CREATING
RISK INTELLIGENT PROFESSIONALS

GRMI | GLOBAL RISK MANAGEMENT INSTITUTE

Disruptive Innovation and Security Risks | by Anuj Khebde (Batch 8)

PROGRAMME ENDORSED BY: othm qualifications

ASSOCIATE PARTNER: The Institute of Internal Auditors India

STRATEGIC PARTNER: SHRM BETTER WORKPLACES BETTER WORLD

ASSOCIATE MEMBER: FICCI Federation of Indian Chambers of Commerce and Industry

STRATEGIC PARTNER: HAUSPETER Consulting Internal Auditing Control

INDEX

How Innovation is Disrupting the Industry and Improving Connectivity?

- According to data collected by the United Nations, more than 20% of the world's population does not have access to 4G network coverage or better. In Many markets, broadband is the only option and as such, providers have little to no competition.
- Satellite internet has the most disruptive potential in reaching unserved and underserved areas, while there are limited benefits for urban and suburban areas with good coverage from legacy providers.
- To solve this issue, major players are providing large no. of satellites orbiting Earth to a network of smaller-scale ones orbiting closer to the planet.
- These satellites are known as 'Low Earth Orbit' satellites these sleek satellites are less expensive than their inexpensive counterparts, coming in at around $1 million each, with that number expected to drop to as low as $10,000 as the technology advances and customers catch on.
- The LEOs will be constructed using lower-priced, mass-produced materials via an assembly line. This way, in the event that a particular part becomes defective, providers aren't required to spend time and resources attempting to fix it. They can simply replace the part and continue to provide uninterrupted service.
- Over time, this improved access could even be an impetus to convince more people to move away from cities and into more rural areas, which have, until now, been cut off from the grid.That remoteness is about to transform, however, as LEO systems are researched, fine-tuned and delivered around the world. The result will be a competitive internet market that can ultimately drive up offerings while dropping cost-per-bit prices across the board

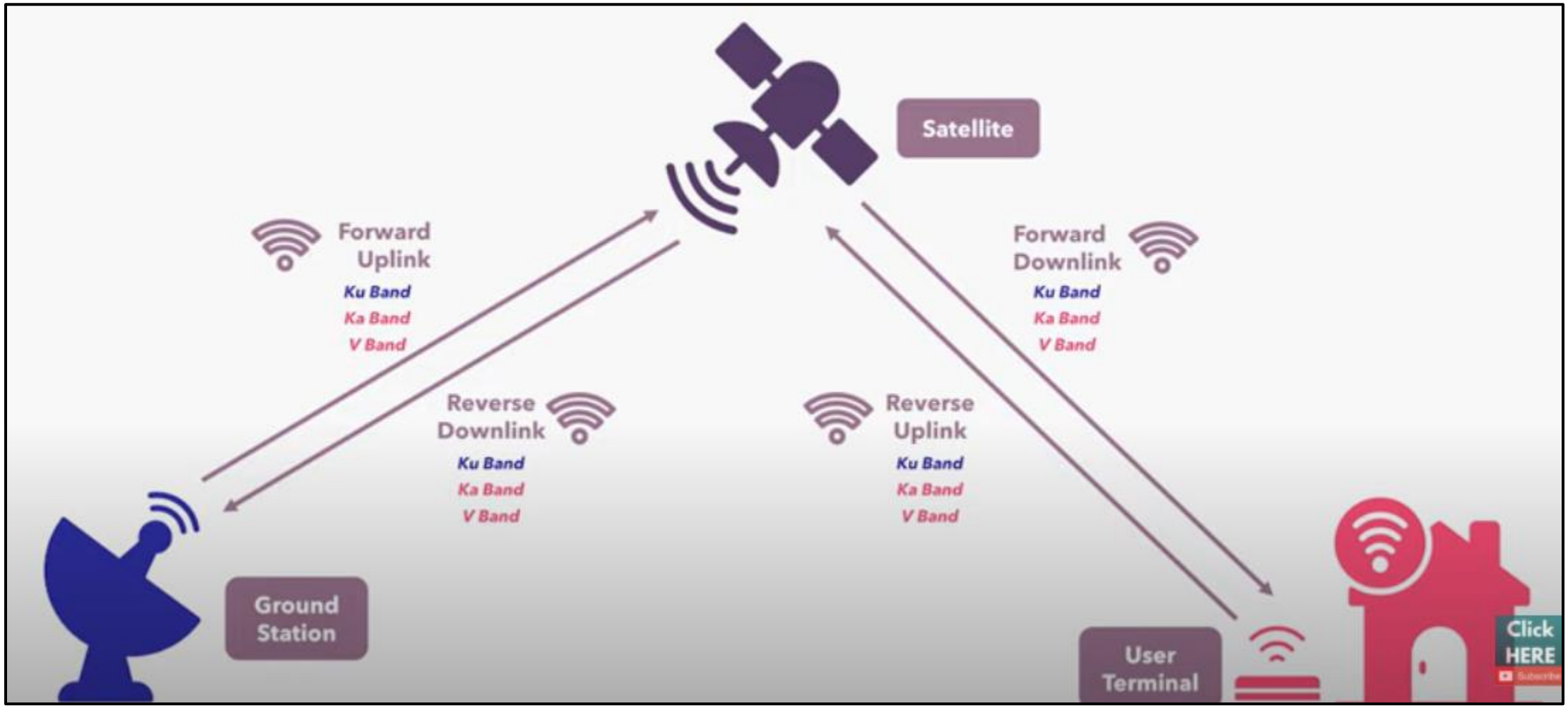
Will LEO SI be the Next Disruption to the Telecommunication Industry?

- The infrastructure needed for 5g is known can cause to local disruption in habitats and hence has got a lot of oppositions from various environmental groups. With advent of LEO SI companies, telecom companies can concentrate their efforts only on urban areas where there is expanding need of fast internet. This might help telecom companies in decreasing the pressure from various environmental groups.

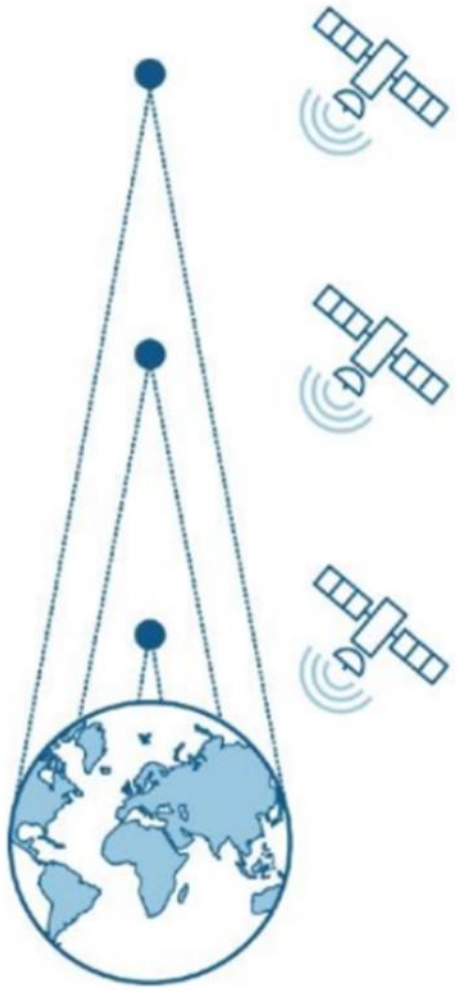
- One of the biggest questions with telecommunications is how to provide connectivity to sparsely populated rural areas where infrastructure deployment is not economically viable.

- Traditional telecommunications businesses and present satellite internet providers are unlikely to be affected at initially. Satellite broadband, on the other hand, may prove transformative in the long run. Telecoms may choose to yield rural an d underdeveloped areas to satellite broadband providers, as constructing infrastructure in these areas is frequently proh ibitively expensive. Indeed, satellite broadband constellations may benefit telecoms businesses by enhancing mobile backhaul services.

Working of LEO Satellite Internet



Comparison of GEO, MEO and LEO satellites

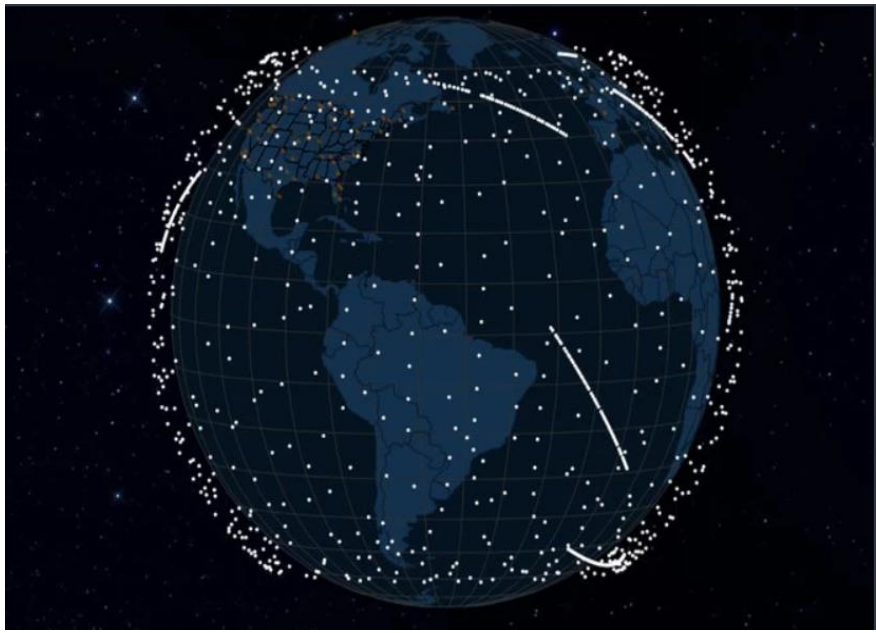


GEO satellites at altitudes of 35,786 km
Full orbital period of 24 hours
Latency (round trip) of approximately 477 ms

MEO satellites at altitudes of 2,000–35,786 km
Full orbital period of 127 minutes to 24 hours
Latency (round trip) of approximately 27–477 ms

LEO satellites at altitudes of 160–2,000 km
Full orbital period of 88–127 min
Latency (round trip) of approximately 2–27 ms

Figure: Comparison of Characteristics: Geostationary Orbit, Medium Earth Orbit, and Low Earth Orbit



Major players in the internet space race

Provider	Satellites	Frequency Band	Altitude(Above the Earth)	Purpose
SpaceX's Starlink	11,943 (Long Term: 42000)	Ka, Ku and V	550 km	Broadband Connectivity Globally
Project Kuiper	3,236	Ka and Ku	590 to 630 km	Broadband Connectivity Globally
OneWeb	648	Ku	1,200 km	Broadband Connectivity Globally
Telesat	292	Ka	1,000 km	Wide and Narrow Band Communication Services

National Security Risks

National security threats	Illegal organizations can steal strategic information of target countries by deploying earth observation payload on LEO satellites
Military security threats	LEO satellite provides communication platform for future information warfare weapons
Frequency and orbit resource preemption	To occupy limited orbit resources by planning LEO satellite constellation
Interference in astronomical exploration	The launch of a large number of LEO satellites can cause serious interference to astronomical observation

Network Security Risks

Identity impersonation	Disguised as a satellite terminal (ST) to access the SI and destroy the network
	Disguised as a satellite to trick legitimate STs into accessing a false network to obtain the ST's location or identification information
Data eavesdropping	Illegal organizations illegally receive and analyze transmitted traffic data or signaling data through wireless links
Data integrity issues	Modify, insert, replay, delete user or signaling data to destroy data integrity
Information interception	Illegal interception of user location or identification information transmitted by ST through wireless links

Network Security Risks(contd.)

Signal interference	Attackers interfere with satellite wireless links by emitting high-power electromagnetic waves
Denial of service	Interfere with satellite or gateway, and interfere with data or signaling physically or by protocol, which makes SI unable to provide normal services for legitimate ST
Anonymous attack	Attackers attack the satellite node in space, but the satellite cannot determine the attackers
Malicious occupation of satellite bandwidth resources	Sending illegal signals to the satellite through wireless link, because the satellite will not check the legitimacy of the signals, so the illegal signals will occupy the bandwidth resources of the satellite

Equipment Security Risks

Malicious satellite control	By issuing malicious instructions or injecting viruses to satellite nodes from ground facilities or space to achieve the goal of controlling satellites
Malicious consumption of satellite resources	Malicious consumption of satellite propellant resources to achieve the goal of reducing satellite life

Advantages and Disadvantages of LEO satellite internet

Advantages

- Airlines
- At Sea
- In Rural Areas
- Easy to install
- Faster disaster recovery

Disadvantages

- Not portable
- Slower internet in cities
- Service disruption during lousy weather

Final thought

- Over time, technological revolutions in communication and transportation have made the world a smaller place, driving economic growth, cultural exchanges and still further technological development. Space-based internet promises yet another revolution, providing broadband internet connection everywhere, allowing true remote working. It may also open a new road to the internet highway that has been denied from billions of people till now because of insufficient infrastructure and government censorship. At the same time, it poses challenges for astronomical research, the environment and policy development worldwide. How these companies, their home governments and the governments in states in which they operate handle those challenges will determine our future access to broadband internet and to space itself.

References

- https://www.cnet.com/home/internet/starlink-satellite-internet-explained/
- https://www.clubhdtv.com/blog/starlink-vs-fiber-optic-internet/
- https://dgtlinfra.com/elon-musk-starlink-and-satellite-broadband/
- https://link.springer.com/chapter/10.1007/978-981-33-4922-3_14
- https://axessnet.com/en/advantages-of-the-satellite-internet/
- https://www2.deloitte.com/us/en/insights/industry/technology/technology-media-and-telecom-predictions/2020/satellite-broadband-internet.html
- https://www.dynamicontent.net/article.php?dcarticleid=1812
- https://datafloq.com/read/leo-technology-satellite-internet-innovation/5942

Campus Address :

88, Sector 44,
Gurgaon – 122002

CONTACT US

www.grm.institute

Email :
admissions@grm.institute

Thank you!