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Subject: Transmission switching and signalling

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Dated :- 26 June 2020

Q1:- Define multiplexing. What are the types of multiplexing. Explain in detail?

Ans:- Multiplexing:-

- multiplexing is the process of combining multiple signals into one signal over a shared medium. if analog signals are multiplexed it is Analog multiplexing and if digital signals are multiplexed that process is digital multiplexing

- Types of multiplexing:-

- There are mainly two types of multiplexing namely analog and digital. They are further divided into FDM, WDM, and TDM

- Analog multiplexing

- The analog multiplexing technique involes signal which are analog in nature. The analoge signals are multiplexed according to their Freguncy (FDM) or wavelength (WDM)

- Frequency Division multiplexing (FDM)
- in analoge multiplexing the most used technique is Frequency Division multiplexing. This technique uses various Frequency to combine streams of data For sending them on a communication medium as a ~~signal~~ single signal.

- Wavelength Division multiplexing (WDM)
- wavelength Disision multiplexing is an analog technique in which many data streams of different wavelength are transmitted in the light spectrum if the wavelength ~~are~~ increases, the Frequency of the signal decreases.
- Digital multiplexing:
- The term digital represents the discrete bits of information. Hence the available data is in the form of frames or packets which are discrete.
- Time Division multiplexing (TDM)

.in TDM, the time frame is divided into slots. This technique is used to transmit a signal over a single communication channel with allotting one slot For each message

Q2:- VoIP. Explain w.r.t basic Functions, voip components Also Explain how to overcomes the challenges. What is role of FXO and FXL in voip?

Ans:- VoIP and its basic Functions:-

- VoIP is short for voice over internet protocol voice over internet protocol is a catagory of hardware and software that enables people to used the internet as the transmission medium for telephones call by sending voice-data in packets using ip rather than by traditional circuit transmission of the PSTN.

- VoIP Components:-

- The four most important voip components are

1) Signaling Gateway controller.
2) media Gateway
3) media server
4) Application server.

overcome the challenges of voip.

- **Latency**:: latency is the time taken for a packet to arrive at its destination
  - packet switching over head
  - congestion
    - latency may result in voice synchronization problems.

- **Jitter**:: is the delay experienced in receiving a packet when a packet is expected to arrive at the end point at a certain time.

- **Bandwidth**::
  when bandwidth is shared between voice and computer data certain bandwidth may have to be allocated for voice communication on a network.

- **packet loss**::
  - packet loss is unavoidable. it can be minimally tolerated in voice transmission - it should not in the first place. distort the audio.

scalability::
Ability to add more telephony equipment as the company grows - network bandwidth and other issues may have an effect on scalability.

Security:- As voip uses the internet. For example it is vulnerable to the same type as security risks
- Hacking
- Denial of servic
- Eavasdropping

- Features:- IP telephony need to match and in the long run, exceed the features provided by the PSTN
  - Call waiting
  - Three way calling etc

- interoperability:- ip telephony equipment manufactured by different vendors must be able to talk to each other. standardized protocol are needed.

- Migration cost:- The cost of migrating from Legacy PBX to ip PBX.

- Role of FXO and FXS:-

These ports are used to allow you to connect your analog phones to a VOIP system. An FXS port helps you connect your analog Fax machine to your VOIP phone system and FXO port enables you to use analog telephone lines with your VOIP phone system

FXS stand For = Foreign Exchange Station
FXO stand " " " Office

Q3:- what is PDH? name some of its ---------- byte and Frame?

Ans:- PDH:-

The plesiochronous digital hierarchy is a technology used in telecommunication networks to transport large quantities of data over digital transport equipment such as Fibre optic and microwave radio systems

- name of its some limitions :-

0 Accesing lower tributary requires the whole system to be de-multiplexed

- The matimum capacity For PDH is 566 Mbps which is limited in bandwidth
- Tolerence is allowed in bit rates
- PDH allows only point-to-point configuration
- PHH does not support Hub.

etc

- Advantages of SDH/SONET
- SDH:-
- Synchronous networking and SDH supports multipoint networking - capabillity of transporting existing PDH signals Easy growth to higher bit rates which enhances the administration and maintance process it is caple of transporting broadband signals.
- SONET:-
- Better network reliabillity • lower equipment invest

Better connectivity between different Telecom caries.

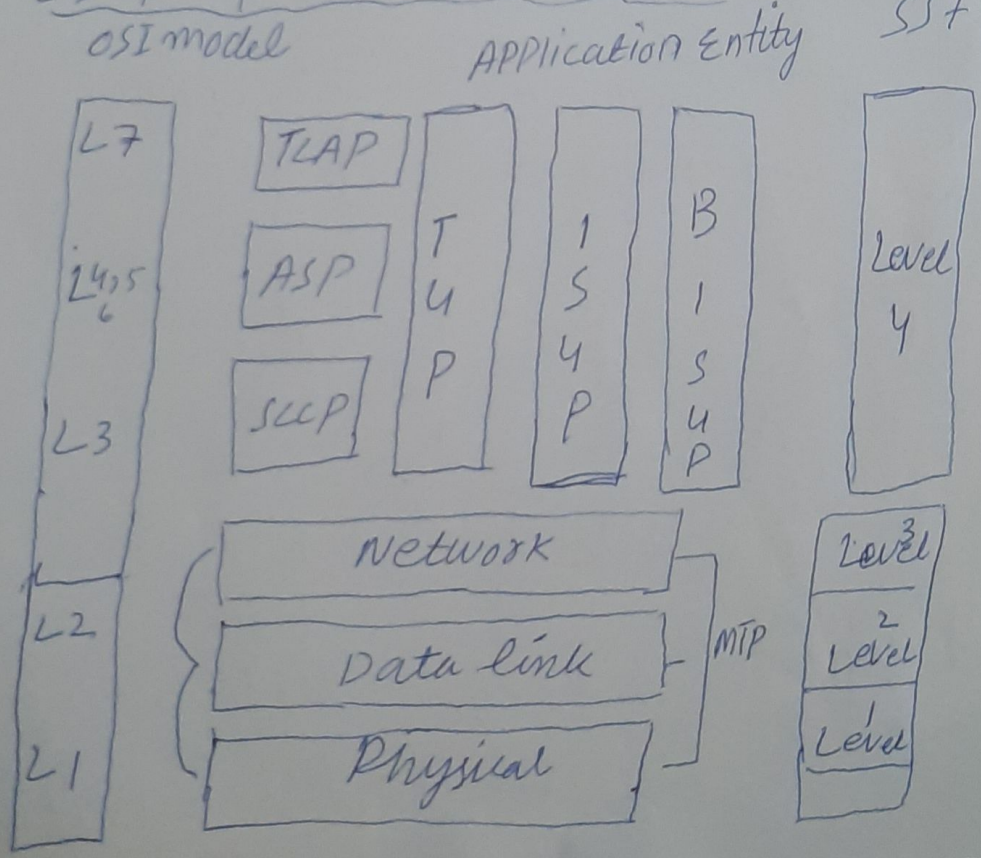
- Path section designation For SDH:
- in sonet/SDH system a strong disignation of level of overhead are kept
- section is lowest level
  - repeater to repeater
- line is middle layer
- path is top/longest layer
  - from entrance to SONET system to exist of SONET system.

Q4A:- Different btw in-band and channel associated signalling?

Answer:- in-band signalling applies only to channel associated signalling (CAS). in common channel signalling (CCS) separate channels are used for control and data as opposed to the shared channel in CAS, so all control is out-of band by defination.

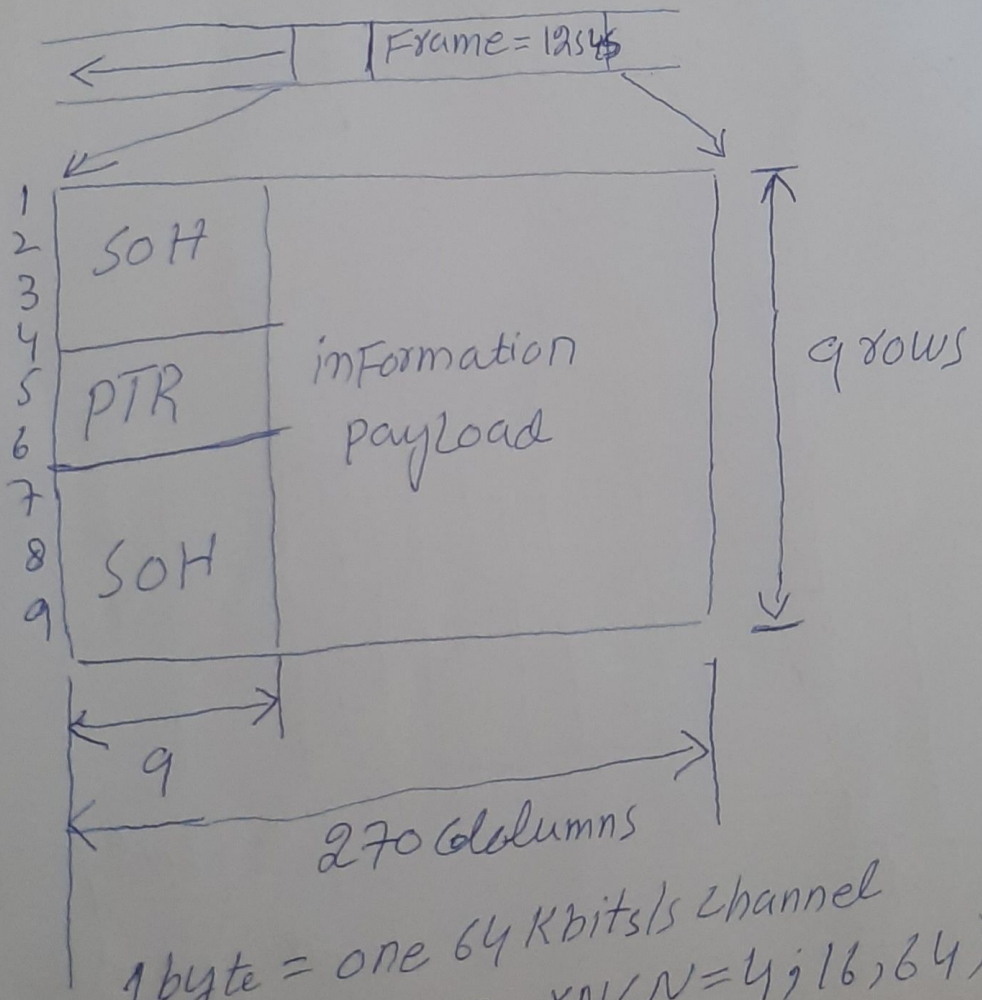
Q4B:- Draw the SS7 protocol stack. show and brief the signalling unit structure of MSU in a telephone signalling network(SS7) show step by step signalling:-

Answer:- SS7 protocol stack



- SDH Frame and capacity For byte and Frame :-

- SDH Frame consists of rows and columns SDH Frame transmitted in byte wise pattern in Just $125\frac{1}{2}$ us From top left corner till bottom right corner in the payload of SDH frame data bits mapped into payload container and some stuffing bits are added which do not contain any information.

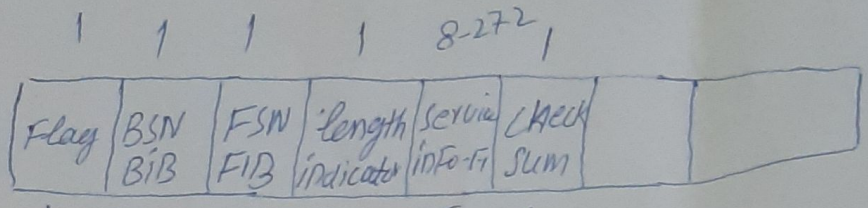


1 byte = one 64 Kbits/s channel

STM-N = 9 x 270 x N (N = 4, 16, 64)

STM 1 rate = 9 x 270 x 8 x 800 = 155 Mb/s

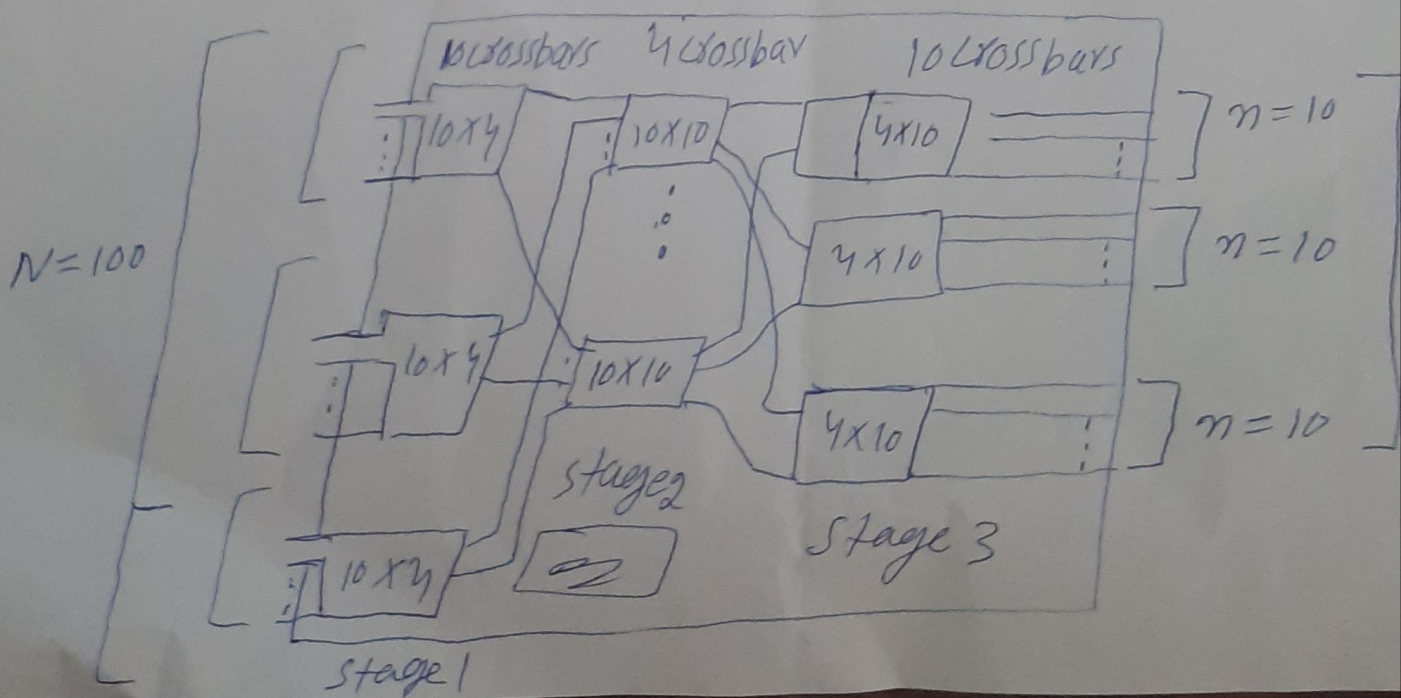
- Signalling unit structure of MSU in a telephone signalling network:-



- MSUs are work Horses of SS7
- Functionality lies in
  - Servile information octet (SIO)
  - Signaling information field (SIF)

Q5:- We need a three stage space division ---- stage.

(A) Show configuration diagram:-



(b) The total number of crosspoints = $10(10\times4)+4-(10\times10)+10(4\times10)=1200$

(c) only Four simultaneous connections are possible For each crossbar at first stage. This mean that the total number of simultaneous connections is $4*10=40$

(d) According to the clos criterion

$n=(N/2)^{1/2}$

$K>2n-1$

crosspoint $\geq 4N[2N]^{1/2}-1]$