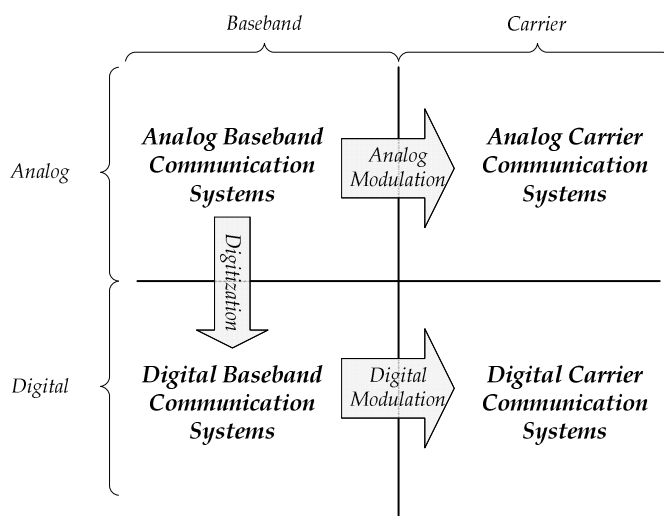


Lecture 17: Time Division Multiplexing and Telephony

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EE421: Communications I. For more information read Chapter 6 in your textbook or visit <http://wikipedia.org/>.

Modulation and Digitization



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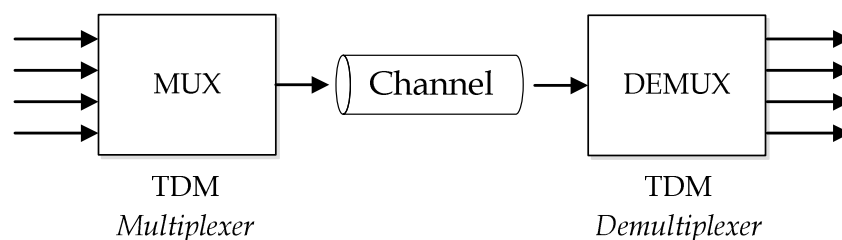
2

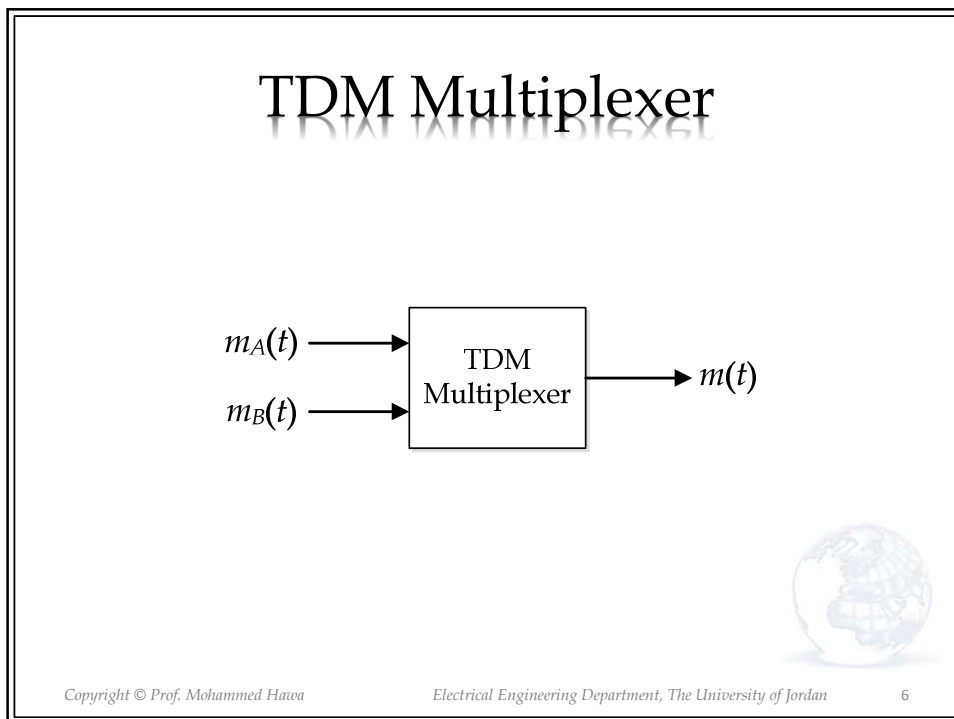
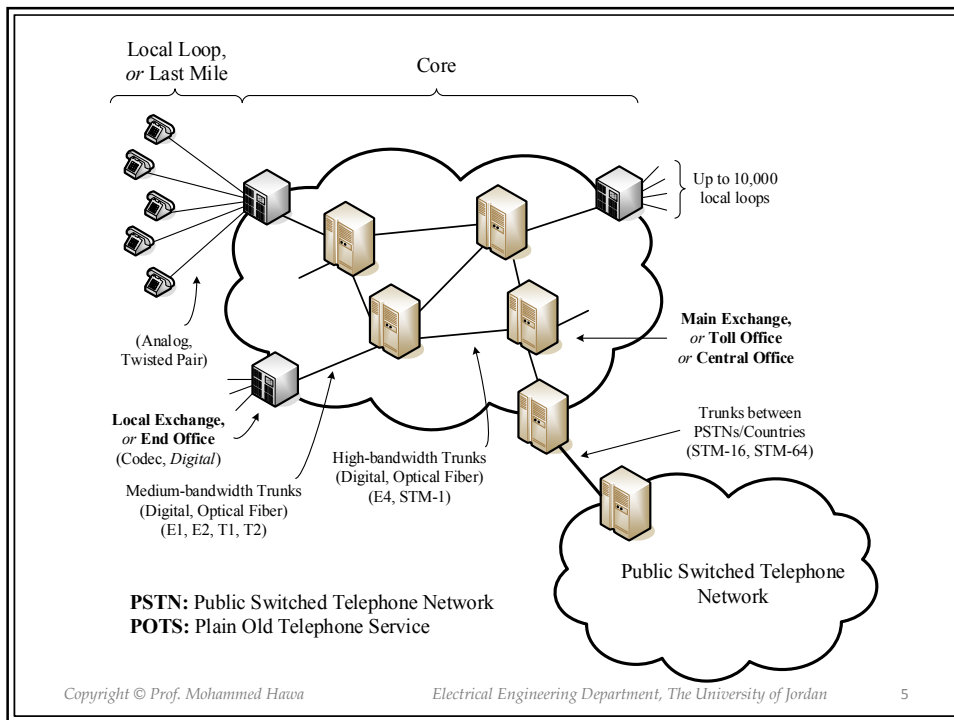
Multiplexing: TDM

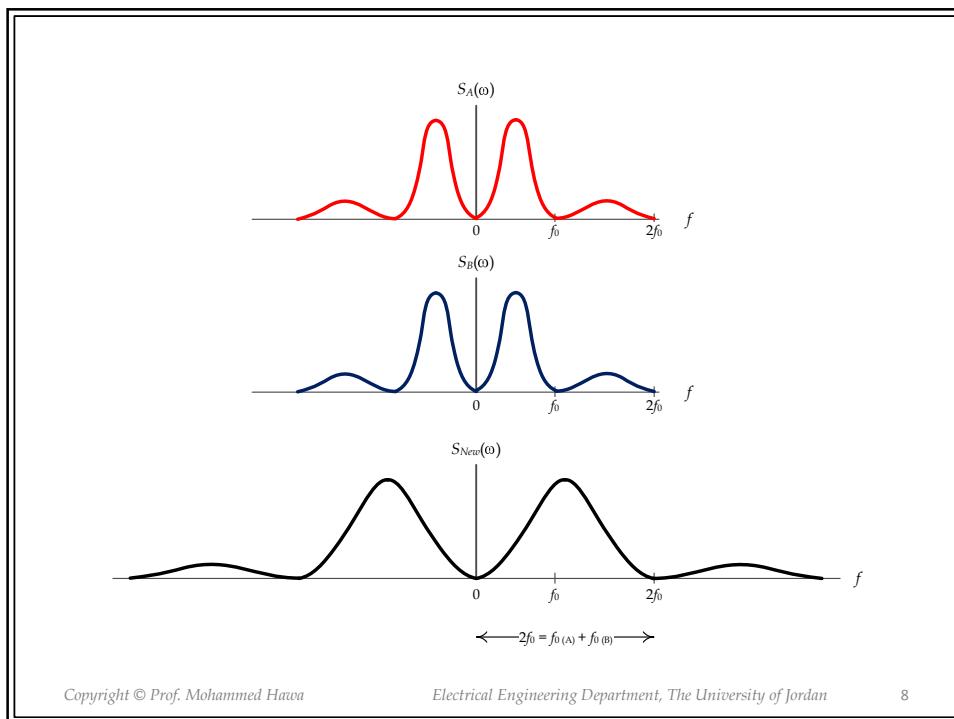
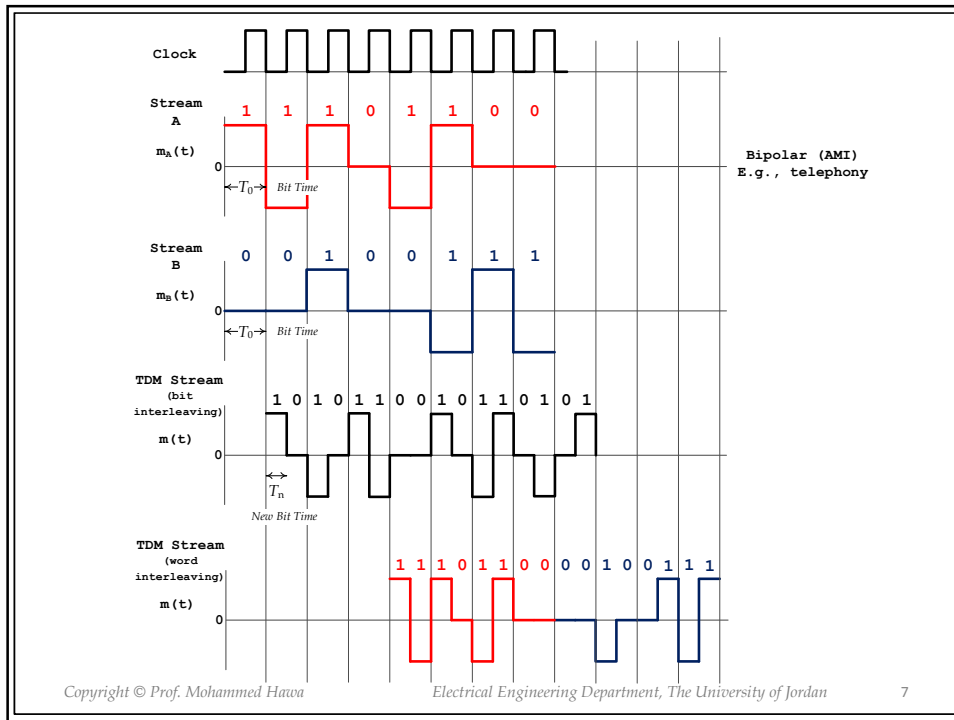
- Time Division Multiplexing (**TDM**) is a process that allows the transmission of several signals over the same baseband channel.
- Achieved by interleaving the bits of the different signals using different **time instants**.
- The receiver isolates one signal from the rest using a **time demultiplexer**.
- TDM is *not* limited to PCM or telephony.



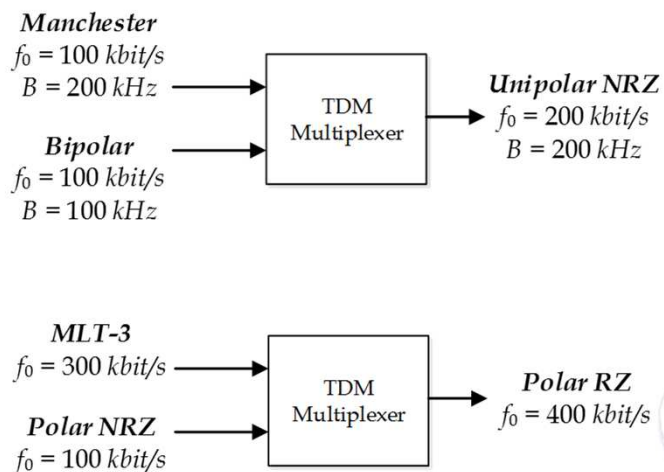
Multiplexer/Demultiplexer







TDM works on bits *NOT* voltages!

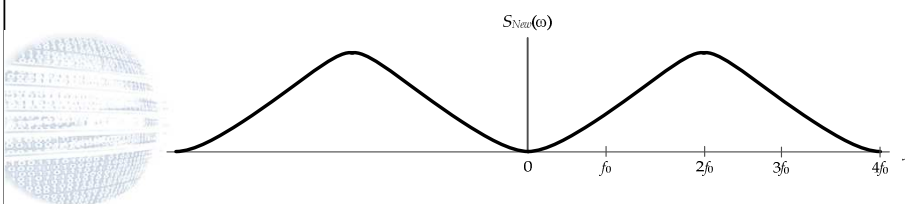
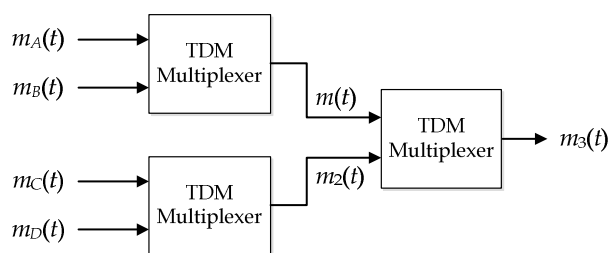


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Hierarchical TDM Multiplexing

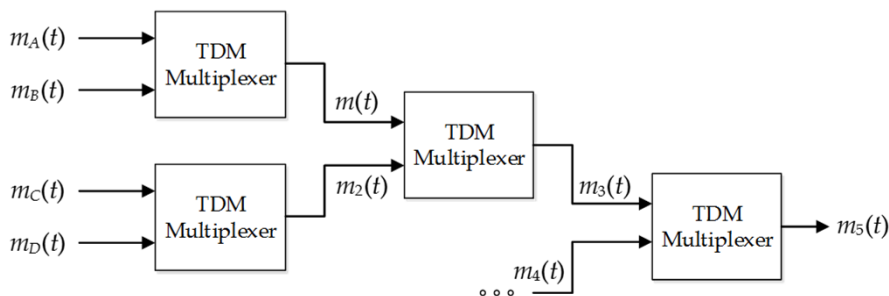


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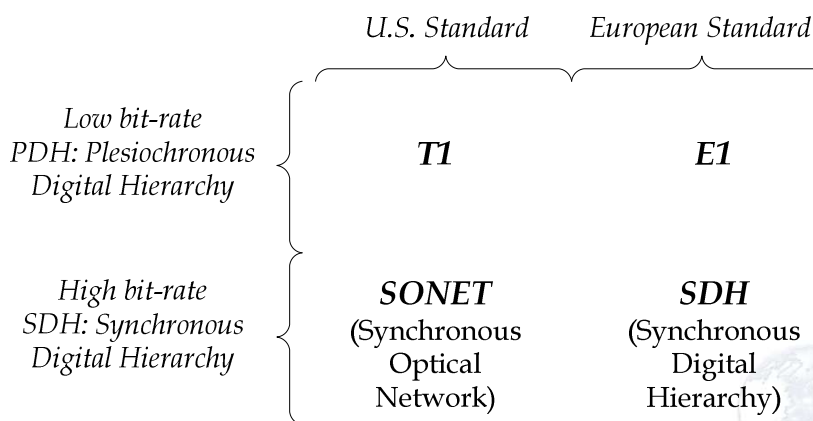
10

Any number of steps!

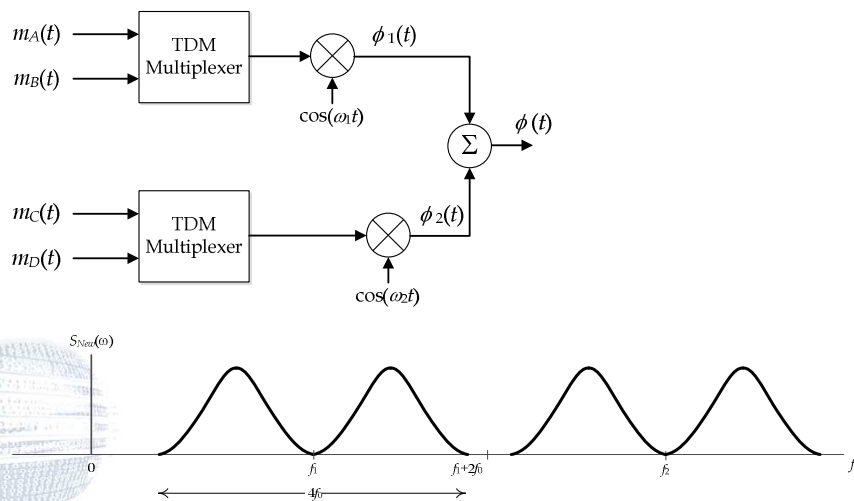


- *Homework:* Show the hardware blocks at the receiver side (Aqaba).

TDM Hierarchy Standard (Tel.)



TDM combined with FDM



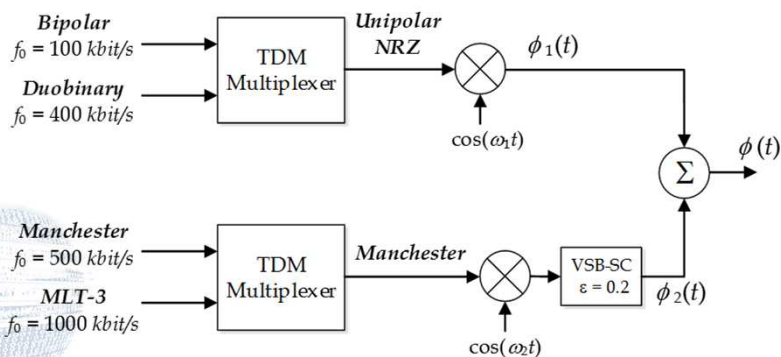
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Homework

- Sketch the PSD for the output signal $\phi(t)$ below.
- Show the block diagram of the receiver.



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Examples on TDM with FDM

- ATSC and DVB digital TV broadcasting systems.
 - Anywhere between 3 and 12 TV stations are multiplexed in one 6 MHz or 8 MHz channel using TDM.
- GSM cellular communications system.
 - Every 8 phone calls are combined using TDMA into one 200 kHz channel.
 - The 200 kHz channels are multiplexed using FDMA.



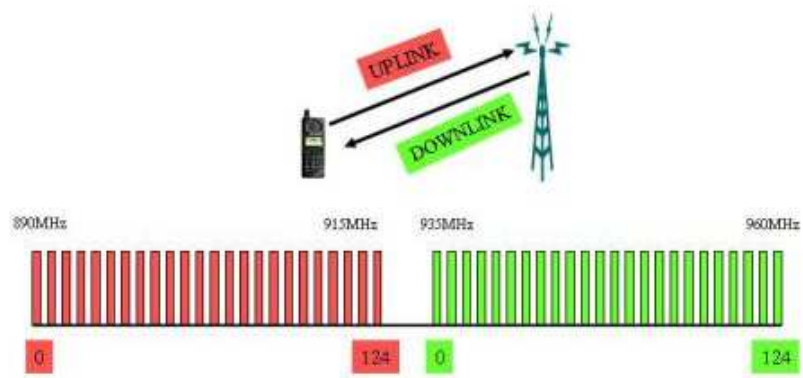
Homework: Satellite Receiver

Satellite	Frequency	P...	Symbol Rate	FEC	Type
	10719	V	27500	3/4	S
	10723	H	29900	3/4	S
Transponder	10758	V	27500	3/4	S
	10775	H	28000	3/4	S
DiSEqC	10796	V	27500	3/4	S
	10830	H	3333	3/4	S
Device	10834	V	27500	3/4	S
	10853	H	27500	3/4	S
Dish Alignment	10873	V	27500	3/4	S
	10892	H	27500	3/4	S
Mobile Settings	10911	V	27500	3/4	S
	10930	H	27500	3/4	S

IX@SOFT 12245,H,27500 Add Delete



GSM uses TDMA/FDMA/FDD



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