

Modern Satcom Technologies & User Benefits

Shivaji Chatterjee

Hughes Communications India

Modern Technologies and Most Users ☺

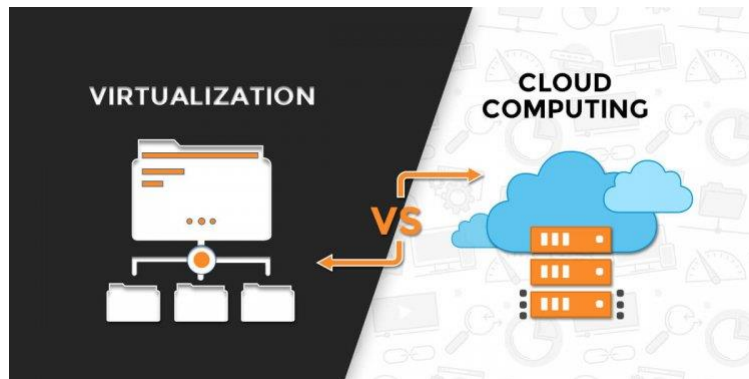
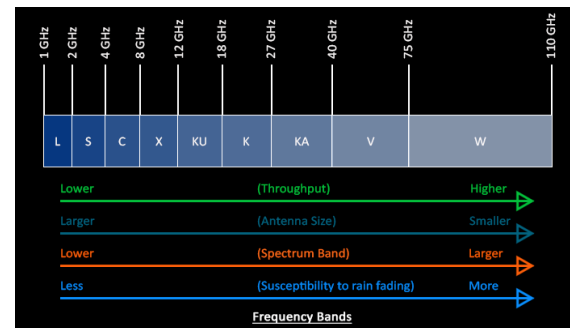
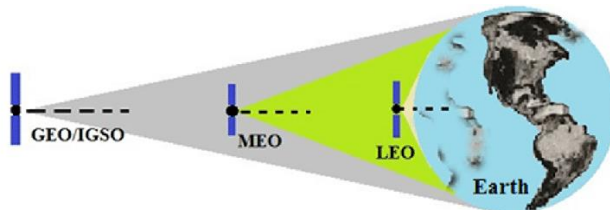
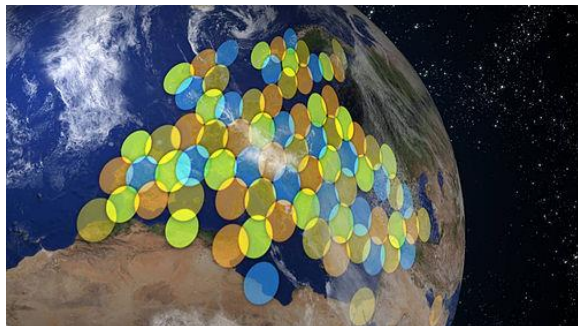


Satcom Technology Traits & User Benefits

- | | | |
|-----------------------------|---|--|
| • Ubiquitous Coverage | → | • Anywhere in India |
| • Highest Reliability | → | • No wires, no outages |
| • Homogeneity of Service | → | • Rural QoS = Urban QoS |
| • Highest Availability | → | • ~100% Uptime |
| • Broadcast Nature | → | • Multicast applications |
| • High Latency | → | • Slowness for high BW, interactive apps |
| • Limited Spectrum | → | • High Cost-per-bit |
| • Country/Region satellites | → | • India left behind in Capacity |
| | | • No satcom broadband as yet |



Modern Satcom Technologies



Modern Satcom Technologies & User Benefits

- | | | |
|------------------------------|---|------------------------------------|
| • High Throughput Satellites | → | • More Gbps/Hz, Lower cost-per-bit |
| • Multi-spot Beam design | → | • High power, Smaller terminals |
| • Use of multiple bands | → | • More GHz, More Gbps |
| • Highest Mod-codes | → | • More Gbps/Hz, Lower cost-per-bit |
| • Cloud, Virtualisation, 5G | → | • Embedded ecosystem, ease of use |
| • LEO/MEO orbits | → | • Low latency, Greater performance |
| • Global constellations | → | • Ubiquitous, global coverage |
| | | • India on par with the world |

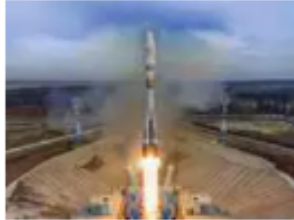


Excitement in the Indian Satcom Space !



Amazon eyeing satellite broadband space in India

amazon | project kuiper



No wires or towers: Satellite broadband promises to be the next big thing

24 May, 2021, 02.07 PM IST

This may soon turn into a reality once satellite broadband connections are rolled out across India, likely as early as next year. Some of the biggest global names – including OneWeb, SpaceX and Hughes – are betting big on the opportunity to deliver satellite-based fast internet services – anywhere, anytime.



OneWeb launches 36 satellites, paves way for fast broadband launch in India by mid-2022

18 Dec, 2020, 06.20 PM IST

OneWeb's latest satellite launch from a Soyuz vehicle takes the in-orbit constellation to 110 satellites.



Starlink Broadband Is Coming To India Next Year, And You Can Reserve Now For \$99

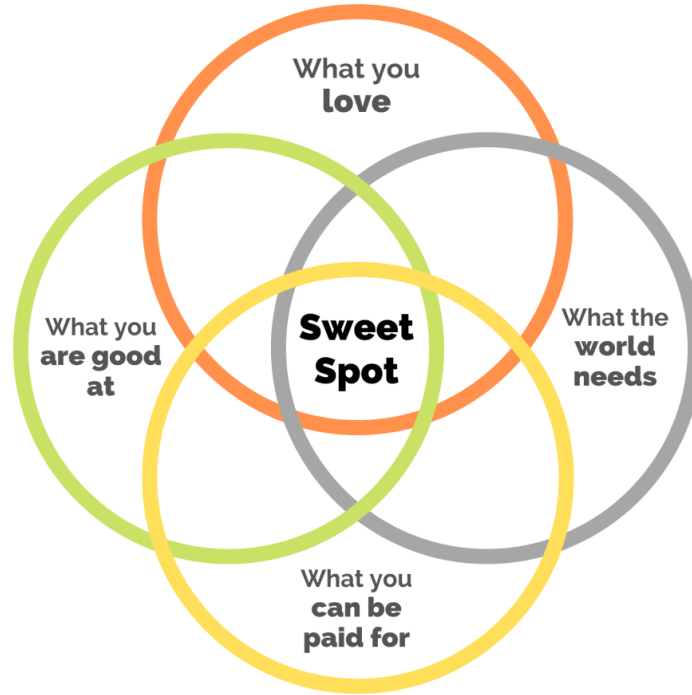
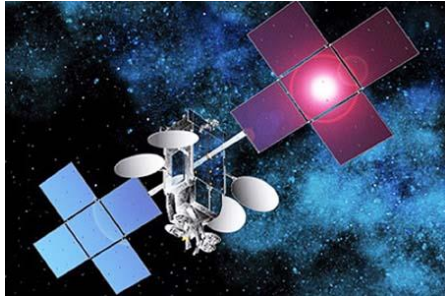


GEO, MEO and LEO

All are relevant and complement each other !

	HTS GEO	mPower MEO	SpaceX LEO	Telesat Lightspeed	OneWeb LEO
Terminal cost	Low	High	Medium	High	Medium
Latency (ms)	550	150	40	40	40
Cost of capacity	Low	High	TBD	TBD	TBD
India Commercial Availability	Now	2023	2023/2024	2025/2026	2023/2024
India Regulatory Approval	Now	TBD	TBD	TBD	2022
Visibility to satellites (field of view)	High	Medium	Low	Medium	Medium
Service Availability (% of time)	99.50%	99.50%	TBD	99.50%	99.50%
Capacity density	High	High	Low	High	Low
QoS	SLAs	SLAs	Best effort	SLAs	SLAs
Efficiency content and file distribution to MEC nodes	High	Low	Very Low	Low	Low
Proven robust deployments for backhaul	Yes	Yes	No	No	No
Primary market focus	Various	50+ Mbps trunking	Consumer	Enterprise	Enterprise

Satcom and Us(ers) : Have we found the sweet spot ?!





Thank You!