

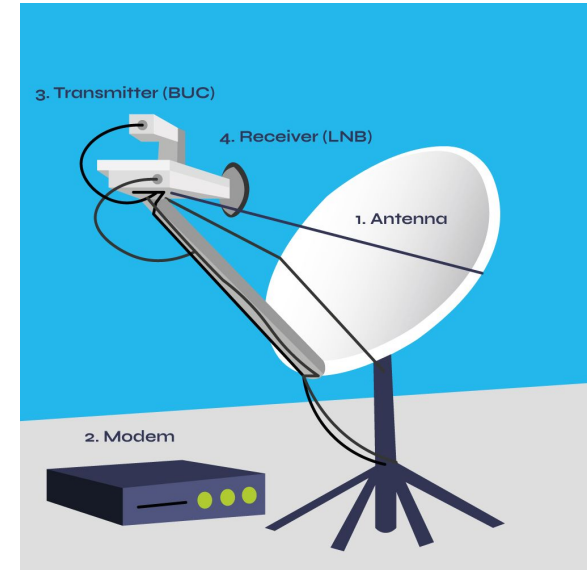


# VSAT Satellite

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# Introduction

- VSAT (Very Small Aperture Terminal)
- A Very Small Aperture Terminal (VSAT), is a two-way satellite ground station with a dish antenna that is smaller than 3 meters.
- VSATs access satellites to relay data from small remote earth stations (terminals) to other terminals (in mesh configurations) or master earth station "hubs" (in star configurations).
- Underlying objective of VSAT Systems: bring the service directly to the end-user



# Types of Communication



Communication is reliable transmission of information over a channel.

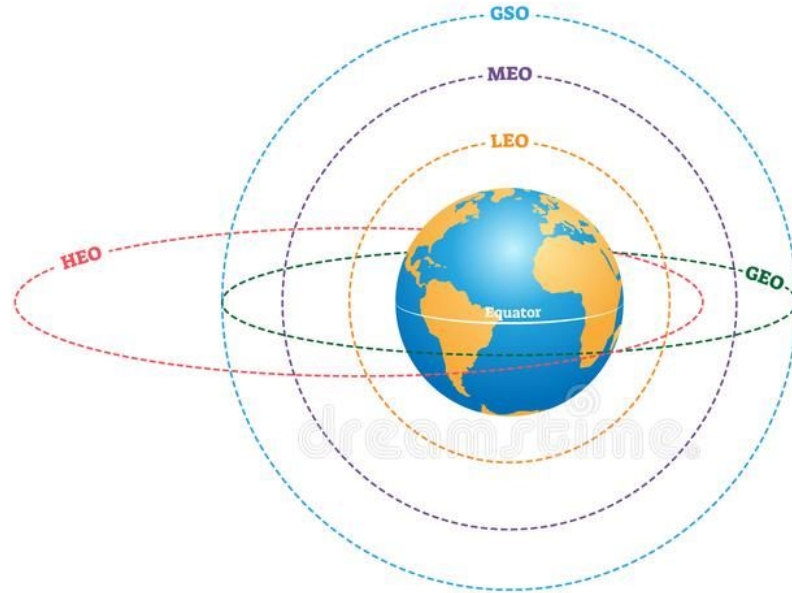
Here we shall concentrate only on **wireless communication.**

# Types of Satellite

According to orbit position there are mainly three types:

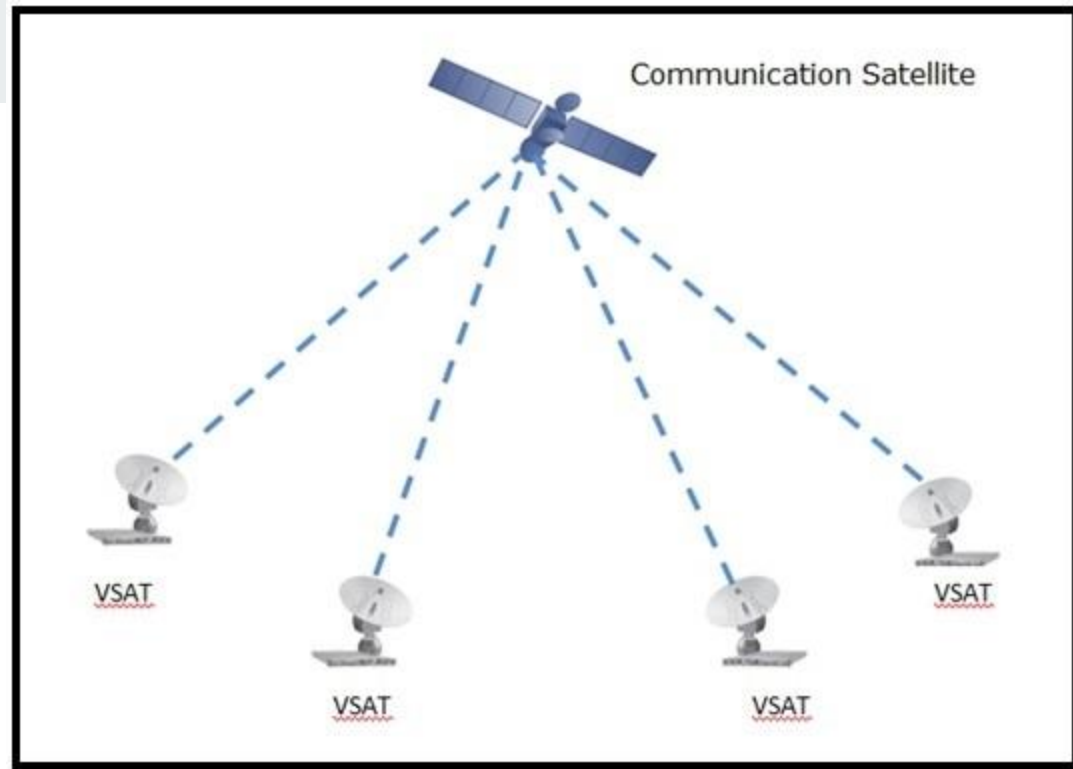
- LEO - (Low Earth Orbit Satellites)
- MEO - (Medium Earth Orbit Satellites)
- GEO - (Geosynchronous Equatorial Orbit Satellites)

## ORBIT TYPES



LEO	MEO	Over the Equator GEO	GSO	HEO
Low Earth Orbit	Medium Earth Orbit	Geostationary Orbit	Geosynchronous Orbit	Highly Elliptical Orbit
↑ Altitude: 160-2,000 km	↑ Altitude: 2,000-35,786 km	↑ Altitude: 35,786 km	↑ Altitude: 35,786 km	↑ Apogee altitude: 40,000 km Perigee altitude: 1,000 km
→ Speed: ~ 8 km/sec	→ Speed: ~ 3-8 km/sec	→ Speed: ~ 3 km/sec	→ Speed: ~ 3 km/sec	→ Speed: ~ 1.5-10.0 km/sec
↻ Orbital period: ~ 90 min	↻ Orbital period: ~ 2-24 hours	↻ Orbital period: 24 hours	↻ Orbital period: 24 hours	↻ Orbital period: ~ 12 hours
<b>Example:</b>  Globalstar - 48 satellites Voice and Data Services	<b>Example:</b>  GPS - 24 satellites Global Positioning System	<b>Example:</b>  Communications satellites, Broadcast satellites	<b>Example:</b>  SBAS Weather satellites	<b>Example:</b>  Communications, Remote sensing

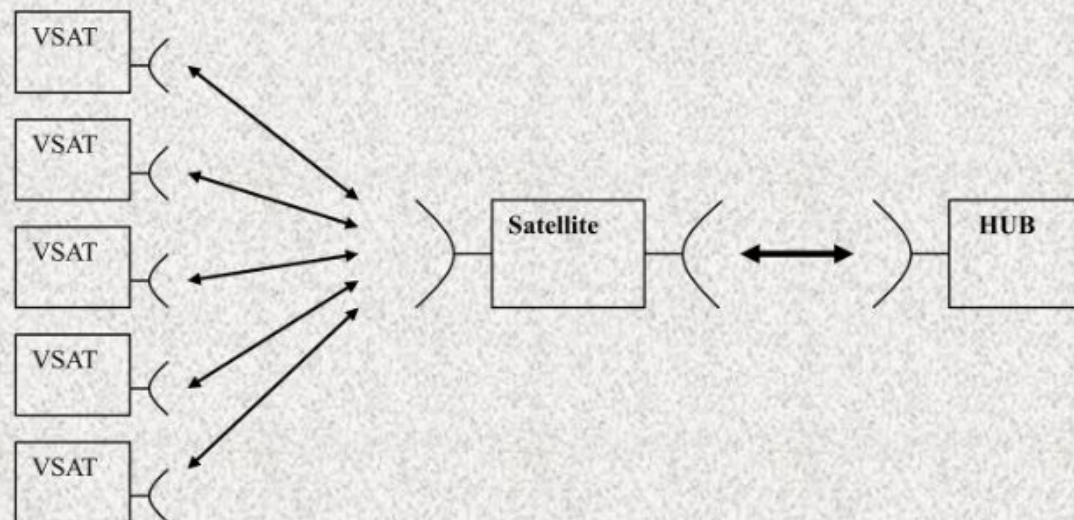
- Data rates in VSATs ranges from 4 Kbps to 16 Mbps.
- It accesses satellites in geosynchronous orbits or geostationary orbits.
- A VSAT has a dish antenna with diameters between 75 cm to 1 m, which is very small in comparison with 10 m diameter of a standard GEO antenna



# **STAR ARCHITECTURE**

## **(satellite's perspective)**

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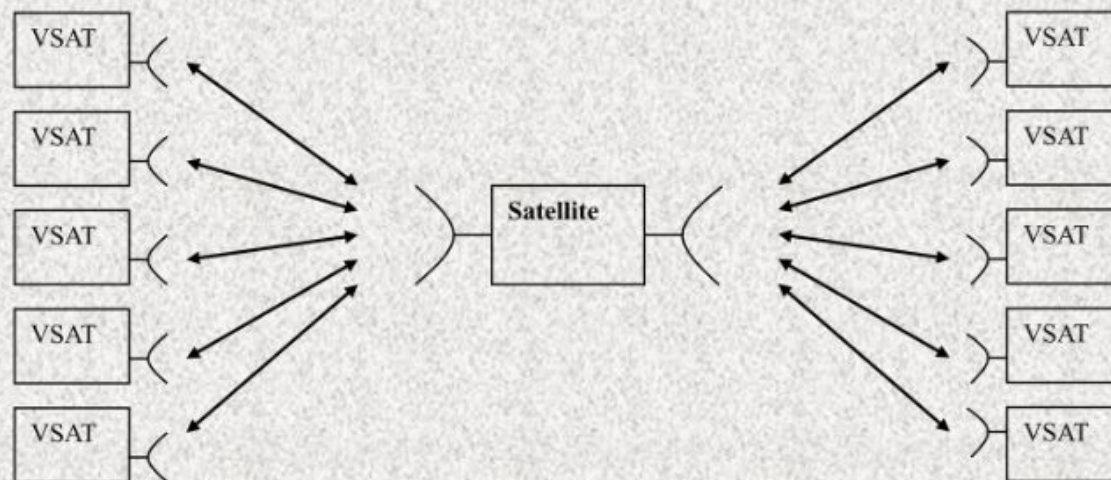


Topology of a **STAR** VSAT network viewed from the satellite's perspective  
Note how the VSAT communications links are routed via the satellite to the Hub in all cases.



# **MESH ARCHITECTURE**

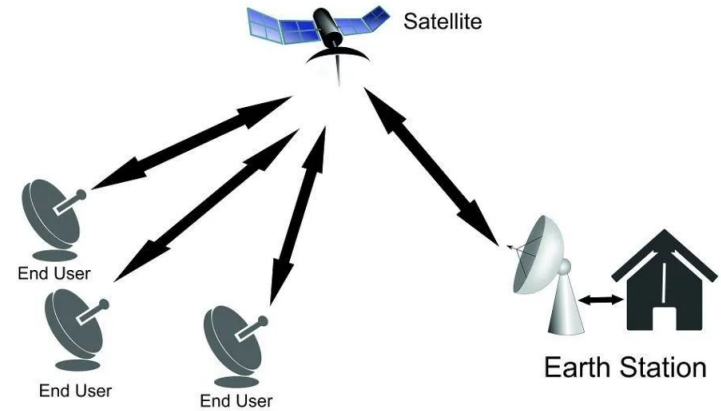
## **(satellite's perspective)**



Topology of a **MESH** VSAT network from the satellite's perspective  
Note how all of the VSATs communicate directly to each other via the satellite  
without passing through a larger master control station (Hub).

## Need Of VSAT

- ❖ Hard to reach areas
- ❖ Reliability : reliable satellite transmission of data between an unlimited number of geographically dispersed sites.
- ❖ Time to deploy (4-6 months vs. 1-2 weeks)
- ❖ Cost ( If distance is more than 500 km then the VSAT solution is more cost-effective as compared to the optical fiber.)



VSAT Communication System





# Application

- In narrowband data – e.g. point – of – sale transactions using debit cards or credit cards, RFID data
- In broadband data – e.g. Internet access to remote locations, VoIP
- Mobile communications
- Maritime communications



## References

- Images from Google images
- [https://en.wikipedia.org/wiki/Very-small-aperture\\_terminal](https://en.wikipedia.org/wiki/Very-small-aperture_terminal)
- <https://www.slideshare.net/iamaproudindian/vsat-technology>
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**Thank you**