

Error Correction

- Error detecting codes
 - Correction by retransmission of erroneous blocks
 - If few errors, very low overhead
 - Most common approach to error correction in data communications
- Error correcting codes
 - Very high overhead with short data blocks
 - Longer data blocks can have multiple errors
 - Used when retransmission impossible or impractical
 - Also used when error rate rather high
 - Error correcting codes for long blocks, with multiple errors exist and are used (trellis encoding)

Error Correction with sliding window

Data blocks in sliding window can be transmitted without waiting for an acknowledgment. Receiving acknowledgments pushes window forward.

Go Back n window management

chap 1.4 communication theory

Data transmission fundamentals

parallel vs serial

parallel

storage in computers

- where flat cables carry 8,16,32 or even 64 bits in parallel
- clock : tell a receiver then the state of the data lines represents valid information
- very difficult to ensure equal propagation (传播) speeds on different channels

serial

- avoid the limitations of long distance
- clock: inform the receiver when the state of the data is meaningful

synchronous vs asynchronous

synchronous

- DTE: data terminal equipment
- DCE: data communication equipment
- phase modulation

merge clock and data in DCE sender and extracts the clock and provide the DTE with separate data and clock equipments

asynchronous

the DCE just transmit data bits, provisions for clock synchronization need to be included in the data

DTE include some information to enable the receiving DTE to recover the correct timing

this is typically used when transmission is based on a carrier with a frequency that can not easily be related with the data clock ??? for instance : optical transmissions —> the frequency of light wave being several orders of magnitude higher than fastest data clock presently in use

start-stop synchronization : designed for electro-mechanical terminals ???

sender and receiver agree about the transmission rhythm—>time is precisely known by both communicating partners

nothing to send—> high state, begin to send—>changes the state of the line for a duration ,start bit. —>stop bit,

external PC modems

analog vs digital

- analog : the signals carrying information can degrade with transmission errors as a consequence
- digital : considered as errorless

shannon's theorem

Eye diagrams

Transmission error correction

redundant encoding

- error detection codes
- error correctionScreen Shot 2017-01-04 at 20.41.34

sliding window error correction

- in most transmission systems ,when a transmission error is detected, the corrupted data block is dropped
- the simplest way for managing retransmissions consists in receiver sending a ACK

encoding and modulation

encoding

- straight binary code
- manchester code

Modulation Techniques

- AM
- FM
- PM

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