

Implementing cooperative link diagnostic

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What could possibly go wrong?!

- Industrial use case:
 - 10Base-T1L: 1000-2000 meter copper twisted pair.
 - Mechanical and thermal stress
 - Reducing diagnostic time may save time, money and maybe lives
- Automotive
 - This type of diagnostic depends on autoneg support which is mostly not used in automotive.



Why do we need it?

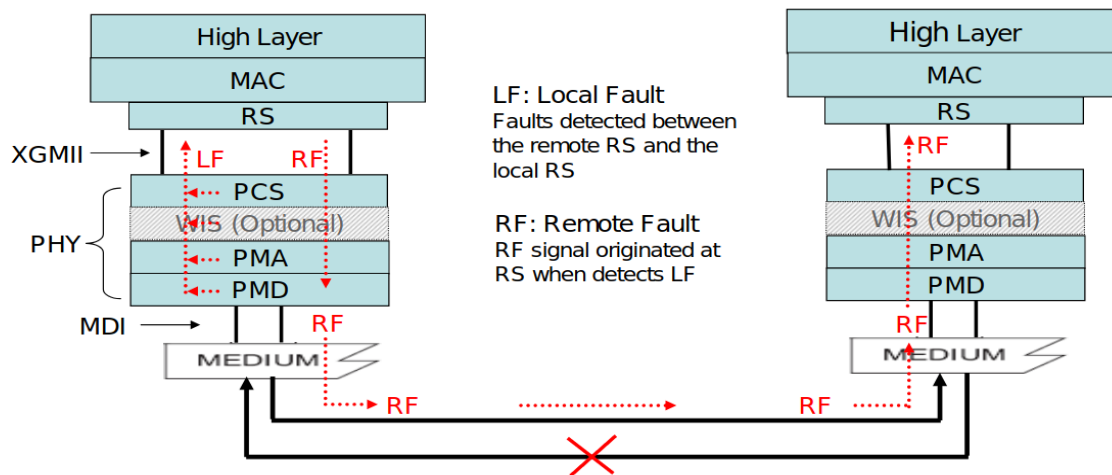
- We have different types of broken:
 - Cable is completely separated/damaged. There are no more signals, no Autoneg. We can easily run time domain reflectometry (TDR)
 - The cable is partially damaged or OK, but something else is wrong. TDR is disturbed by autoneg messages and attempts to create the link by the link partner.



Cooperative cable diagnostic

PHY Monitoring in 802.3ae

- **There is a Link Fault Signaling mechanism in 10GE**
 - Reside in Reconciliation Sublayer (RS)
 - To monitor link status between local RS & remote RS and perform link status notification
 - Sublayers within the PHY are required to detect faults that render a link unreliable



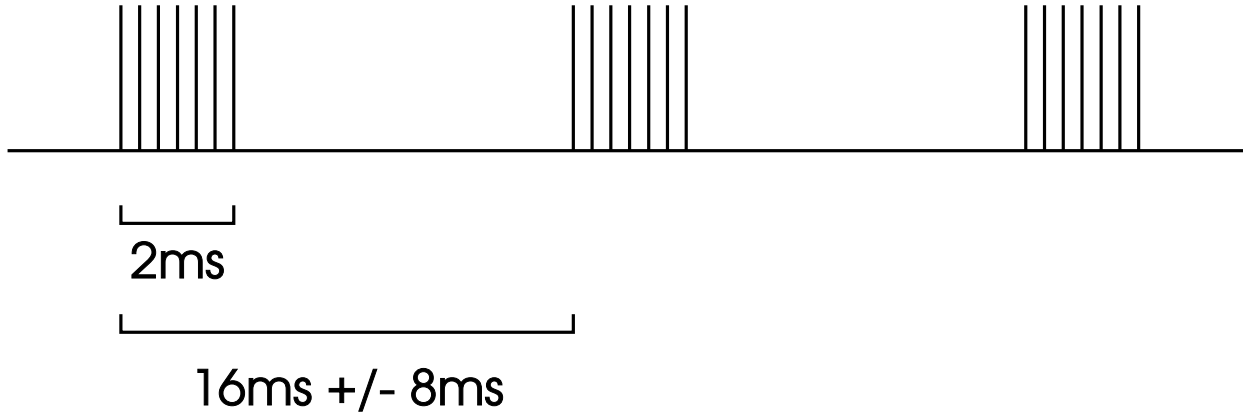
How this work

- Autonegotiation pulses run at lower frequency and less affected by partially damaged twisted pair.
- IEEE 802.3 defines standard to communicate by using autoneg pulses.
- How about to run IP over autoneg? ;)

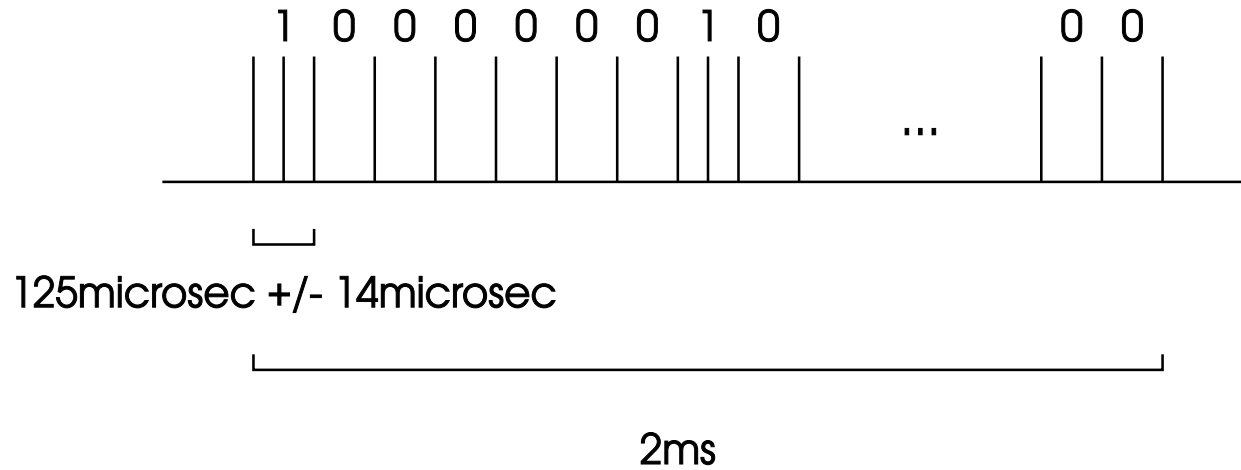


Autoneg FLP (Fast link pulses)

max 33 pulses



FLP: Link code word



Link code word

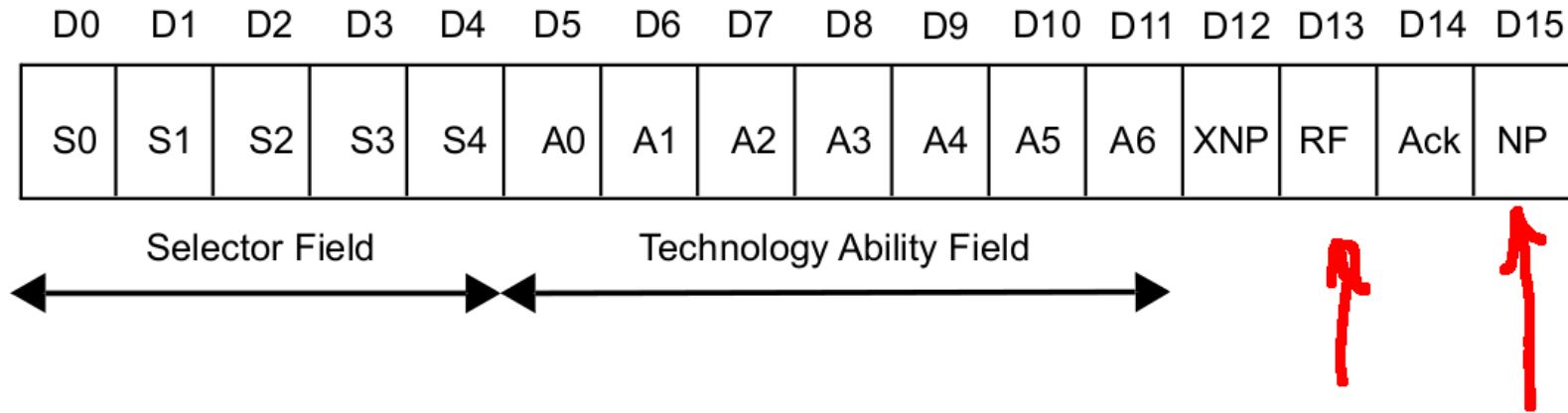


Figure 28-7—Base Page encoding



Weitere pages

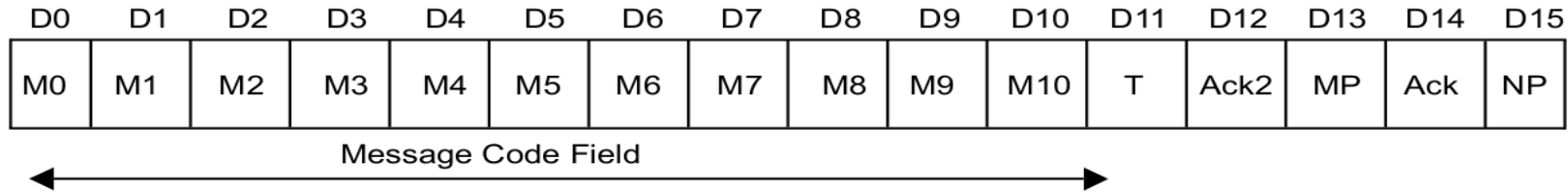


Figure 28–11—Message Page encoding

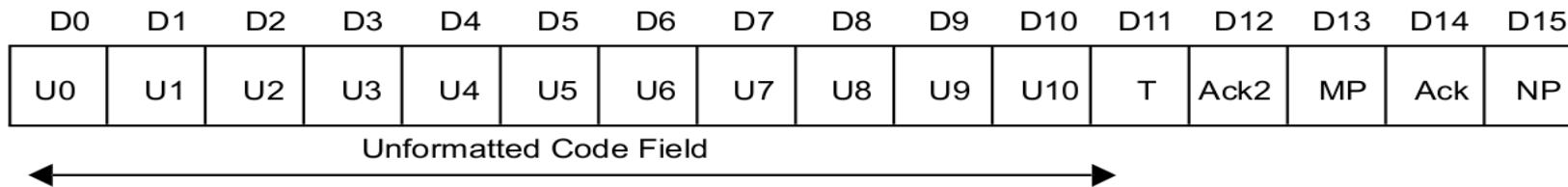


Figure 28–12—Unformatted Page encoding



Extended pages

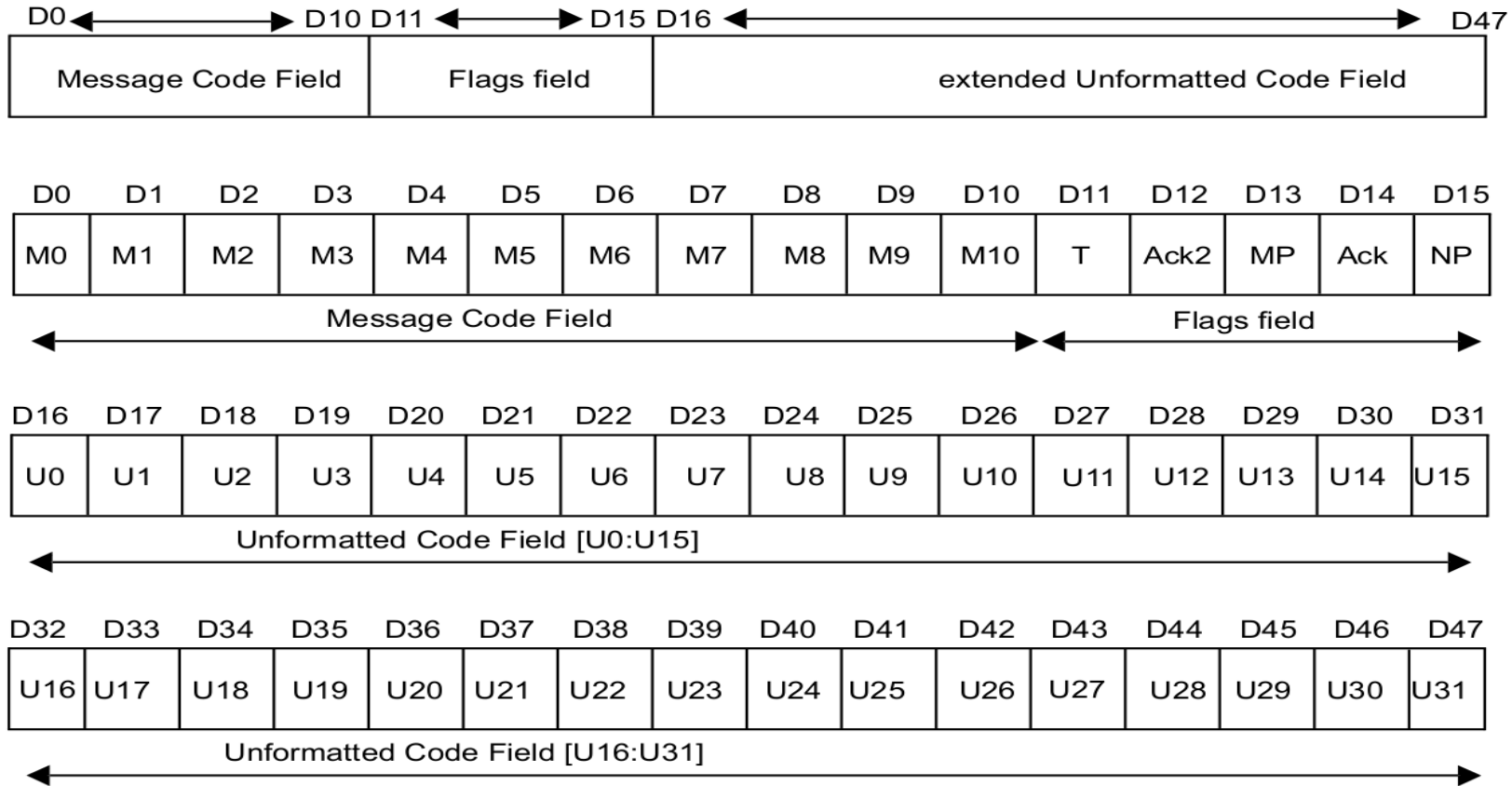


Figure 28–13—Extended Message Page encoding



Thank you!

Questions?

