



INTERNATIONAL JOURNAL FOR ENGINEERING APPLICATIONS AND TECHNOLOGY

TITLE: PROJECT LOON: INNOVATING THE CONNECTIVITY WORLDWIDE

Miss. Sonal S. Narlawar¹, Miss. Shital S. Thakre², Miss. Komal S. Jambhulkar³

¹Sonal S. Narlawar, CSE 2nd year, J.D.I.E.T. Yavatmal, Maharashtra, India, sonalnarlwar1999@gmail.com

²Shital S. Thakre, CSE 2nd year, J.D.I.E.T Yavatmal, Maharashtra, India, thakreshital2@gmail.com

³Komal S. Jambhulkar, IT 2nd year, J.D.I.E.T Yavatmal, Maharashtra, India, komaljambhulkar11@gmail.com

Abstract

Project Loon that could be an analysis and development project being developed by Google with the mission of providing web access to rural and remote area. This paper describes a summary of a Balloon-powered internet for everyone. This technology involves the use of specially design helium balloon launch in the stratosphere, which work in coordination with each other and the ground antenna based on complex algorithm, the aiming to provide a cost effective yet reliable and environment friendly way to beam the internet from the sky to places lacking it. This preternatural phenomenon thus aims at innovating connectivity worldwide.

Index Terms: Goole Project Loon, Stratosphere, Equipment, Solar Plate.

1. INTRODUCTION

Google believes that there are various issues with existing Internet technology such as but not limited to the cost and terrestrial challenges. Moreover, in some of the places in Southern Hemisphere, the cost of an Internet connection is more than most people's monthly income, thus affordability of Internet is of great importance in such areas. And another major challenge is that, in some areas, it is not possible to set up connection because of lack of infrastructure and other resources. Imagine what would happen when 4.5 billion people who are currently offline, would get Internet access? Each one would start contributing to the sources on Wikipedia, Facebook, Twitter, etc. One of the key aims of this project is to expand and enhance the web's influence throughout the Earth to everyone and not just a limited number of people. Google X (the team behind this initiative) wants everyone to be connected by the end of the decade. This could increase educational and other disaster relief opportunities in countries where the existing technology is an expensive alternative. This project aims at providing free access to people in rural and remote areas. During crisis and other disasters, affordable Internet could be used to provide and share crucial information across borders, thus save lives and curb the fatal consequences of the situation.

Project Loon may be a network of balloons traveling on the sting of area, designed to attach folks in rural and remote areas, facilitate fill coverage gaps, and produce folks back online after disasters. Project Loon balloons float within the layer, doubly as high as airplanes and also the weather. They are carried round the Earth by winds and that they are often steered by rising or raining to associate altitude with winds acquiring the required direction. People connect with the balloon network employing a special web antenna connected to their building. The signal bounces from balloon to balloon, then to the world web back on Earth. Project Loon could be a analysis and development project being developed by Google with the mission of providing web access to rural and remote areas. The project uses high-altitude balloons placed within the layer at associate altitude of concerning twenty kilometre (12 mi) to make associate aerial wireless network with up to 3G-like speeds. Because of the project's somewhat outlandish mission goals, Google dubbed it "Project Loon".

In the evolution of the web today, some population of the planet enjoys the advantages of the web. According to Google™, simple fraction of individuals on the planet, reliable Internet connection is still out of reach. To solve this world downside, Google™ developed associate innovative project known as the "LOON", to provide broadband for free in rural and remote areas, as well as to improve communication throughout and when natural disasters or a humanitarian crisis. During a crisis, connectivity is really significant because information in itself is really lifesaving. Here the key construct may be a set of high-altitude balloons ascends to

the layer associated creates an aerial wireless network .The technology designed in the project could allow countries to avoid using expensive underground infrastructure.

The unofficial development of this project began in 2011 and was officially announced in June 2013.A pilot experiment was conducted in New Zealand involving 30 balloons and 50 users in Christchurch and Canterbury Region. After this, it aims at providing Internet access to the region covering Australia, Chile, Argentina and New Zealand and later, further expanding the scope of the project in other regions. In May-June 2014 Google tested in Brazil. There are certain issues involved with the existing Internet services like the Internet is not accessible in some remote and rural areas and speed might not be so high. And believe it or not, the reality is that even today approximately 2/3 of the population is deprived of the Internet access. Zuckerberg believes that digital divide is one of the greatest challenges of our generation. The pilot take a look at has since enlarged to incorporate a bigger range of individuals over a wider space. Trying ahead, Project Loon will continue to expand the pilot, with the goal of establishing a ring of uninterrupted connectivity at latitudes in the Southern Hemisphere, so that pilot testers in these latitudes will receive continuous service via balloon-powered web.

1. HOW LOON MOVES?

Project Loon balloons positioned within the layer winds at associate altitude of concerning twenty click, double as high as aeroplane flights and also the weather changes. In the layer, there square measure several layers of wind, and every layer of wind varies in direction and speed. Why the stratosphere means? It is placed on the sting of area, between 10 km and 60 km in altitude having steady winds below 20 mph. This spherical layer is nice for star panels as a result of there are not any clouds to dam the sun. Loon balloons square measure directed by rising or downhill into a layer of wind processing within the desired direction of go mistreatment wind information from NOAA. By moving with the air or wind, the balloons can be arranged to form one large communication network. Each balloon is provided with a GPS for pursuit its location. Project Loon has complicated algorithms to see wherever its balloons got to go, then moves each one into a layer of wind blowing in the right direction. People connect with the network employing a special net antenna hooked up to their building. The signal bounces kind balloon to balloon the world net back on earth. Each balloon can provide connectivity to a ground about 40km in diameter at speeds comparable to 3G. For balloon to balloon-to-ground communications, the balloons use antennas equipped with specialized radio frequency technology. Project loon presently uses philosophy band (specifically two.4 and 5.8 gigacycle bands) that square measure accessible for anyone to use.



Fig 1.1: Balloons in the stratosphere

2. HOW LOON IS DESIGNED?

They have 3 components:

- Envelope
- Solar Panels
- Electronics

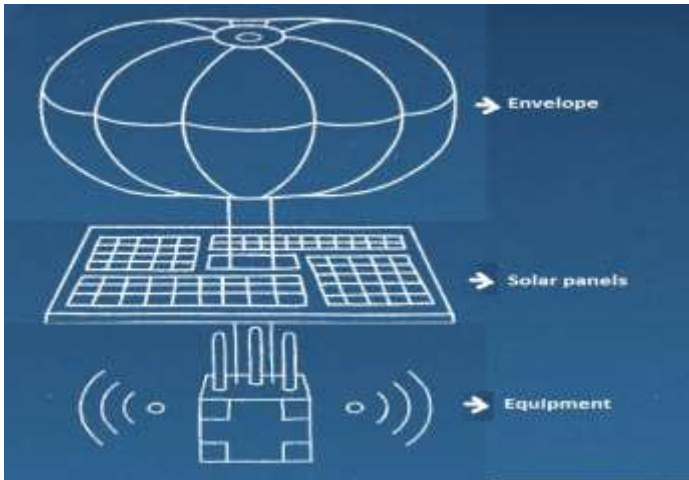


Fig 2.1: Components

- **Envelope:** These helium-filled balloons are made of polyethylene plastic material and the inflatable part is the envelope. It is UV resistant and can survive temperatures as low as -80 degree Celsius.
- **Solar Panels:** It is made of flexible plastic laminate and provides power to its electronics. It uses monocrystalline solar cells and the panels are mounted at steep angles.
- **Equipment:** A box containing circuit board to control the system, Linux-based computer, radio antenna for communication, GPS for tracking location, sensors to monitor and record weather conditions and lithium batteries to store solar power hangs under the envelope. These balloons have been launched at an altitude of 20km in the stratosphere. These are positioned twice as high as where the airplanes fly and weather changes occur. The balloons are designed to withstand the atmospheric conditions of the stratosphere, as the air pressure is 1% of the sea level, the temperature hovers around -50 degrees C etc. These balloons are steered by rising or descending with the steady winds of the stratosphere. The speed and direction of the balloons are adjusted using the wind data provided by the National Oceanic and Atmospheric Administration.

3.PROJECT LOON CONNECTING MECHANISM

Each balloon features a non-directional antenna that has constant property to the bottom and connects every balloon to different balloon. There is a special ground antenna that's put in on the house or geographic point to access the web from balloon. Google™ claims that every balloon will offer signal property to a ground space regarding forty klick in diameter and ready to deliver 3G comparable speeds (up to ten Mbps). These antennas use ISM bands of spectrum 2.4 GHz & 5.8 GHz. ISM radio bands (portions of the radio spectrum) reserved internationally for industrial, scientific, and medical purposes other than telecommunications.

Google™ balloons square measure connected within the topology to confirm reliableness. The IEEE802.11s standard defines how wireless devices form the mesh network. Loon's protocol stack is not disclosed yet.

There are two types of communications:

1. Balloon-to-balloon communication.
2. Balloon-to-ground communication.



Fig3.1 Transmitting Signals

ISP-to-Subscriber: web|theweb|the net} Service supplier or pre-existing internet infrastructure sends response back to the Balloon network; then knowledge travels through the balloon network. Finally, the highest balloon to the subscriber receives knowledge and sends it back to the subscriber.

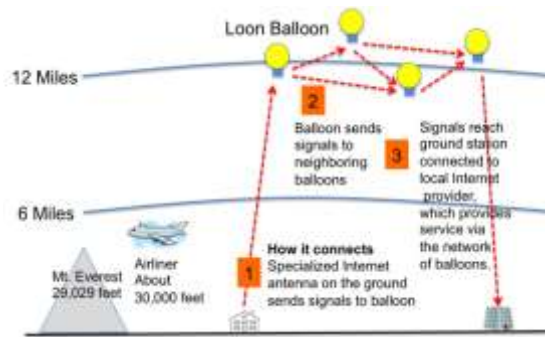


Fig3.2 How it connects in Project Loon.

4.ADVANTAGES AND DISADVANTAGES

Advantages:

- It would increase the education opportunities for people in the rural and remote areas who cannot afford the formal education by going to secondary school.
- It would increase economic opportunities.
- It would provide health and hygiene information to the people and also help us take advantages of doctors in far away regions to solve numerous fatal problems.
- It would help people connect during times of disaster and help control the damage and further recover from a crisis.
- Easy to use.

Disadvantages:

- Not all countries would be willing to support the project, which could lead.
- Helium shortage in the future is another area of concern.
- Life of a balloon is 100 days on an average after which it needs maintenance.
- Landing locations of a balloon are beyond our control and can act as a threat to the safety of people.
- What about those nations that want to provide censored Internet?

5.CONCLUSION

In this paper, description on Project Loon has been discussed which is a research and development project being developed by Google with the mission of providing Internet access to rural and remote area and also it's working,advantages in industrial, medical and scientific field. Also explained in brief the structure and components proposed in Project Loon. The Internet and global communication go hand in hand. There is no denying to the fact that Project Loon would revolutionize the networking and benefit the underdeveloped and developing nations enormously by providing free internet access in rural and remote areas thereby increasing the educational and economic scope drastically.

6.ACKNOWLEDGEMENT

We would like to sincerely thank all the authors and reviewers for their efforts towards the success of this special issue.

7.REFERENCES

- [1] LavinaNagpal and Krishna Samdani "PROJECT LOON :INNOVATING THE CONNECTIVITY WORLDWIDE",2017 2nd IEEE International Conference on Recent Trends in Electronic, Information & Communication Technology (RTEICT),2017.
- [2] Prof. Mrs. A. G. Andurkar and Miss PrachiZodpe, "A Review paper on Project 'LOONS'", IJARCC, Vol. 5, Issue 3 March 2016.
- [3] Rakesh M. Tiwari," International Journal of Advanced Engineering & Technology (IJARCET) Volume 5, Issue 5, May 2016 Engineering & Technology (IJARCET) Volume 5, Issue 5, May 2016.
- [4] Marjorie Carlson, "Balloon Powered Internet for Everyone", April 2015.