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Satellite Internet and Its Social Impact

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Abstract: Information transfer and communication is the backbone of developing society. Brotherhood and a sense of social responsibility is also being promoted. Nowadays this work is being carried out by using optic fibers but it comes with restrictions. Not every part of the world can have its access to it. This is where the very technology we elaborated in our paper is a great boon. We have explained the same through our research paper.

I. COMMUNICATION THROUGHOUT THE AGES

With today's high-tech systems with low-cost internet, we can communicate very easily. We also have confined our classes into our computers, but communication was not always the same. We can remember our parents or grandparents' stories about writing letters to communicate, it would take them as long as a couple of weeks to send a message.

Humans have always craved communications recently. It is usually used to exchange pleasantries without actually meeting people but. For example, in around the 1500s smoke signals were used by the Chinese soldiers to send signals through the Great Wall of China during war.

Further, during the 18th century electrical telegraph was invented. Telegraph revolutionized communication by bidding goodbye to physically transported messages. First formally introduced in the 1830s and 1840s, electrical telegraphy used electrical currents sent through long wire sometimes spanning across an ocean to deliver messages across long distances. Morse code was developed by assigning dots and dashes to certain letters to spell out messages.

In 1876 just 4 decades later the electrical telegraph, the telephone was invented. It further simplified the process of long-distance communication as anyone could use it. The first long-distance phone call was made by Alexander Graham Bell to his assistant, Thomas Watson, on Aug 10,1876, from Brantford to Paris. Watson would also receive the first transcontinental phone call in 1915, where Bell said the same thing, he said in 1876: “Mr. Watson, come here, I want to see you.”

The next invention was that of text messaging. The first person to receive a text message was simply wished a “Merry Christmas”.

The concept of sending short, quick messages was first proposed by a man named Friedhelm Hillebrand in 1984. His idea that most sentences and questions fit within 160 characters’ lives on in today’s 160-character text length and 140-character tweet length. But today with the invention of the internet and countless applications that came with it we can send infinite messages to anyone and anyone around the world.

Now in the latest we have video calling. The first mobile with a camera was sold in Japan in 1996. Video calling has changed the way people interact. Even in situations like the global pandemic, video conferencing is a blessing in disguise.

But internet wasn’t that easily available nor was it affordable. Internet was considered a luxury. Especially in India only some metro cities had internet and only a few elites used it. Internet in India came in 1995 after about 12 years when it first officially started. When it first came to India only 8 educational institutes were allowed to use it NCST Bombay, Indian Institute of Science, five Indian Institutes of Technology (Delhi, Mumbai, Kanpur, Kharagpur and Chennai), and the DoE in New Delhi.

II. CONSTRUCTION & WORKING OF SATELLITE INTERNET

A. Construction

As these satellites will be in the lower earth orbit it could be seen with the naked eyes. On the contrary the satellites if visible, will definitely interfere with the astronomical expeditions thus a need for the graveyard orbit is also more emphasized.

To accomplish this, the plan is to use the new “VisorSat” approach which will essentially use sun visors to block inbound sunlight from hitting the reflective antennas on the spacecraft, preventing them from reflecting light back to Earth (Analogous to a black body), so they won't appear as bright lights in the night sky.

This unique approach demands a new hardware addition for the satellites which will supplement other measures, including making use of a new method for changing the orientation of the satellites as they raise into their target orbits after launch, which is a period during which they’re especially visible.

First test for reducing the visibility of satellites constellation focused on using a darkening treatment to cover reflective surfaces, and though that proved somewhat effective. Early testing says that believing in the VisorSat alternative will be more effective, greatly reducing the satellites' brightness instead of just making a smaller reduction in thor visibility.

For now, satellites intend to test the VisorSat system on the next launch, which happened at about a pace of one satellite launch per month so far in 2020. The system did encounter some of mechanical difficulties however, as it's a whole new part that has to extend during flight to block the inbound light. A focused approach on using materials that are radio transparent for the shades, so they don't interfere with the primary mission of satellites, which is to provide low-latency, high-broadband bandwidth to customers on the ground.

Researchers in satellites have planned to launch these brand-new satellites soon as the existing satellites on orbit have a relatively short lifespan, they can only be in use for around three to four years before being deorbited, and hence they can be replaced by new optically improved versions.

B. Working of Satellite Internet

Providing internet via communication satellites rather than the routine optic fiber cables, is what we refer as satellite internet. To get a brief idea about the same, we need to know the earth orbits, wherein the satellites are generally launched.

1) Lower earth orbit (LEO)
2) Medium earth orbit (MEO)
3) Geostationary earth orbit (GEO)
4) Polar orbit and sun synchronous orbit (SSO)

Earlier satellites were launched in the GEO orbit, but to give a stable and a real time connection with reduced latency the satellites are now launched into the LEO orbit.

The LEO is 30 times closer to the earth than the GEO. The altitude for the former is 1200kms and 30000kms for the latter, the latency referred is actually the time delay that is produced between the user action and the web's response to it. The satellites that are now launched into the LEO have a latency of 50-100ms, which is around 560ms in the higher orbit. To achieve this, the satellite always keeps moving, orbiting in a constellation design and offers a seamless coverage. Each satellite covers an area of 6,63,300 square miles. A laser monitored area in under each satellite, which the satellite in the GEO orbit simply can't.it is worth noting that cloud architecture (attenuation) also plays an important role in determining the systems efficiency. As mentioned earlier a wired ethernet cable provide internet via optical fibers from the database to the user using the unique ip address of the web server, the basic idea deployed is the phenomenon of total internal reflection. Regions which are devoid of the very cables are still inaccessible to the internet, this is where satellite internet comes into picture. The working is mentioned in lucid way ahead.

An end user computer is connected to our network which is in turn connected to the internet via the service provider .The moment you enter the web address ,end user computer sends a request for transferring a data (both to send and to receive).The user sends a request which through the modem installed at the house, travels to the satellite as a radio wave via the dish antenna at the rooftop. The point worth noting is that all operations occur at light speed. Further, as the number of physical barriers are reduced the latency is reduced, providing a seamless network. The signal thus reaches to the headquarters of the service provider. Now the entire procedure is reversed and repeated thus a cycle is completed. Astonishingly all this takes place in around 700 milliseconds.

III. SOCIAL IMPACT OF SATELLITE INTERNET

What would l happen if your internet is not through cables or cell towers but from a vast swarm of orbiting satellites?

Countryside borders will no longer be our communication boundary, your phones will work the same in any region or country, you can communicate with the people on the other side of the globe near the physical limits of information transmission, restricted by slow cable networks.

One of the US-based launch provider space exploration technologies, launched around 60 communication satellites on May 23,2019 in Low Earth Orbit to serve as a basis for their Constellation. This constellation will soon have thousands of satellites orbiting the earth around 550 km above the earth surface. Now, the satellite could efficiently interconnect and the person on the earth surface while keeping low latency.

Since these constellations are being launched into space, over the period of time, the access to the internet around the world will expand greatly, mainly in the remote areas. The service providers could empower the island communities and water and cloud researchers to expand their field of research.

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The service has already been started for the beta testing and also made its first public use. As per the article published in firstpost it stated that the satellite is serving as an emergency responder in Washington during wildfire that struck on 7th December 2020, which according to Whitman county's sheriff office, about 80% of the homes and building were destroyed in Malden, so the technology is helping to assist the local residents to rebuild the town of Malden by acting as an emergency responder.

The underwater(sea) cables which enable global communication today can transmit humongous amount of data. Millions and thousands of text messages, phone calls, money transactions and other content are being jammed down in the thin glass fibers that span thousands of miles of vast open sea. These cables have physical limitations which might disturb the end of their use as a primary means of global data transfer.

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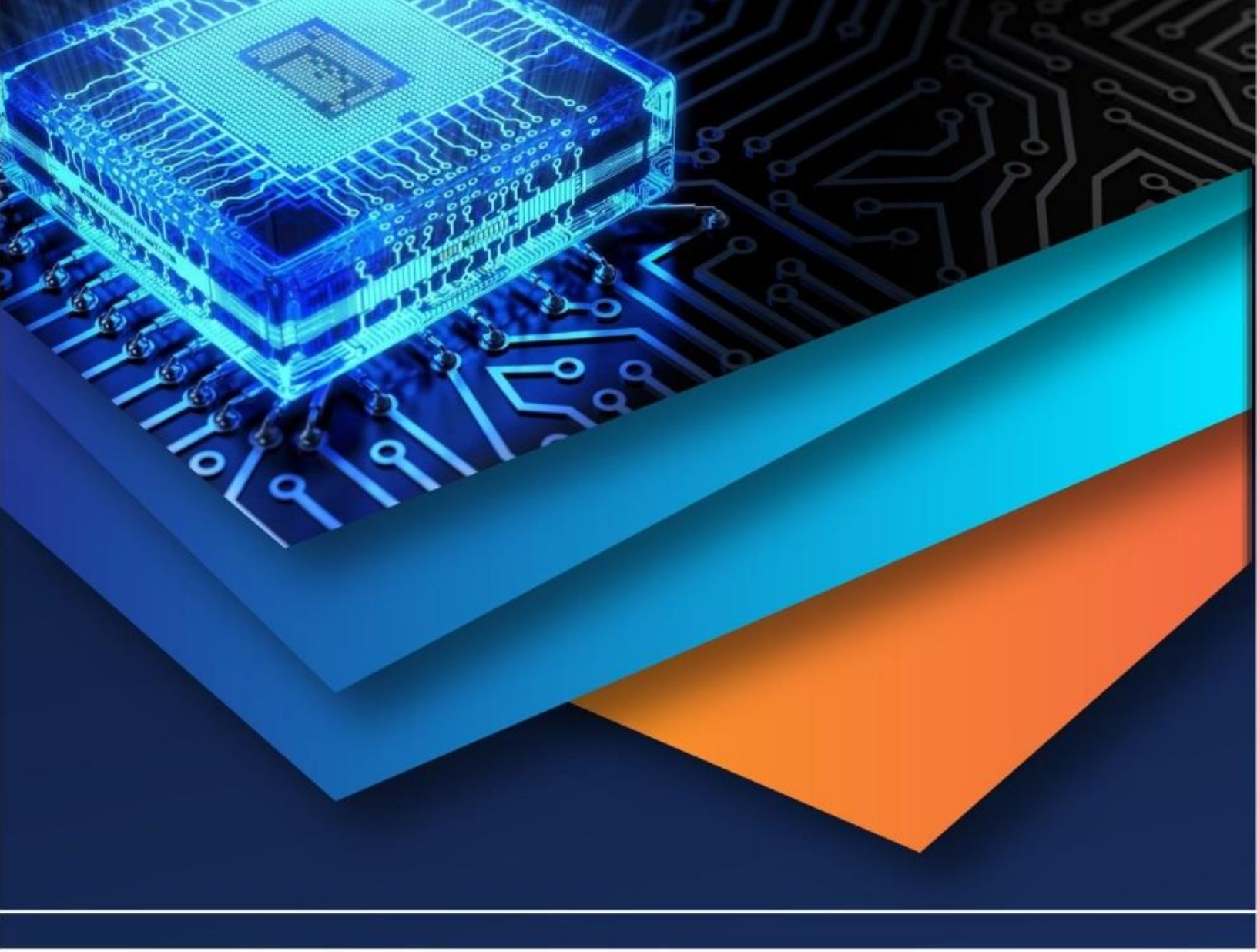

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