Communication Basics

1) Protocol
   - Hardware interface
   - Frame format
   - characteristics

2) standerd protocol (can-LIN)

Protocol Characheristics

1) Hardware medium

	wired	wireless
speed	Fiber	overlight / LiFi
cost	(↑)	Free maintaince (1)
safety	↑ (1)	↓
security	↑ (1)	↓
mobility	↓	↑ (1)
Noise Immunity	↑ (1)	↓

ciphering Algorithems

IR Reciever

HMZ

2) Data transmission

- serial
- Parellel

Parellel problems

1) Data skew

environment

Trans-Rate ↑ Skew ↑

2) cross talk

Trans-Rate ↑ cross talk ↑

3) complex / high cost

3) synchronization

1 HZ, 1.2 HZ, 2 MHZ, 1.02 HZ, 1 HZ, .98 HZ, 1 MHZ

1 bps = 1 HZ

Bitrate no of bits per second

bps

synchronus
- Share clock signal for the commication
- Clock (SPI) (I2C)
- In frame synch. (LIN)

Before data, send clock synch.

Asynchronus (UART) (Can)
- Every node has its own clock system
- communication clock is driven from the system clock for each node

problems
- clock derivation may occur.

0 1 0 1 0 1

1 Ton 1 T off

MC1	1ms	1.9ms
MC2	1.1ms	1.5ms
MC3	0.9ms	.8ms

4) data direction
- simplex
- half duplex
- full duplex

5) N_2N relation
- peer to peer
- master slave
  - SMSS
  - SMMS SPI LIN
  - MMMS I2C
  - SMMS CAN CAN FD

6) Through put

$$\frac{\text{no of data bits}}{\text{Frame size}} \%$$

UART

universal synchronus Asynchronus Reciver Transmitter

1- HW interface

MC(1) Tx Rx — MC(2) Tx RX

2-char.
1) wired
2) Full duplex
3) serial
4) peer to peer
5) A synchronus

frame format

Sb | 8 OR 9 | stopbits 1 OR 2

data 8 OR 9 bit, Parity 1 bit

startbit: 1 bit

$$\text{minTP} = \frac{8}{12} = 67\%$$

$$\text{maxTP} = \frac{9}{11} = 82\%$$

Parity
- even parity: 1, 0
- odd parity: 0, 1

data: 10101, 01001 10

data bits: 1 0 0 1 0 1 0 0 → 0 0 0 1 0 1 0 0 → 0 0 0 1 0 0 0

even parity: 1, 0, 1

Speed

bit rate bps → bit Per second

Byte rate Bps → Byte per second

Baudrate → Baud per second

ex: 5bit

Baudrate = bit rate

Baud = bit