



CTC(T&IT), CRPF



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Starlink Satellite Internet: Bridging the Digital Frontier



In a world where connectivity is key, Starlink, a revolutionary satellite internet service, is making waves across the globe. Developed by SpaceX, the brainchild of visionary entrepreneur Elon Musk, Starlink aims to break down barriers to internet access, bringing high-speed connectivity to even the most remote and underserved areas.

How it Works

At the core of Starlink's innovation is its vast constellation of low Earth orbit (LEO) satellites. Unlike traditional geostationary satellites, which orbit at much higher altitudes, Starlink's satellites orbit closer to Earth, reducing latency and enhancing overall performance. Users connect to the Starlink network via a user terminal, commonly referred to as a satellite dish. This sleek, user-friendly terminal communicates with the satellites overhead, creating a direct link to the global Starlink network. This unique setup ensures fast and reliable internet access, even in areas with limited infrastructure.

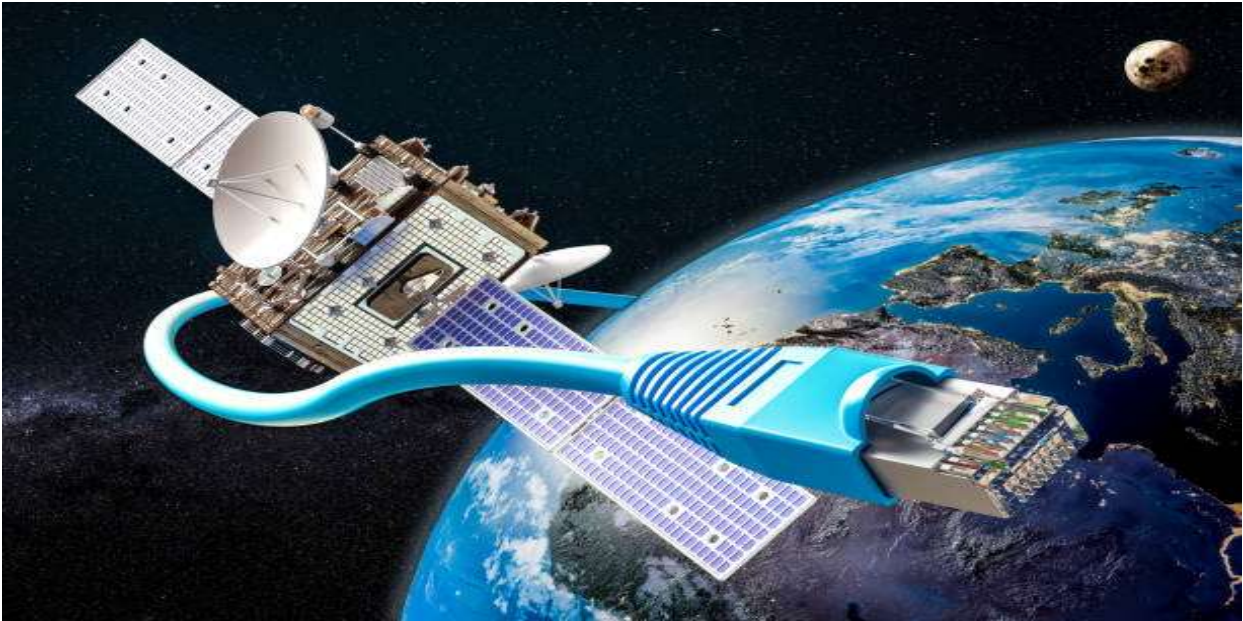
Global Reach

Starlink's mission is to provide global internet coverage, and it's well on its way to achieving that goal. The constellation is expanding rapidly, with regular launches adding new satellites to the network. This dynamic and ever-growing constellation enables Starlink to reach remote and rural areas that traditional internet infrastructure struggles to serve.

Impact on Communities

Starlink is not just about internet access; it's about empowerment. By connecting remote areas, Starlink is playing a crucial role in bridging the digital divide. Communities are gaining access to educational resources, healthcare services, and economic opportunities that were once out of reach.

In a world where being connected is more important than ever, Starlink is at the forefront, pushing the boundaries of what's possible. As the constellation continues to expand and technology evolves, Starlink is set to redefine how we think about internet access, making it a reality for everyone, everywhere.



Beta to General Availability

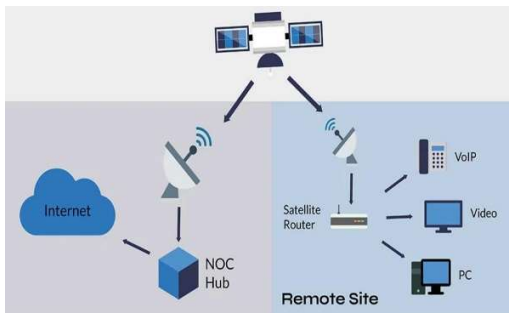
Starlink initially rolled out as a beta service, allowing early adopters to test and provide valuable feedback. The service has now transitioned from beta to general availability, opening its doors to a wider audience. Individuals, businesses, and communities can now subscribe to Starlink and experience a new era of internet connectivity.

Hardware Evolution

Starlink's commitment to improvement extends to its hardware. The user terminals have undergone updates to enhance performance and user experience. The goal is to provide users with faster data speeds, lower latency, and a seamless internet experience, regardless of their location.

INSP/T Jayan P

Satellite Internet: Bridging the Digital Frontier



1. Introduction:

How do you access the Internet other than dial-up if you live too far from a phone company office for digital subscriber line (DSL) and there is no cable TV on your street? Satellite Internet access may be worth considering. Unlike traditional services, Satellite Internet doesn't rely on telephone lines or cable systems; instead, it utilizes a satellite dish for

bidirectional data communication, offering download speeds of around 500 kbps, with upload speeds approximately one-tenth of that. While cable and DSL may offer higher download speeds, Satellite Internet is still about ten times faster than a standard modem.

How it works ?

Satellite internet uses a five-part relay system:

- Internet-ready device:** Any device capable of connecting to the Internet, including computers, tablets, smartphones, smart TVs, gaming consoles, and more.
- Modem/router:** The modem translates data to facilitate communication between your device and the satellite dish. Some devices, like computers, smart TVs, or gaming consoles, can connect directly to the modem via an Ethernet cable.
- Satellite dish:** The next step in the relay is your home satellite dish. This dish must be precisely positioned to beam signals to the provider's satellite in orbit and receive information back. A certified technician from your provider will take care of placement for you.
- Satellite in space:** Roughly 22,000 miles above the surface of the Earth, satellites used in traditional satellite internet service (like what you get from Viasat and HughesNet) hover over the equator. They rotate with the planet, so the signal relay stays consistent. This is called a geostationary orbit. This allows for two-way data communication between your dish and the provider hub, or NOC. At about 300 miles above the Earth, next-generation satellites from Starlink (SpaceX) and Project Kuiper (Amazon) are much closer to the Earth. These satellites are launched into low-Earth orbit (LEO). Because of their closer proximity, next-generation satellites can provide customers with faster internet speeds and lower latency than previous satellite internet services. But the downside is the satellites can't cover as wide an area as satellites in geostationary orbit, so thousands of Starlink satellites are needed to deliver the same coverage area as two or three traditional satellites.
- Network operations center (NOC):** Whenever you request information from the internet, whether you're clicking on a link, streaming a show, or opening Facebook, the data from that request is uploaded through the above relay. The satellite then beams that request to the NOC. Using a much larger satellite dish than the one you have at home, the NOC receives your request. The NOC then taps into the internet backbone, gathers the information you requested, and sends it back

through the relay to you. All of this process, including beaming information 22,000 miles into space and back twice, happens in fractions of a second. Because the information has to travel so far, you may notice more latency (also called lag) than you might with DSL or cable internet, but advances in technology have made the satellite internet today much faster than it used to be.

Advantages

- High speed internet solution
- Larger coverage area compared to LTE base stations.
- It's used for internet connectivity on ships and airplanes
- Once implemented, service availability practically every part of the world especially remote areas where commercial LTE network or broadband infrastructure not feasible.
- It is one of the feasible solutions for regions where conventional infrastructure has not been implemented or limited availability (rural areas in developing countries).
- During absence of other services due to disaster (earth quake, hurricane etc.), satellite internet become an essential tools for disaster management.

Challenges

- **Latency:** Satellite internet can have higher latency (delay) compared to other types of internet due to the time it takes for signals to travel between Earth and satellites.
- **Weather Interference:** Adverse weather conditions, like heavy rain or storms, can affect the signal quality.

Military Application

- The US military has also been leveraging satellite internet technologies to provide internet access to remote locations. By utilizing these technologies, the US military is able to provide internet access to personnel in remote locations such as Afghanistan and Iraq. This allows US personnel to communicate with each other and access critical information in a timely manner.

India's satellite-based internet sector

- In India, satellite Internet technology is still in its early stages. Reliance Jio has introduced JioSpaceFiber, India's first satellite-based giga fiber service, partnering with SES and utilizing medium earth orbit (MEO) satellite technology. Elon Musk's Starlink is set to join India's satellite-based Internet sector upon receiving a Global Mobile Personal Communication by Satellite (GMPCS) license from the government, becoming the third player alongside Bharti's OneWeb and Reliance's Jio Satellite

INSP/T Jayan P

Computer Forensics

“Forensic computing is the process of identifying, preserving, analyzing and presenting digital evidence in a manner that is legally acceptable.

IDENTIFYING

This is the process of identifying things such as what evidence is present, where and how it is stored, and which operating system is being used. From this information the investigator can identify the appropriate recovery methodologies, and the tools to be used.

PRESERVING

This is the process of preserving the integrity of digital evidence, ensuring the chain of custody is not broken. The data needs to be preserved (copied) on stable media such as CD-ROM, using reproducible methodologies. All steps taken to capture the data must be documented. Any changes to the evidence should be documented, including what the change was and the reason for the change. You may need to prove the integrity of the data in the court of law.

ANALYSING

This is the process of reviewing and examining the data. The advantage of copying this data onto CD-ROMs is the fact it can be viewed without the risk of accidental changes, therefore maintaining the integrity whilst examining the changes

PRESENTING

This is the process of presenting the evidence in a legally acceptable and understandable manner. If the matter is presented in court the jury who may have little or no computer experience, must all be able to understand what is presented and how it relates to the original, otherwise all efforts could be futile.

The goal of computer forensics is to retrieve the data and interpret as much information about it as possible as compared to data recovery where the goal is to retrieve the lost data.

WHAT IS COMPUTER FORENSICS?

Forensic computing is the process of identifying, preserving, analyzing and presenting digital evidence in a manner that is legally acceptable.

Evidence might be required for a wide range of computer crimes and misuses

NEED FOR COMPUTER FORENSICS: -

- To produce evidence in the court that can lead to the punishment of the actual.
- To ensure the integrity of the computer system.
- To focus on the response to hi-tech offenses, started to intertwine.

GOAL OF COMPUTER FORENSICS: -

- The main goal of computer forensic experts is not only to find the criminal but also to find out the evidence and the presentation of the evidence in a manner that leads to legal action of the criminal.

CYBER CRIME

- Cybercrime occurs when information technology is used to commit or conceal an offence.

Types of Cyber Crime: -

- Forgery
- Breach of Computer Security
- Fraud/Theft
- Copyright Violations
- Identity Theft
- Threats
- Burglary
- Homicide
- Administrative Investigations
- Cyber Terrorism
- Sales and Investment Fraud
- Electronic Fund Transfer Fraud
-

DIGITAL EVIDENCE: -

“Any data that is recorded or preserved on any medium in or by a computer system or other similar device, that can be read or understood by a person or a computer system or other similar device. It includes a display, print out or other output of that data.”

TYPES OF DIGITAL EVIDENCE: -

1) PERSISTENT DATA

Meaning data that remains intact when the computer is turned off. E.g. hard drives, disk drives and removable storage devices (such as USB drives or flash drives).

2) VOLATILE DATA

Meaning data that would be lost if the computer is turned off. E.g. deleted files, computer history, the computer's registry, temporary files and web browsing history.

HC/RO S. K. Mohanty

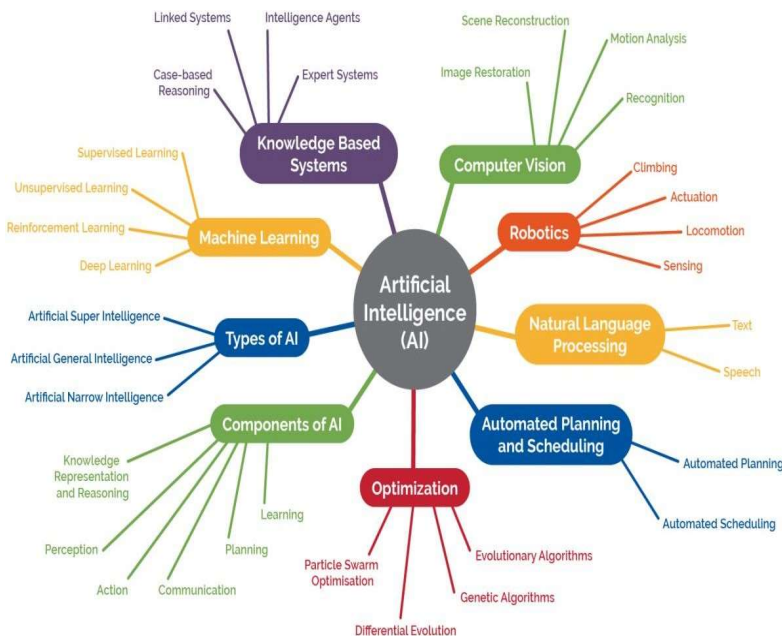
Artificial Intelligence

What is AI?

Our preliminary definition of AI as automation based on associations requires elaboration. Below we address three additional perspectives on what constitutes AI. Educators will find these different perspectives arise in the marketing of AI functionality and are important to understand when evaluating edtech systems that incorporate AI.

One useful glossary of AI for Education terms is the CIRCLS Glossary of Artificial Intelligence Terms for Educators.

AI is not one thing but an umbrella term for a growing set of modeling capabilities, as visualized in Figure.



	Familiar Technology Capabilities	Future Technology Capabilities
Input	• Typing	• Speaking
	• Clicking and dragging	• Drawing
	• Touching and gesturing	• Analyzing images and video
Processing	• Displaying information and tasks	• Assisting students and teachers
	• Sequencing learning activities	• Planning and adapting activities
	• Checking student work	• Revealing patterns in student work
Output	• Text	• Conversations
	• Graphics	• Annotating and highlighting
	• Multimedia	• Suggesting and recommending
	• Dashboards	• Organizing and guiding

Perspective: An Algorithm that Pursues a Goal

“Any computational method that is made to act independently towards a Goal based on inferences from theory or patterns in data.” This second definition emphasizes that AI systems and tools identify patterns and choose actions to achieve a given goal. These pattern recognition capabilities and automated recommendations will be used in ways that impact the educational process, including student learning and teacher instructional decision making. For example, today’s personalized learning systems may recognize signs that a student is struggling and may recommend an alternative instructional sequence. The scope of pattern recognition and automated recommendations will expand.

Perspective: Intelligence Augmentation

“Augmented intelligence is a design pattern for a human-centered partnership model of people and artificial intelligence (AI) working together to enhance cognitive performance, including learning, decision making, and new experiences.”

Foundation (above) keeps humans in the loop and positions AI systems and tools to support human reasoning. “Intelligence Augmentation” (IA)¹⁷ centers “intelligence” and “decision making” in humans but recognizes that people sometimes are overburdened and benefit from assistive tools. AI may help teachers make better decisions because computers notice patterns that teachers can miss. For example, when a teacher and student agree that the student needs reminders, an AI system may provide reminders in whatever form a student likes without adding to the teacher’s workload. Intelligence Automation (IA) uses the same basic capabilities of AI, employing associations in data to notice patterns, and, through automation, takes actions based on those patterns. However, IA squarely focuses on helping people in human activities of teaching and learning, whereas AI tends to focus attention on what computers can do.

Key Recommendation: Human in the Loop AI

Many have experienced a moment where technology surprised them with an uncanny ability to recommend what feels like a precisely personalized product, song, or even phrase to complete a sentence in a word processor such as the one being used to draft this document. Throughout this supplement, we talk about specific, focused applications where AI systems may bring value (or risks) into education. At no point do we intend to imply that AI can replace a teacher, a guardian, or an educational leader as the custodian of their students’ learning. We talk about the limitations of models in AI and the conversations that educational constituents need to have about what qualities they want AI models to have and how they should be used. “We can use AI to study the diversity, the multiplicity of effective learning approaches and think about the various models to help us get a broader understanding of what effective, meaningful engagement might look like across a variety of different contexts.”

A Challenge: Systems Thinking About AI in Education

As AI expands into the educational system, our listening session attendees reminded us that it will be entering parts or locations of the system that are presently dysfunctional. AI is certainly not a fix for broken systems, and instead, must be used with even more care when the systems’ context is unstable or uncertain.

HC/RO P. Thanabalan

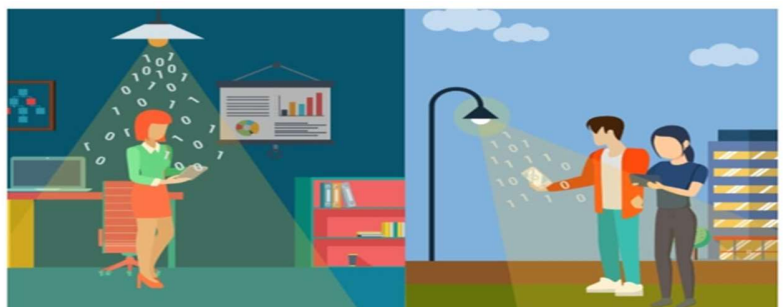
LiFi

What is LiFi Technology ?

LiFi (light fidelity) is a bidirectional wireless system that transmit data via LED or infrared light . it was first unveiled in 2011 and , unlike wifi, which uses radio frequency , LiFi technology only needs a light source with a chip to transmit and in ternate signal through light waves .

This an extra ordinary advance over todays wireless networks . LiFi multiplies the speed and bandwidth of WiFi , 3G and 4G . the latter have a limited capacity and become saturated when the number of users surfing increases , causing them to crash , reducing speeds and even interrupting the connection .with LiFi , however , its band frequency of 200000 GHZ , versus the maximum 5GHZ of the WiFi , is 100 times faster and can transmit much more information per second . A 2017 study by the university of Eindhoven obtained a download rate of 4.8 G byte / second with infrared light with a radius of 2.5 metres , when the best WiFi would barely reach 300 M byte /second Rolling out LiFi world wide LiFi technology emerged thanks to the German physicist herald haas , a professor and director of the LiFi research and development centre at the university of edinburgeh , and it could reach our homes in just a few years. It is currently being tested with LED luminaires in offices around the world and the aeronautical industries is already working on solution to integrate it into commercial aircraft.

Airports, hospitals and city streets are other spaces where LiFi technology could become popular. the boom in mobile devices and the growing demand for higher bandwidth systems are expected to drive the development of this social technology in the next decade, as noted in the global market for LiFi technology analysis and forecast 2018 to 2028 .This report estimate that's the global market will reach a value of nearly 36 billion in 2028 , and that over the next 10 years the compound annual growth rate will rise to 71.2 % . the Asia pacific region will lead the global growth in LiFi technology upto 2028 , over taking Europe , which remained at the forefront in 2017.



Lifi vs. Wifi: who gets to wear the wireless networks crown?

LiFi technology is faster, cheaper and even more secure than wifi.

Its main advantages include:

- **Faster:** the current speed of wifi oscillates between 11 and 300 Mbit/s, while that of LiFi is also highly variable according to the last studies carried out. The most widely accepted speed is 10 Gbit/s, but it has been proven that it could reach 224 Gbit/s and that a 1.5 Gbit film could be downloaded in thousandths of a second.
- **Cheaper and more sustainable:** it is up to 10 times cheaper than wifi, requires fewer components and uses less energy. All you have to do is turn on a light!
- **More accessible:** any light fitting can easily be converted into an internet connection point, as only a simple LiFi emitter needs to be fitted.
- **More secure:** light does not pass through walls like radio waves do, and this prevents intruders from intercepting LiFi communications through a wireless network.
- **More bandwidth:** the light spectrum is 10,000 times wider than the radio spectrum, which increases the volume of data it can carry and transmit per second.
- **More reliable:** LiFi transmits its signal without interruptions, making communication more stable than with wifi.
- **No interference:** electronic light does not interfere with radio communications, interact with other systems or compromise transmissions from aircraft, ships, etc.
- **Wireless and invisible:** LiFi takes advantage of lights and dispenses with the router, so it works without the need for cables. In addition, it can operate with infrared light, which is invisible to the human eye, or with visible LED light at very low intensity so as to avoid disturbance.
- **No saturation:** internet connection via light could prevent the collapse of the radio spectrum which, according to LiFi's inventor Harald Haas, could take place by 2025. With the emergence and development of LiFi technology, many foreshadow the obsolescence of wifi and other wireless networks. We will have to wait a few more years to see if streetlights, in addition to illuminating our streets, will connect us to the internet at the speed of light.

HC/RO. S.M.HUSSAIN

Acknowledgement

We are highly thankful for reading out this compilation and hope it will be useful for you in day to day professional and personal life. We would like to hear your interest areas, suggestions from you to make this newsletter more informative and interesting. Your views will definitely help us to create this newsletter as an effective medium to reach you with latest development in the fields of communication and technology.

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