

WIRELESS LOCAL LOOP

- 1) it is a two way communication service to a user station near a small service area.
- 2) This will uses radio signal & wireless networking technologies to local loop is used instead of copper cable technology for access to PSTN.

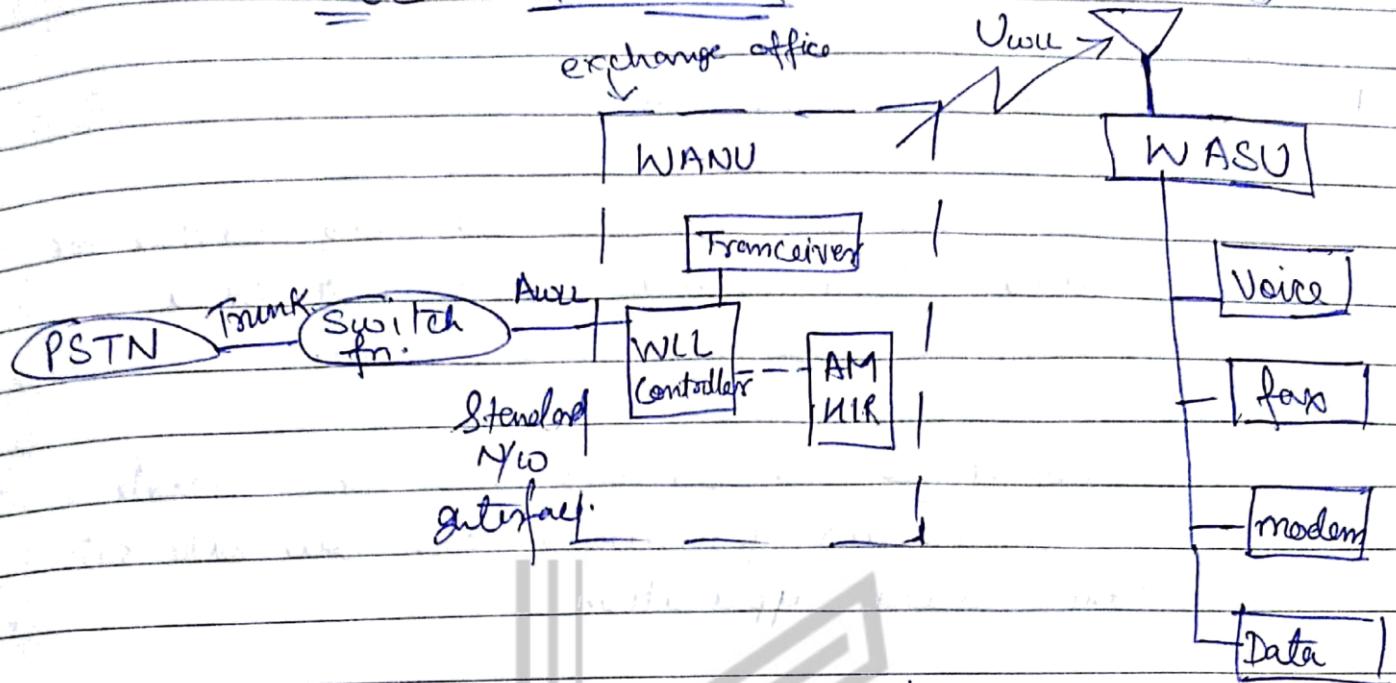
ADVANTAGE:

- Reduce operating & maintenance cost. The copper wire must be maintained periodically.
- Will technology is available in both downtown & suburban areas. Includes area with large populations.

FEATURES

- Audio Service
- Audio data Service (Internet Connection via Modem)
- FAX Services
- Information Services.

WLL ARCHITECTURE



1) WANU (Wireless Access N/w Unit)

↳ exchange office
↳ fax to data

1.1) Component

- ↳ Base station transceiver or Radio port
- ↳ Radio port control unit
- ↳ Access Manager
- ↳ ULR.

1.2) functions of

- ↳ Authentication
- ↳ Operation & maintenance
- ↳ Routing
- ↳ Billing
- ↳ Switching function
- ↳ transcoding of voice & Data

2) WASU (Wireless Access Subscriber Units)

↳ home
pass
@ home

- ↳ it supports Air interface
- ↳ The power supply for this is provided locally.

WLL TECHNOLOGIES

1) Satellite Based System

- ↳ These system provide telephony service for rural communities & isolated area such as Island.
- ↳ Specialized to support low cost mobile terminals primarily for low bit rate voice data application.

2) Cellular Based System

- ↳ These system provide high power, wide range, media subscriber density & median Ckt quality WLL services.
- ↳ used to expand basic telephony services.

3) Low tier PCS or Micro Cellular Based System

- ↳ These system provide low power, narrow range, high subscriber density & high quality WLL.

4) Fixed Wireless Access System

- ↳ Proprietary radio system designed specifically for wireless application.
- ↳ for rural area provide local telephone area directly from PSTN.

IEEE 802.15

↳ In 1999, a working group for the development of wireless personal area networks (WPAN) was established by IEEE.

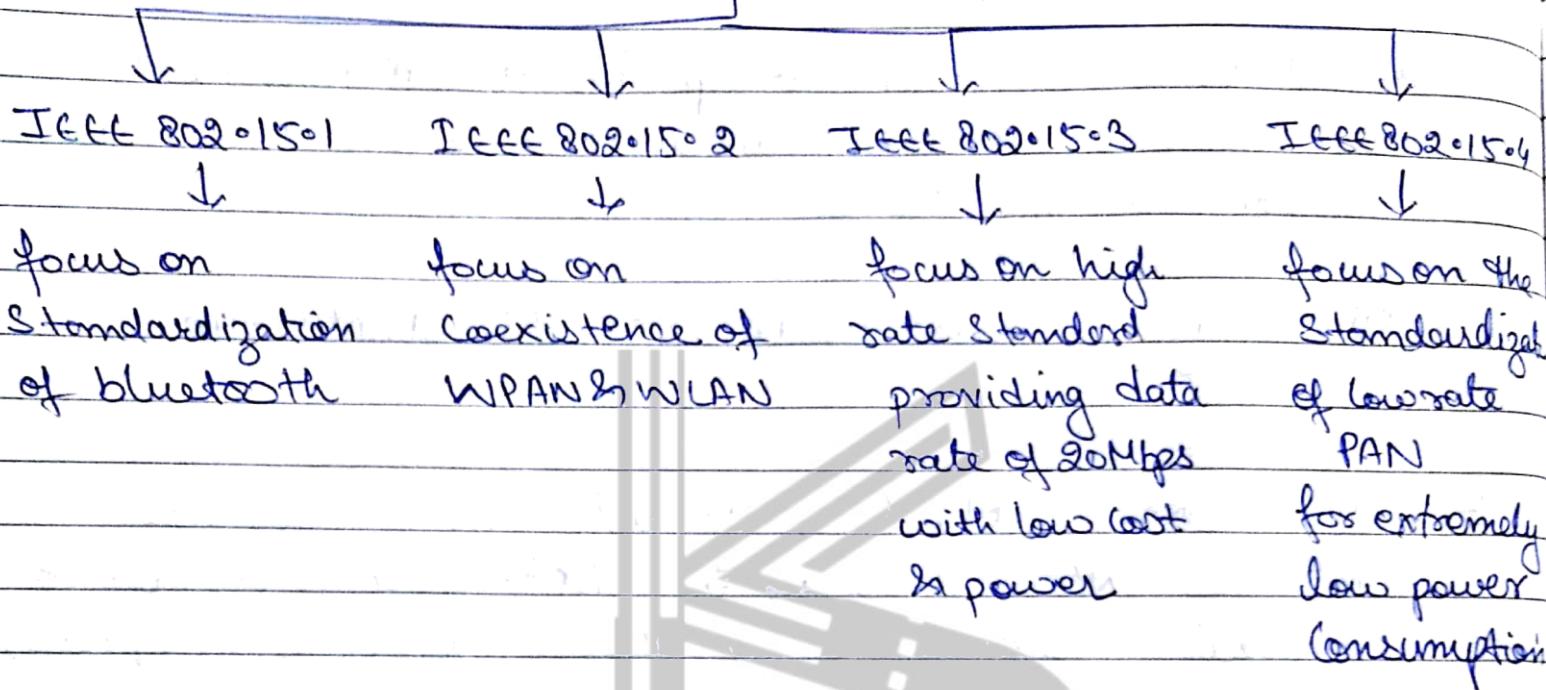
This group was called 802.15 WPAN Group

↳ The 802.15 Standard includes short distance wireless N/W used for Networking of portable & mobile communicating device such as Cellphone, printers, PDA, PC's etc.

↳ Functional Requirement

- Power management :- low current consumption
- Range :- 0 - 10 meters
- Speed :- 19.2 - 100 Kbps
- Small Size :- 0.5 Cubic inches without antenna
- low cost relative to target device
- Should allow overlap multiple N/W in the same
- Networking support for minimum 16 devices.

802.15 WPAN Group



KS ACADEMY

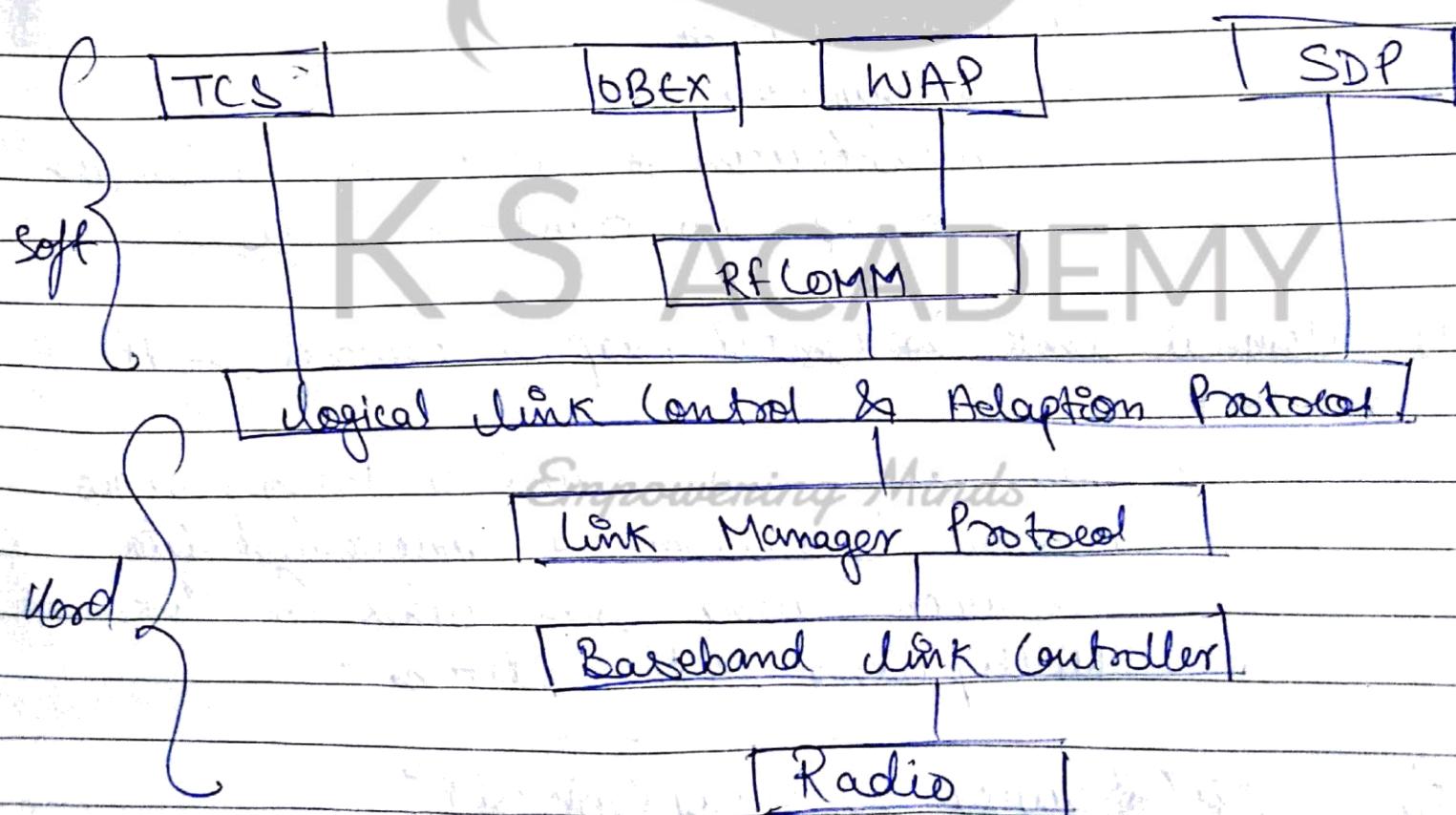
Empowering Minds

limitation → Slow transfer rate
 limitation → Distance limitation
 limitation → Interference
 (unlicenced 2.4 GHz band)
 invented by emerson(1994) Date

BLUE TOOTH

- ↳ first & most popular technology for short-range networking that is designed for integrated voice & data applications.
- ↳ it is an open specification for short range wireless voice & data communication to operate all over the world.
- ↳ it has lower data rate, but it has mechanism to support voice application

ARCHITECTURE



PROTOCOL STACK

Date _____

1) Bluetooth Radio Frequency (RF)

↳ This includes protocol which define physical links which can be synchronous Connection Oriented (SCO) or asynchronous Connectionless (ACL)

2) Baseband

↳ This protocol Enable the connection b/w the two units

3) LMP (Link Manager Protocol)

↳ The protocol perform Various fn. like

- 1) authentication
- 2) Encryption
- 3) negotiation of packet size for connection setup b/w Bluetooth devices.

4) Logical Link Control Adaptation Protocol (L2CAP)

↳ This work in parallel to LMP & provides various connection & connectionless data services along with other fn. like Multiplexing, Segmentation.

5) SDP (Service Discovery Protocol)

This protocol perform Various fn. such as retrieving the device information & service characteristics.

Apart from these Core protocol, Some other protocol also exist.

1) Telephony Control Protocol :-

- ↳ Include TCS-BIN & AT-Commands
- ↳ TCS-BIN → used as mobility Management & VideoCall Control.
- ↳ AT-Command → for fax service

2) Bluetooth Cable Replacement Protocol :-

- ↳ It include a serial cable RF COMM which can emulate RS - 232 Control by data Signals.

3) PPP

- ↳ This protocol used to support Internet access or WAP through UDP & TCP.

4) OBEX (Object Exchange protocol) :-

It is another important protocol which is used to exchange object such as Vcard & Vcalender using bluetooth.

wi-fi - LAN - few meters
↓
150m.

IEEE 802.16 → 1999

Date _____

WiMAX - MAN -

Worldwide Interoperability for microwave Access

↳ it is used to provide higher data rates with increased coverage also.

↳ it is (MAN) techniques

↳ data rate - 70 Mbps. Distance - 100 Km.

→ it can operate in Non-Line of Sight

↳ fast, convenient, cost effective

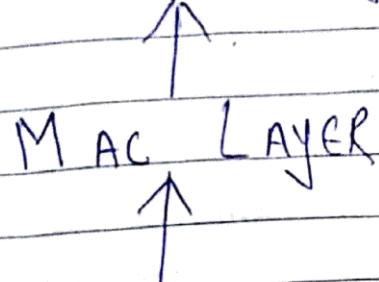
IEEE 802.1 → Bridge
IEEE 802.3 → Ethernet
IEEE 802.11 → Wi-Fi
IEEE 802.16 → WiMAX

K S ACADEMY

Empowering Minds

WiMAX ARCHITECTURE

CONVERGENCE LAYER



1) PHYSICAL LAYER

- Encoding & decoding of Signals
- Bit transmission/Reception
- it converts MAC layer frames into signal to be transmitted across air interface
- Traditional narrow band radio is used with conventional modulation scheme.
 - ↳ QPSK
 - ↳ QAM-16
 - ↳ QAM-64

2) MAC LAYER

- it provides an interface b/w higher transport layer & physical layer.
- it takes packet from upper layer, these packets are called MAC service data units (MSDUs)
↳ Organizing them into MAC protocol data unit (MPDUs) for transmission over air interface

- ↳ It is designed for Point to Multipoint applications.
- ↳ Is based on Collision Sense Multiple Access with collision avoidance.

CONVERGENCE SUBLAYER

- ↳ It provides any information or mapping of external N/w data, received through the CS Service Access point into MAC SDUs.
- ↳ Accepting higher layer Protocol Data Unit (PDU) from higher layers.
- ↳ Delivering CS PDUs to the Appropriate MAC SAP.

APPLICATIONS

- ↳ Video Streaming, VOIP, Video Conference, Surveillance & monitoring
- E - learning.

Empowering Minds

MOBILE AD-HOC NETWORK

- ↳ It refers to a self-configuring N/w which consist of mobile routers that are interconnected by low-bandwidth wireless link.
- ↳ Its vision is to support robust & efficient operation in mobile wireless N/w by incorporating a routing functionality into the mobile nodes.
- ↳ It can range from small, static N/w that are constrained by power source, to large scale, mobile, highly dynamic N/w's.

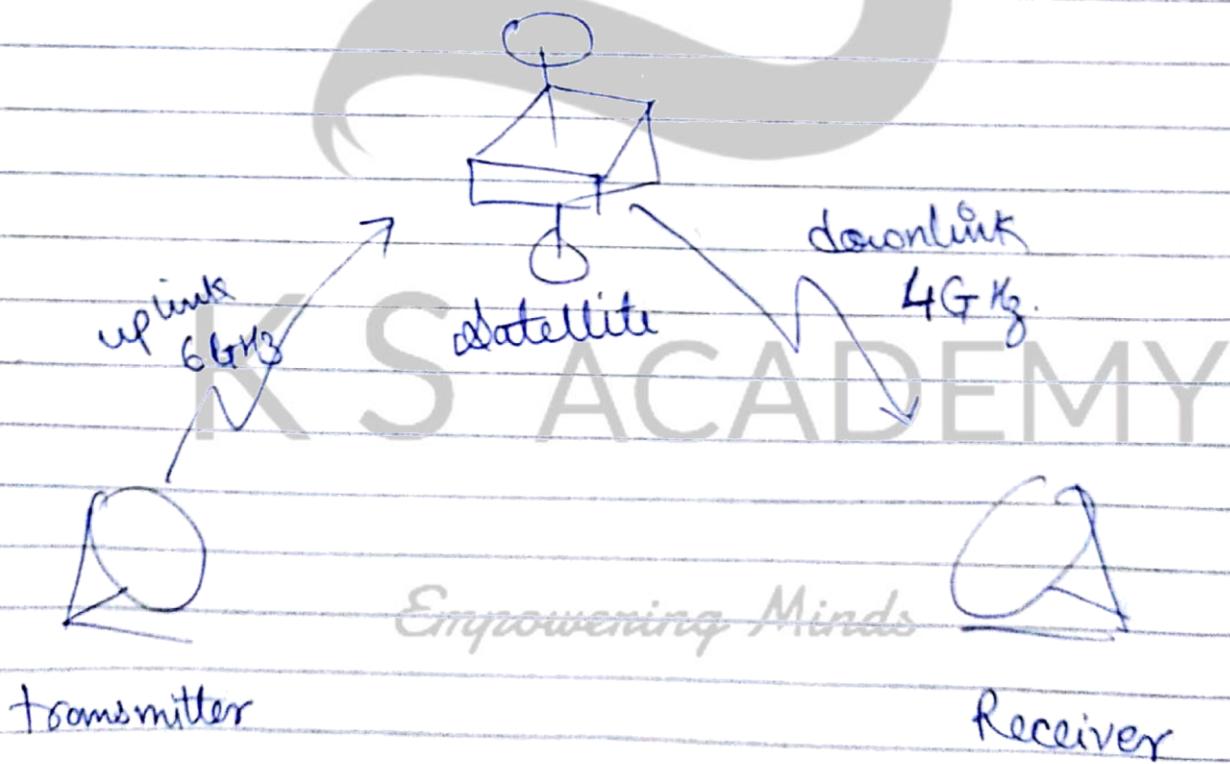
KS ACADEMY

Empowering Minds

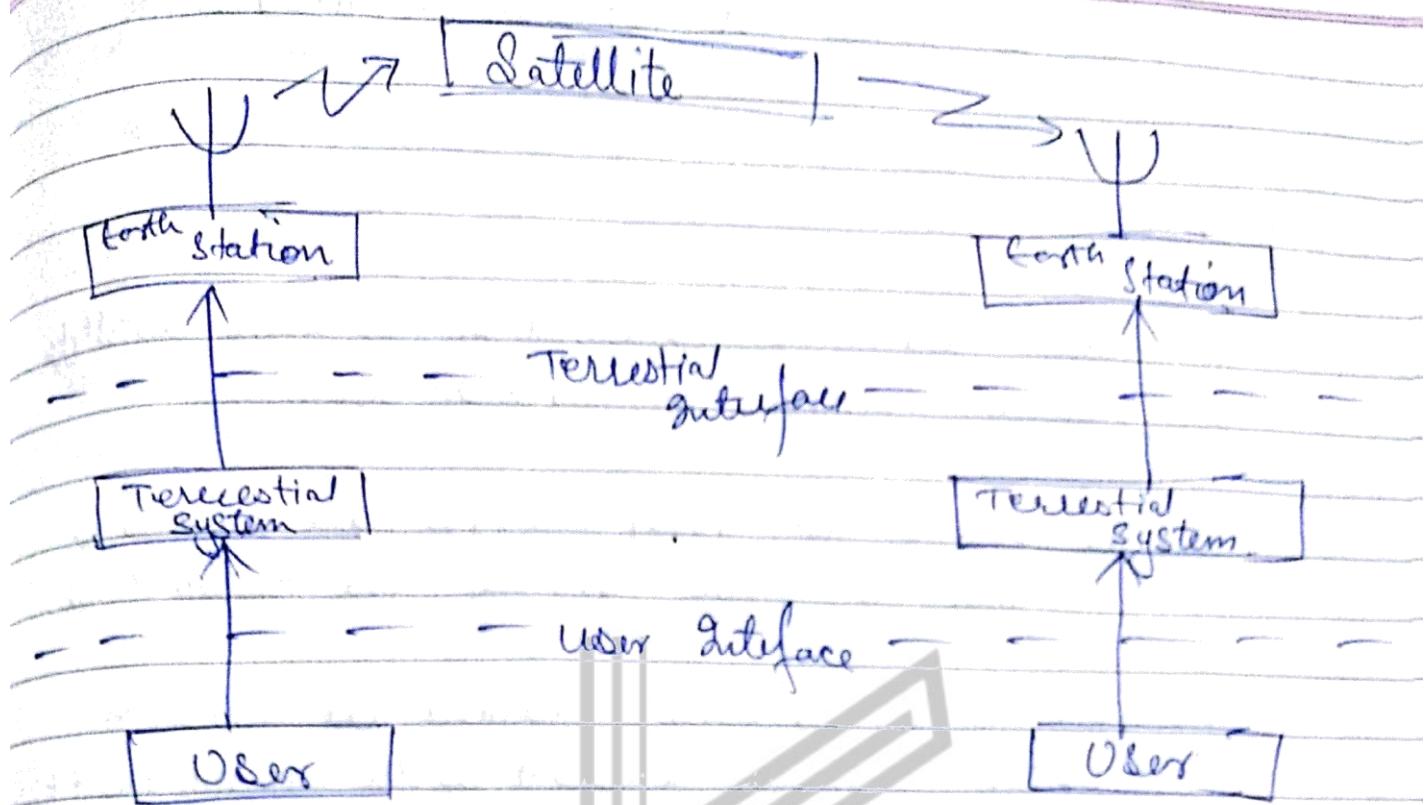
GLOBAL MOBILE SATELLITE SYSTEM

- ↳ A satellite is a physical object which revolves around the Earth at known height (orbit).
- ↳ One major application of satellite is communication. Several artificial satellites are launched into orbit for various purposes.
- ↳ Satellite communication provides more flexibility than submarine cables, underground cables & fiber optics system.

ELEMENTS OF SATELLITE COMMUNICATION SYSTEM



Empowering Minds



The user are connected to the Earth station through a terrestrial N/w which may be telephone switch as dedicated link to an Earth Station.

Q) Why the Downlink freq. is lower than the uplink freq.

(a) Output power amplifier of transponder

→ The final power amplifier in transponder generates more power at lower freq. than at higher freq.

(b) Effective area of an antenna $\propto \frac{1}{\text{Square of frequency}}$

(c) Path loss is less @ lower freq. than at higher freq.

CASE STUDIES OF IRIDIUM IN GLOBALSTAR

IRIDIUM

- first satellite constellation to offer satellite based Personal Communication Services.
- it provide fax, Voice, Paging & data services & aims to offer coverage the entire globe.
- Contains 77 Satellite . Named ~~as~~ IRIDIUM after element IRIDIUM with atomic no 77 in satellite evoking bohr's model of ~~atom~~ electrons orbiting around the Earth as its nucleus.
- The constellation has 66 active Satellite has 6 planes Spaced 30 degree apart with 11 satellite on Each plane.
- Each satellite can support 1100 phone calls at 2400 bits/sec. & weight abt 680 kg.

LEO → Low Earth Satellite

Date _____

GLOBALSTAR

- it is an american satellite company that operates on LEO satellite constellation for satellite phone & low speed data comm.
- it is a second generation constellation consist of 24 LEO satellites
- it is a provider of voice & data services
- Company product include mobile & satellite telephones, simplex, duplex satellite datamodem & satellite Antennae package.
- In 2007, they launched handheld satellite messaging & tracking personal safety.

KS ACADEMY

Empowering Minds



KS ACADEMY

Empowering Minds