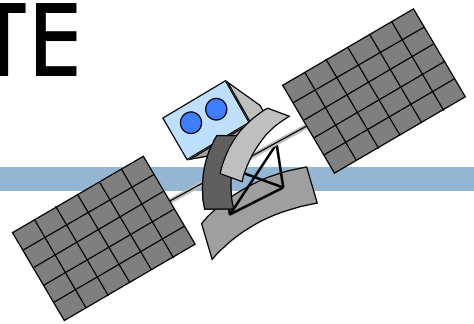
SCOPE

- Introduction to Satellite
- Why Satellite?
- VSAT in General
- Spectrum Allocation & Characteristics
- VSAT Network Topology
- C Band vs Ku Band

INTRODUCTION TO SATELLITE



- Satellites
  - Specialize transceiver
  - Place in orbit around earth
- Satellites uses
  - Communications
  - Weather
  - Global Positioning systems
  - Scientific studies of our planet, the atmosphere and the universe
  - Spy

INTRODUCTION TO SATELLITE

continues…..

- Satellite Orbits

GEO	Geostationary Earth Orbit	35,400 Km
MEO	Medium Earth Orbit	20,000 – 30,000 Km
LEO	Low Earth Orbit	200 – 1400 Km

WHY SATELLITE?

- Satellite comms provide the following:
  - Ubiquitous availability.
  - Terrestrial-free network.
  - Reliability.
  - Multi-cast content distribution.
  - Security & privacy.
  - Superior economics.
  - Rapid deployment & installation.
  - Flexibility & expandability.

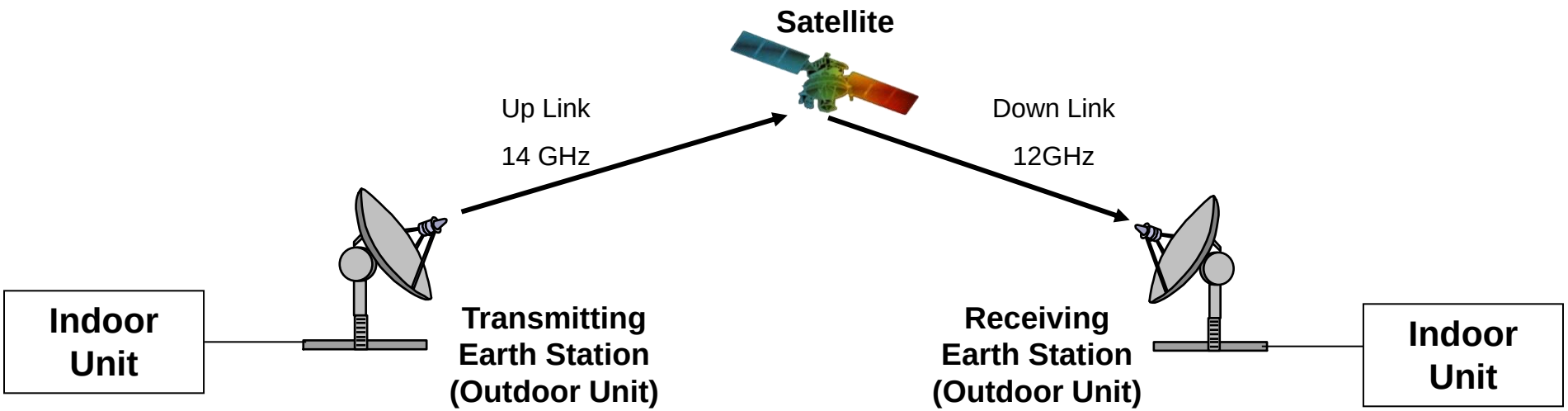
VSAT

- VSAT(Very Small Aperture Terminal) is a satellite-based communications service that offers businesses and government agencies flexible and reliable communications solutions, both nationally and internationally, on land and at sea.
- VSAT networks provide:
  - Rapid, reliable satellite transmission of data, voice and video and an ability to allocate resources (bandwidth and amplification power) to different users over the coverage region as needed.
  - VSAT industry is offering fixed network solutions that can provide a full suite of services at reasonable price. eg: a toll quality voice channel via VSAT is available between 3-15 cents/minute today.
  - Easy to provide point-to-multipoint (broadcast), multipoint-to-point (data collection), point-to-point communications and broadband multimedia services.
  - VSATs are serviced not only in cases where the land areas are difficult to install, say in the case of remote locations, water areas, and large volumes of air space.
  - An ability to have direct access to users and user premises.

VSAT in General

VSAT	:	Very Small Aperture Terminal
Antenna Diameter	:	0.6m ~ 4.5m
Traffic Capacity	:	9.6kbps ~ 2Mbps
Frequency Bands	:	C-band (4 - 6 GHz) or Ku-band (12 - 14 GHz).
Use of Satellite	:	Geo-stationary satellite (36,000km above equator)
Network Configuration	:	i. Point - to - point
		ii. Point - to - multipoint
		- STAR network
		- MESH network
Equipment List	:	i. Antenna (1.8m / 2.4m / 3.8m)
		ii. Outdoor Unit (Feedhorne, LNA, SSPA)
		iii. Indoor Unit (Chasis, Satellite Modem)
Applications	:	Voice, Data, Internet, Fax and Video

SATELLITE COMMUNICATION EQUIPMENT



Basic Satellite Communication :

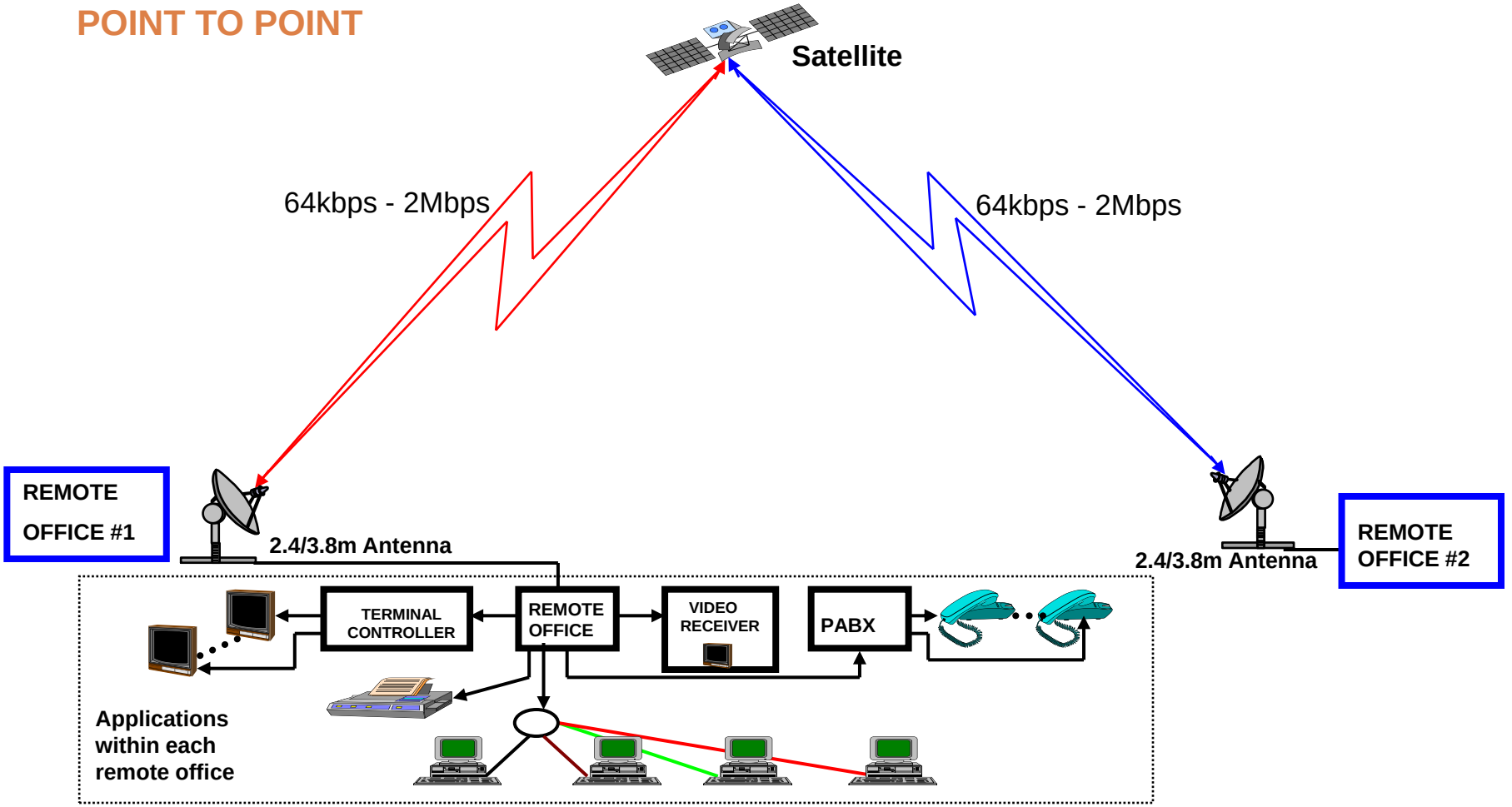
- Line of sight microwave system with a single repeater (transponder) located at space
- ***Space segment*** or satellite (e.g. Intelsat, Inmarsat, Measat)
- ***Ground segment*** or earth station which includes:
    - Antenna
    - Outdoor Unit (ODU) (e.g. Feedhorn, Low Noise Amplifier, Solid State Power Amplifier)
    - Inter Facility Link (IFL) - waveguide or coaxial cable
    - Indoor Unit (IDU) (e.g. Up/Down Converter, Satellite Modem)

SPECTRUM ALLOCATION & CHARACTERISTICS

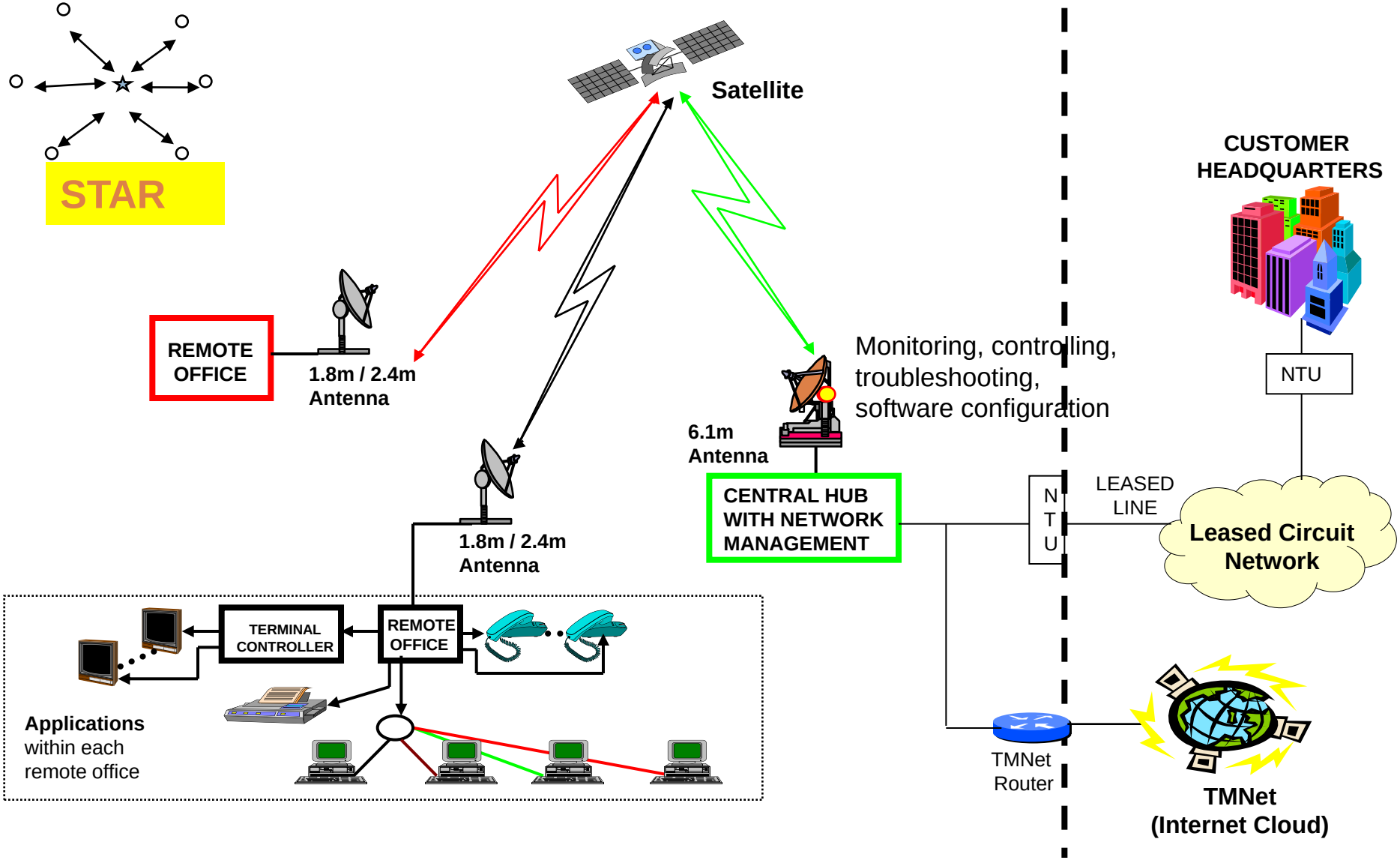
VSAT Frequency Spectrum Allocation This table acts as a guide only.				
Band	**Frequency GHz**	**Area Foot-print**	**Delivered Power**	**Rainfall effect**
Band C	3 to 7	Large	Low	Minimum
Band Ku	10 to 18	Medium	Medium	Moderate
Band Ka	18 to 31	Small	High	Severe

VSAT Network Topology POINT-TO-POINT NETWORK

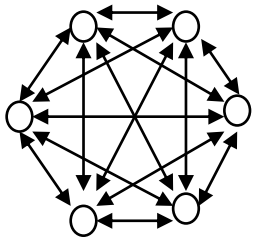
POINT TO POINT



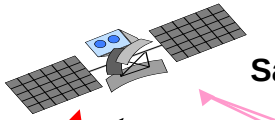
VSAT Network Topology STAR NETWORK



VSAT Network Topology MESH NETWORK



MESH



Satellite

REMOTE OFFICE

2.4m Ant

2.4m Antenna

REMOTE OFFICE

2.4m Ant

3.8m Ant

NETWORK CONTROL SYSTEM

TERMINAL CONTROLLER

REMOTE OFFICE

VIDEO RECEIVER

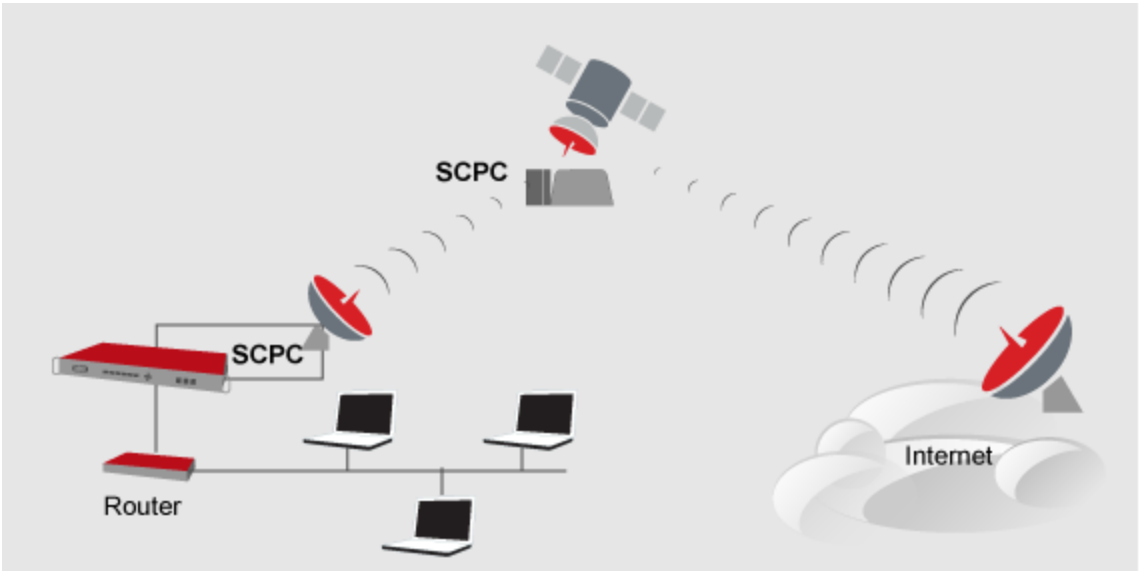
PABX

Applications within each remote office

NETWORK CONTROL SYSTEM

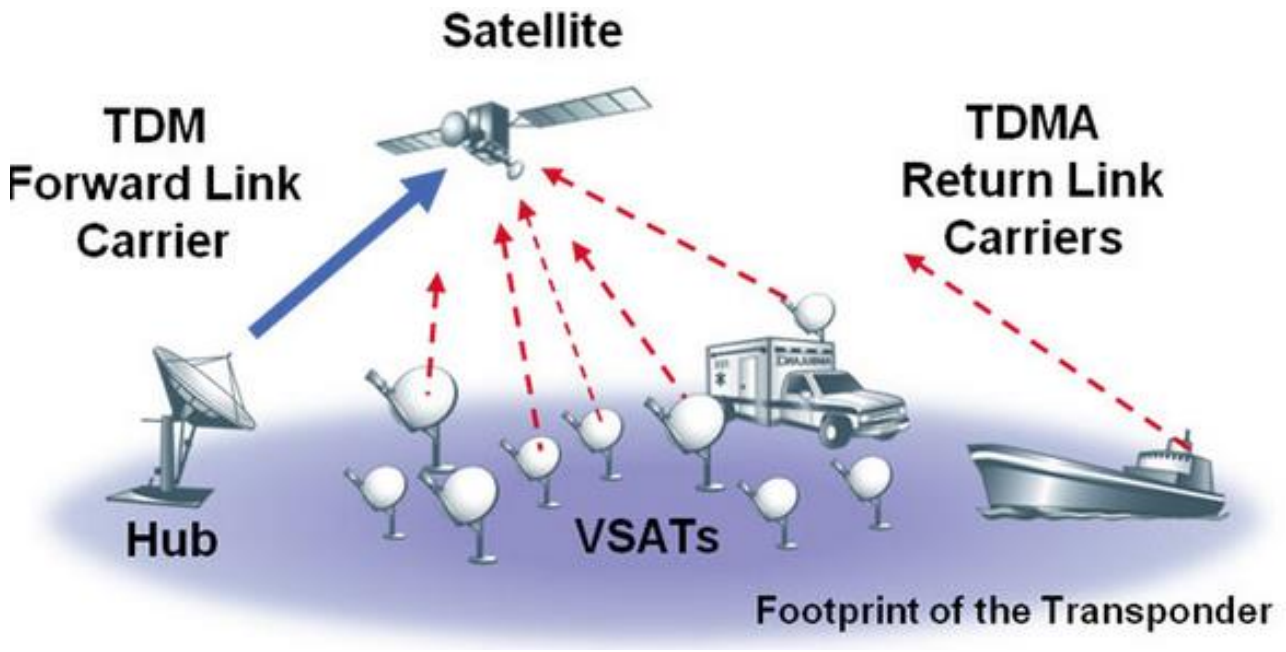
- Monitoring, controlling, troubleshooting, software configuration

Multiple Access Scheme
SCPC (Single-Carrier Per Channel)



SCPC-based design provides a point-to-point technology, making it the VSAT equivalent to conventional leased lines.

Multiple Access Scheme
TDMA (Time-division multiple access)



With TDMA networks, numerous remote sites communicate with one central hub – a design that is similar to packet-switched networks
In a TDMA network, all VSATs share satellite resource on a time-slot basis.