

# xBASE-T1 Auto-Negotiation

IEEE 802.3cg 10 Mbps Single Pair Ethernet Task Force  
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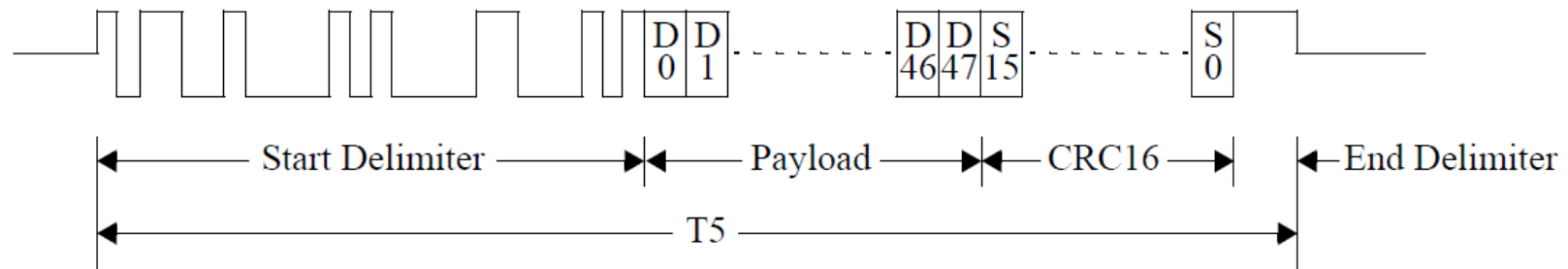
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## Auto-Negotiation for single differential-pair media

- ▶ 802.3bp Clause 98: Auto-Negotiation for single differential-pair media
  - Exchange information between two devices that share a link segment and automatically configure both devices to take maximum advantage of their abilities.
  - Common synchronization time between two devices prior to link training.
    - Starts the 100 millisecond timeout for link training
  - Advertise enhanced modes of operation and to detect corresponding enhanced operational modes that the other device may be advertising.
  - Standardized mechanism to restart link training in case PHYs cannot link up on initial attempt.
    - Escape path from lock up due to any reason
    - Eliminates incompatible vendor dependent re-try implementation
  - Completes negotiation in less than 1 millisecond

## Differential Manchester Encoded Pages

- ▶ Differential Manchester encoded (DME) pages.
  - DC balanced signal.
  - Polarity insensitive
  - Simple and robust decoding
  - Half-duplex over the single twisted-pair copper cable.
  - 48-bit data, 16-bit CRC

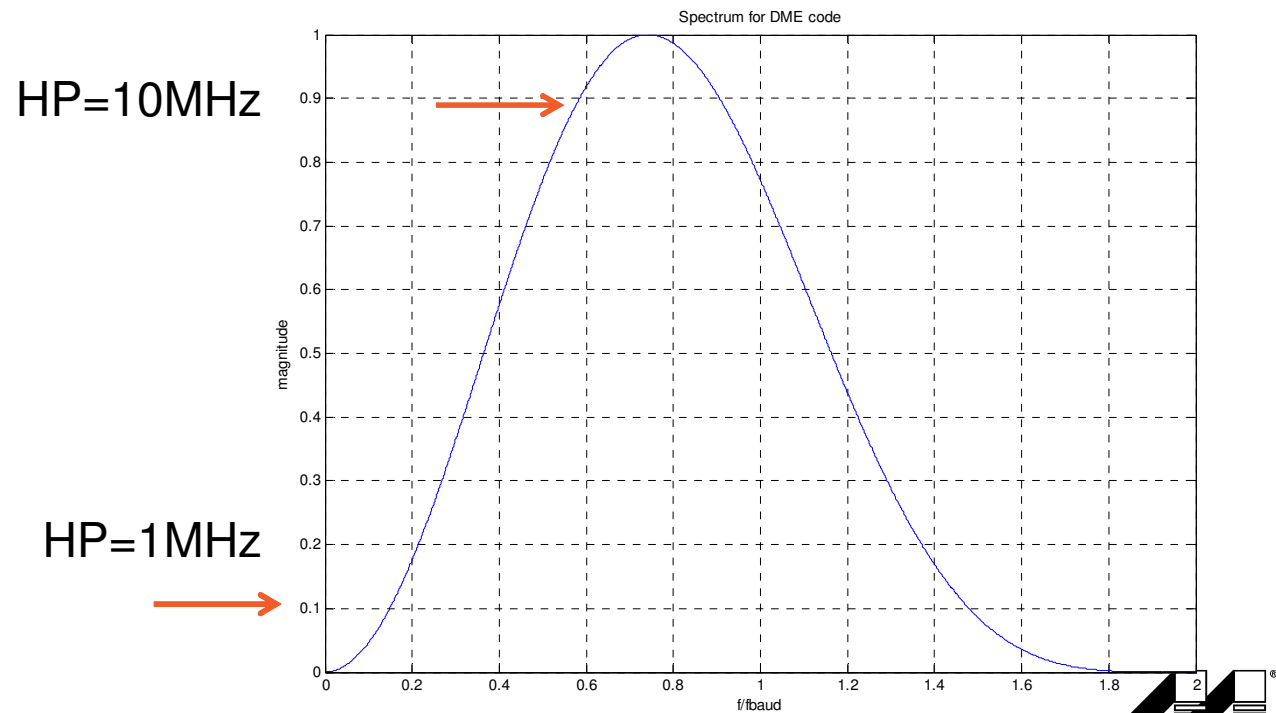


## DME Message Pages

- ▶ Base Page message – 48 bits
  - 100BASE-T1 ability
  - 1000BASE-T1 ability
  - Master / Slave configuration
  - Flow control ability
  
- ▶ Optional Next Page messages – 48 bits
  - Organizationally Unique Identifier Tagged Message - exchange OUI and user defined message
  - AN device Identifier Tag Code - exchange AN device identifier tag code and user defined message

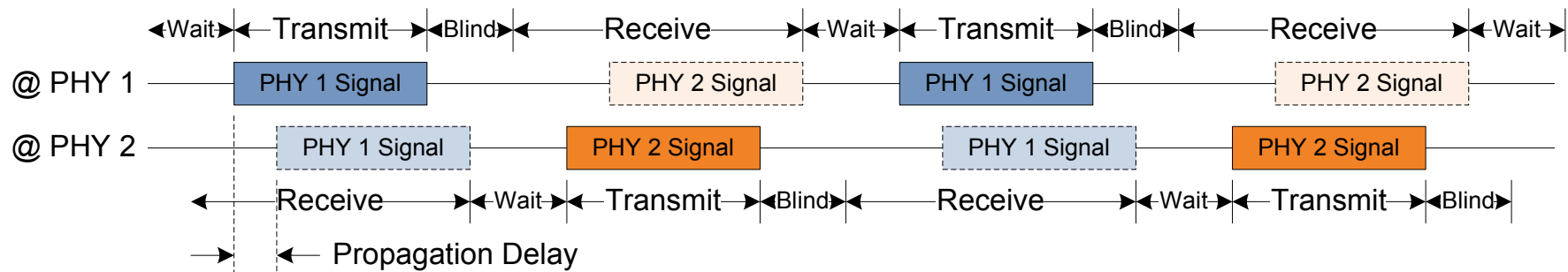
## DME Signaling

- ▶ 16 2/3 MHz symbol rate - 33 1/3 MHz clock
  - At least one transition per symbol
  - within the pass band of 100M and 1G
    - Below the ~33 MHz bandwidth of 100M
  - common clock divider from 100M and 1G
  - above the 1MHz and 10MHz high pass corners for PoDL



## Half Duplex Over Single Pair

- ▶ PHYs take turns sending and receiving DME pages
- ▶ Blind period to avoid seeing echo from self
- ▶ After page received Wait (Silent) period needed since link partner may be in Blind period
- ▶ Timers were defined to support propagation delay for ~200 meters



see Lo\_3bp\_04\_0314.pdf

## Potential Issues for 10M SPE

- ▶ Half Duplex Timers designed for up to ~200 meters
- ▶ 16 2/3 MHz symbol rate - 33 1/3 MHz clock
  - May be out of band for 10M SPE
- ▶ Insertion loss of 1000 meters
  - will degrade DME detector performance

# THANK YOU