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# Internet through Balloons for Andaman Islands

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**Abstract -** *The only thing which connects people from all over the world is the Internet. Even it makes the broad and huge world small into our hands which is possible only by the internet. Moreover it is like oxygen to everyone nowadays. So the oxygen should reach each and every person on the earth. They have to enjoy it as well but the untouched paradise Andaman and Nicobar Islands are exceptions for this. People there do not have good and fast internet connections. The internet connectivity should reach the people there without any interruptions .It is possible by creating a chain of balloons in the stratosphere region at a height of 66000 ft. Also this will work even during disaster times. So people who did not receive internet will now get a high speed internet during disaster times also. This is very promising and people and tourists of Andaman will definitely get benefited.*

***Key Words***: Balloon, Internet, Stratosphere

## 1. INTRODUCTION

Our ultimate aim is connect people all over the world. Now it is going to be established by loon technology. Already Google has implemented this idea in various areas. Andaman which is the untouched paradise needs a high speed internet connectivity. So that the people will have outside world communication in an effective way. Even the tourists who go there struggle a lot without internet connection. They feel very disappointed as they could not access all the facilities available there. These balloon structures are 15-meters wide and made from polyethylene film. Once it has reached the altitude of 20km (65,000ft), it will adjust helium gas to stay there. Each balloon contains a bag of about 10kg Linux-based computer with the important radios, GPS and several sensors recording air altitude, temperature and speed. All information collected over the balloons is sent to Google's Command Centre on ground below, where each balloon can be controlled to fly in a certain direction. Here we can move these balloons to the desired layer of wind in the stratosphere. Wind in the stratosphere moves in different directions in different layers. [2]

### 1.1 The Balloons

The balloons in the stratosphere can be of anywhere based on the required position. If it is not in the required position or it is out of the track it can be brought to the required point by adjusting the helium gas inside it. So that its altitude can be controlled to the pirate wind layer in the stratosphere. It takes a specialized type of antenna to receive signals and uses radio frequency. [1]

## 2. Structure of balloons

A small box of weight 10kg contains each balloon with electronic equipment that hangs underneath the loon's balloons. That small box consist the various circuit board which control the radio antennae system, other system functions, and all networks rocket M2 to communicate with the other balloons as a Wi-Fi as a transceiver and with the antenna on the ground, and a battery to store power so balloons can operate during the time when light is not there. A customized Linux OS is also loaded on the processor chip to manage and transmitter network and positioning data. Each balloon is powered by an array of solar panels that sit between the envelope and the hardware. A parachute attached at the top of the envelope allows for the control of the balloon and landing when a balloon is ready to be taken out of service. In any case if there is an unexpected failure, the parachute gets deployed automatically. Three components are required for designing a Google Loon Balloon:

1. Envelope
2. Solar panels
3. Equipment

Balloon's electronic equipment is placed in a small box, it hangs underneath loon`s balloons, like the basket which is carried by a hot air balloon. That small box consists of a circuit board and it controls the system, radio antennas are used to communicate with the other loon`s balloons and with internet antennas on the ground, and loon`s batteries to store solar power.. It will be more difficult if the internet user is in mountain areas or those areas which frequently face problems of calamities. For those countries this Google loon system will be very effective because this needs comparatively less money and it has no effect of any natural disaster. The high altitude loon's balloons fly over the world on the prevailing winds flowing mostly in the direction parallel with the lines of altitude, i.e. east or west. Solar panels of flying balloons are

capable of generating enough electricity in four hours to power the transmitter for a day. This project's balloons spread the internet to ground stations which are about 60 miles apart, or two balloon hops and may bounce. [3]

These super pressure balloons are filled with helium. Stand almost 50ft across and 40ft tall when fully inflated carry a custom air pump system that pumps in or releases the air to stabilize the balloon and control its elevation. The envelope bag of balloon thickness is only thrice than a supermarket shop carrier bags but still capable to remain there at very high altitude at very high pressure without exploding.

**Fig -1:** loon project balloon

### 2.1 Distance and Operation

For the project, it should have ground centres to transmit and receive signal to the balloon. So the centres must be in the good signal area. As far as Andaman is concerned the centres to control the balloons can be at the minimum distance between Andaman and India with good internet connectivity.

So that the connection between the balloon and the centre will be stable which is very important. Each **balloon** can provide coverage to ground area about 80 km in diameter.

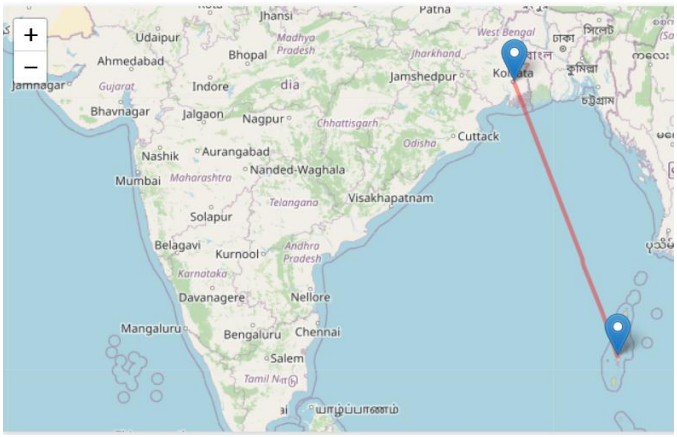



**Fig -2:** Distance between Andaman and nearest high frequency internet point

Project Loon balloons positioned in the stratosphere winds at an altitude of about 20 km, twice as high as airplane flights and the weather changes. In the stratosphere, there are many layers of wind, and each layer of wind varies in direction and speed. Why does the stratosphere mean? It is situated on the edge of space, between 10 km and 60 km in altitude having steady winds below 20 mph. This spherical layer is great for solar panels because there are no clouds to block the sun. Loon balloons are directed by rising or descending into a layer of wind blowing in the desired direction of travel by using wind data from the centre from ground. By moving with the wind, the balloons can be arranged to form one large communication network. Each balloon is equipped with a GPS for tracking its location. Project Loon has complex algorithms to determine where its balloons need to go, then moves each one into a layer of wind blowing in the right direction.

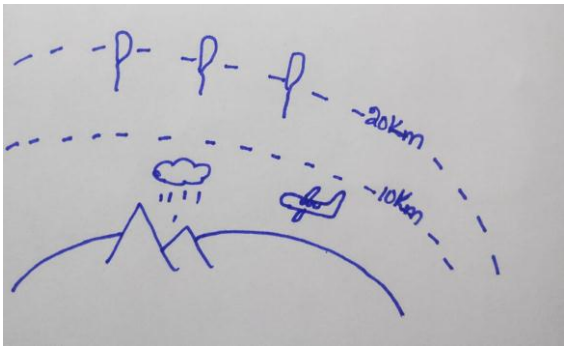



**Fig -3:** Position of balloons

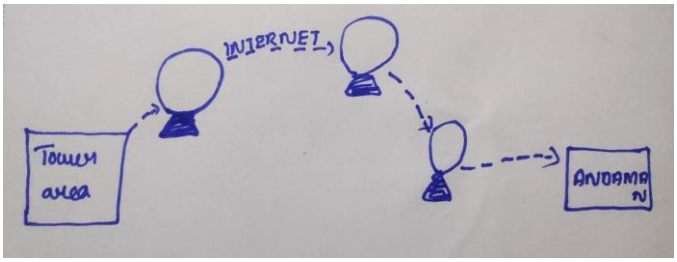
### 3. Operation

Each balloon has a radio antenna that provides constant connectivity to the ground and connects each balloon to another balloon. There is a special ground antenna that is installed on the home or workplace to access the internet from balloons. I can claim that each balloon can provide

signal connectivity to a ground area about 40 km in diameter and able to deliver 3G comparable speeds (up to 10 Mbps). These antennas use ISM bands of 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. Balloons are connected in the mesh topology to ensure reliability. The IEEE802.11s standard defines wireless devices from 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. [3]




### 3.1 Maintenance

If a balloon fails or needs maintenance, the staff brings the balloon down. A trigger mechanism on the top of the balloon would deflate it by releasing gas from the envelope, and it releases a parachute that brings the balloon down to the Earth in a controlled descent. GPS equipment tracks where the balloon is landing. Google™ needs the dedicated staff across the globe for balloon maintenance.

## 4. Advantages and Disadvantages

### 4.1 Advantages

1. By using this system internet connection will be available for free to every person in the world.

2. This loon system will provide information to all human beings, irrespectively of their location.

3. Project Loon will be able to text, audio, video, and applications to any Wi-Fi enabled device, including mobile phones, anywhere in the world.

### 4.2 Disadvantages

1. "Cost" was high as we have to take permission, buy an antenna and fix it at home.

2. The Maintenance cost will be very high for the loon technology as the equipment which is required, very costly and complicated.

## 5. CONCLUSIONS

Project Loon definitely will be very useful for Andaman which has a huge gap of people who are still not connected to the internet. It is also easy to connect the internet to the islands by using project loon, where it is difficult to spread the network of optical fiber. There is one more obstacle in front of this project: loon is politics as these balloons do not know concept borders. Also it needs a strict regulation for spectrum bands as it wants a totally new band for this. Project loon will help the world for education, business, and wifi connectivity for peoples and many more.

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