paper we study about the loon's technology, working of this project and Reviews. This project can be viewed as the stepping stone to connect each an individual person in this world and make it truly global.

Keywords: Google Loon, Internet Access, High altitude Balloons, Stratosphere, Envelope, Equipment, Solar Plates.

I. Introduction

Internet has been the biggest revolution of most recent couple of decades. It would not be right to say that internet has disintegrated the idea of physical limits and we now have a place with a worldwide domain, empowering us to speak with the general population living far from us in the matter of seconds and effortlessly. Project Loon is an innovative work undertaking being produced by Google with the mission of giving Internet access to rural and remote areas. The undertaking utilizes high-elevation balloons put as a part of the stratosphere at a height of around 20 mi (32 km) to make a flying remote system with up to 3G-like velocities. As a result of the project's apparently amazing mission objectives, Google named it "Project Loon". The balloons are moved by changing their altitude to float to a wind

layer after identifying the wind layer they automatically desire there speed and direction according to the wind data from the National Oceanic and Atmospheric Administration (NOAA). The clients of this project (people) connect to the balloon using a special internet antenna attached to their buildings. The internet signal travels from balloon to balloon, then to the global internet return on Earth. Through this project they are able to bring internet access to all the remote areas at an affordable price to each and every person. The project Loon is an aerial balloon network. It flies at an altitude of 20 km above the earth surface in the stratosphere, and provide wireless mobile network station in sky with up to 3G and 4G lte speeds. The balloons are connected with transceivers to send and receive the signals will travel in the balloon network before reaching to the ground station. In turn it joins the global network with enable connection with ISP (Internet Service Provider) or using LTE (Long Term Evolution). Each balloon can provide connectivity to an area of approximately 80 km in diameter using a technology called LTE wireless communication. The balloons use patch antennas which are directional antennas for the Google balloons to transmit signals to the ground stations users. The whole infrastructure is based on LTE. For every person affording an internet connection is out of range. And this is far from being a solved problem. There are many challenges for the internet connectivity near jungles, archipelagos, mountains etc. And there are also major cost challenges at those regions. Right now, For example, in most of the countries, the cost of an Internet connection is more than a month's income. Solving these problems isn't simply a question of time: it requires looking at the problem of access from new angles. So today we're unveiling our latest project from Google balloon-powered Internet access.

2. Literature Review

Around ten years back, nobody would have thought that smart phones would turn out to be such an essential piece of how we lead our lives or that internet would encourage such a solid impact in instructive straight forwardness and social incorporation over different landmasses. A whole class of employments has emitted on the internet in the course of the most recent decade, huge numbers of which are based exclusively around spreading information. YouTube, for instance, has a large number of "how to" recordings. With internet getting to be accessible to a huge number of internet detached individuals, there will be an extreme surge of these recordings. In these recent years, Google X has discharged various incredible projects, including Google Glass, Self-Driving Cars, and in addition different activities related to neural networks. It provides the facility from no internet to the high speed internet for everyone as many of the Indian as well as the small villages and the towns are unable to enjoy the benefits of the internet due to some or the other reasons. So it decided to provide the technique of the internet through balloon to

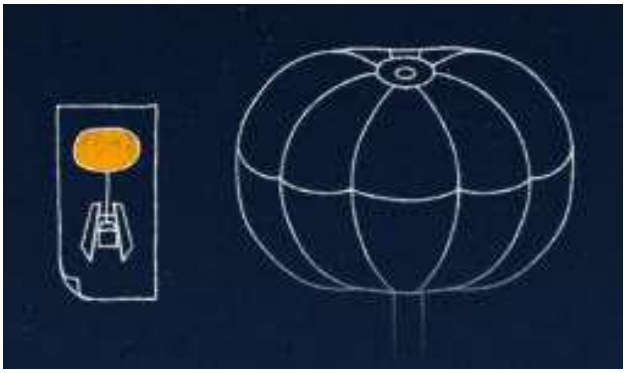
connect many areas by providing the internet. This will become helpful to connect many areas hand will also help to share new ideas and techniques for the development of countries. For this reason Google has launched the technique of Google Loon which was named as PROJECT LOON. Through this there will be no disconnection of the internet but a continues connectivity of the internet.

3. **Loons Technology**

This project avoids the implementation of use of expensive fibre cable for the high speed of internet. Most of the equipment's used in this loon can be reused and recycled and can be affordable with low cost. So this project will not affect the environment and safe to use.

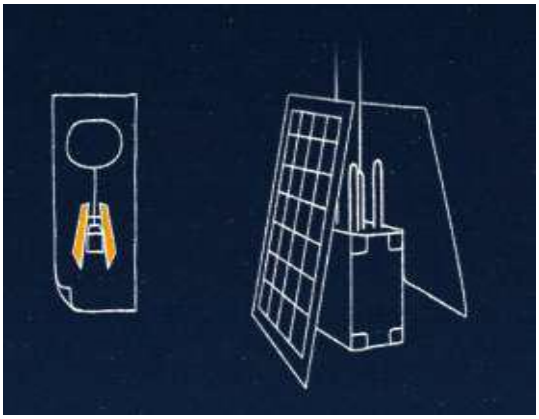
A. Envelope

The balloons piece of balloon is made of sheets of polyethylene plastics, which is around 3 mil or 0.076 mm thickness. It shapes the balloon envelope. At the point when loaded with Helium, it stands 15m (49 ft) wide and 12m (39 ft) tall, on full expansion. They are durable than customary climate balloons. These are super weight expands and have a most extreme life time of 55 days. At the point when an balloon is to be hauled out of administration, first we need to discharge the gas in the balloon. This is accomplished with the execution of a custom vacuum apparatus framework, which is utilized to discharge air from or pump into the balloon in an intermittent way for controlled descendent. Sadly, if the balloons drop rapidly or when the balloon is to be chosen of system securely, we utilize a parachute which is settled at the highest point of the envelope.



B. Solar Panels

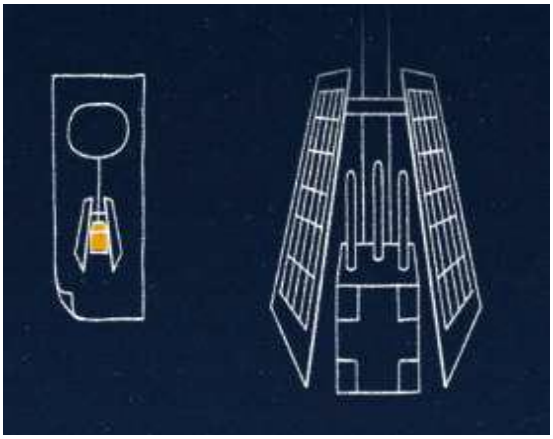
The Power supply of each unit is powered by solar panel array which is conveniently placed between the envelope and hardware part for the whole balloon structure. These solar panels generate a power of **100 W** (Watt) in full sun. This power is sufficient enough to run the entire unit during night time. In the day time the battery charges fully for the usage during night time.



C. Control Box

A small box ways up to 10 kg hangs below the balloon's envelope which has all controlling connections, Wi-Fi circuits, batteries, a Linux-based computer, GPS(Geographical positioning System)devicesfor tracking the location of the balloon and sensors to record the temperature, air speed, altitude of balloon and its speed and circuit boards to control the unit.

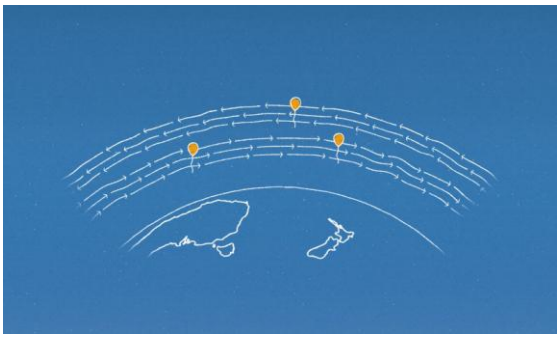
These all devices are been controlled automatically be the system and the recorded data is been sent to the workstation through the network connection. All the balloons are been connected to the workstation with the help of control box for the controlling of the balloon in the space.



4. Navigation of Loon

The balloons move by exploring the wind in the stratosphere. At stratosphere (double the scope of flying machines travel height), 20km over the surface of earth, winds like to move in particular bearing. There are distinctive wind layers in stratosphere. Every layer changes towards it and size. We can decide the direction of wind from the wind information gave by NOAA and direct the balloon movement. The balloon are made to raise or tumble to the coveted elevation and move in craved course at the predefined speed by blowing up or collapsing the envelope utilizing a vacuum apparatus settled as a part of the setup.

Genuine existence of balloon is assessed to be 100 days be that as it may, we can supplant it continually once in 55 days for checking which stays away from startling disappointments. By doing as such we could keep the balloons redesigned. Inside this period it flies roughly 3 times far and wide. The amazing height presents numerous difficulties to the crackpot like pneumatic force, great low temperature, less assurancefrom UV (Ultra Violet) beams and the temperature swings. However it can defeat every one of these obstacles and withstand these conditions just by the ideal planning of balloons envelope. Consequently, balloon can frame an expansive correspondence system in the stratosphere.



5. Receiving Internet Service from Balloons

Signals are transmitted to the LTE enabled devices. Web traffic that travels through the balloon network which is ultimately relayed to our local telecommunication partner's station, where it connects to existing internet infrastructure in the ground station. Users of this service connect to the balloon network using a special Internet antenna which is been attached to their building. The signal will travel through the balloon network from balloon to balloon in a certain distance between them, then to a ground-based station connected to an Internet service provider (ISP). The system mainly aims to improve communication between the people during natural disasters.

6. Balloon Network Topologies

Network topology is the logical arrangement of the various elements (links, nodes, etc.) of a nodes or biological network. Essentially, it is the topological structure of a computer network, and may be depicted physically or logically. Physical topology refers to the placement of the network's various components, including device current

location and cable installation, while logical topology shows how data flows in a network. Distances between devices (nodes), physical interconnections, transmission rates, time and/or signal types may differ between two networks, then still their topologies may be similar.

1. SPANING TREE TOPOLOGY

2. HYBRID USING MESH AND STAR TOPOLOGIES

3. RING TOPOLOGY

4. DUAL RING TOPOLOGY

7. Establishing the Network

The balloons structure a system of airborne problem areas. It can deliver web access over an expansive range of around 1250 square kilometres at compatible speedup to 3G. For communication between balloons to balloon and to communicate to ground stations it uses a particular radio receiving technology. In a matter of seconds, the project loon uses ISM bands particularly 2.4-5.8 GHz bands. Every balloons unit has three handsets for various purposes. Initial one is for the balloons to balloons communication and the second one is for balloons to ground connection and the other is the reinforcement utility. The reflector plate set between the receiving wire on top and radio in base is prepared together in the control box. It is utilized to set up the system association. The head is made out of two sections which are called as "patch antenna" together. They serve to get the signs reflected from the plate and direct flags. These signs when coupled together frame the signs to be transmitted. Clients can accomplish association with the system (balloons) with the assistance of a ball measured reception apparatus joined to their building. It takes after major splendid red gathering balloons and can be strategically located anyplace on their building. The signs are sending and got with the assistance of this radio wire.

8. Applications

1. There is no interference as balloons are flying in the stratosphere above commercial air traffic and weather events, at around 18-27 km or 60,000 - 90,000 feet.

2. Project Loon is an attempt to deliver reliable connectivity to those areas where the loons does not exist or is prohibitively expensive.

3. The technique is using all the natural sources of energy as sun and wind.

9. Conclusion

Internet is risen as the essential need in everyday life. While one part of the planet is getting enhanced in a huge pace with the assistance of internet connection, around 2/3 of populace is not by any means ready to get to it. Google attempted to fill this void by the 'Project Loon' and fix the expansive band issue. Project loon case is one of the greatest thought of Google. It goes about as a remote station for a territory of around 25 miles in breadth. The procedure to convey portable web network to billions of individuals utilizing inflatables may sounds insane yet it may work. Google expresses that "It is profoundly exploratory innovation we have long approach". This imaginative endeavour made by the Google to give association with rural territories and remote locales that merit internet connection is a motivating effort. The dispatch of 'Project Loon' made balloons to a choice to get internet wherever it is necessary.

10. Reference

1. Levy, Steven (14 June 2013). "How Google Will Use High-Flying Balloons to Deliver Internet to the Hinterlands". Wired. Retrieved 15 June 2013.
2. "Google to beam Internet from balloons". Agency France-Presse. Google. 15 June 2013. Retrieved 16 June 2013.
3. "Google launches Project Loon". The New Zealand Herald. 15 June 2013. Retrieved 15 June 2013.
4. Lardinois, Frederic (14 June 2013). "Google X Announces Project Loon: Balloon-Powered Internet For Rural, Remote And Underserved Areas". TechCrunch. Retrieved 15 June 2013.
5. Mack, Eric (14 June 2013). "Meet Google's 'Project Loon:' Balloon-powered 'net access". CNET. Retrieved 15 June 2013.
6. Brodkin, Jon (14 June 2013). "Google flies Internet balloons in stratosphere for a “network in the sky”". ArsTechnica. Retrieved 15 June 2013.
7. Sharma, Amol (20 February 2008). "Floating a New Idea For Going Wireless, Parachute Included". The Wall Street Journal. Retrieved 16 June 2013.
8. Perry, Nick; Mendoza, Martha (15 June 2013). "Google launches Internet-beaming balloons". The Associated Press. Retrieved 17 June 2013.

9. "How Loon Works". Google. Retrieved 16 June 2013.
10. Hodson, Hal (18 June 2013). "Google's Project Loon to float the internet on balloons". New Scientist.Retrieved 20 June 2013.
11. "Project Loon: Raven Aerostar - Google Collaboration". Raven Aerostar. Retrieved 15 June 2013.
12. Kelion, Leo (15 June 2013). "Google tests balloons to beam internet from near space". BBC News. Retrieved 21 June 2013.
13. "Google's ambitious Internet balloons soar above New Zealand". The Associated Press.CBS News. 15 June 2013. Retrieved 18 June 2013.
14. Connect people [online] http://ipnsig.org/wp-content/uploads/2014/02/Project-Loon.pdf
15. Loon For All [Online] http://www.google.com/loon/
16. Project Loon [Online] http://en.wikipedia.org/wiki/Project_Loon
17. Introducing Project Loon: Balloon-powered Internet access [online] http://googleblog.blogspot.in/2013 /06/ introducing-project-loon.html
18. Internet balloons to benefit small business; Google says [online] http://phys.org/news/2013-06-internet-balloons -benefit-small-business.html