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IEEE 802.3cg

10BASE-T1S jabber problem

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Outline

- The jabber problem is defined in clause 1
  - **1.4.242 jabber:** A condition wherein a station transmits for a period of time longer than the maximum permissible packet length, usually due to a fault condition.
- Possible causes
  - jabber usually happens because of a faulty system, e.g.
    - Broken MII interface (TX_EN stuck in asserted state)
    - Infinite loops in the user SW
    - Bogus / partial reset of single components in the TX path
- This is also known to be a sub-case of the "babbling idiot problem"
  - A condition where one node transmits forever packets / streams of arbitrary length on the line, possibly preventing other nodes to get access to the network.
- PLCA provides some degree of protection against this problem as each PHY is constrained to transmit only when it owns a transmit opportunity
  - But PLCA is optional and does not limit by itself the length of a packet (not its job anyway)
  - We need a fix in Clause 147, adapted from Clause 10 (10BASE-2) and Clause 13

Proposed solution

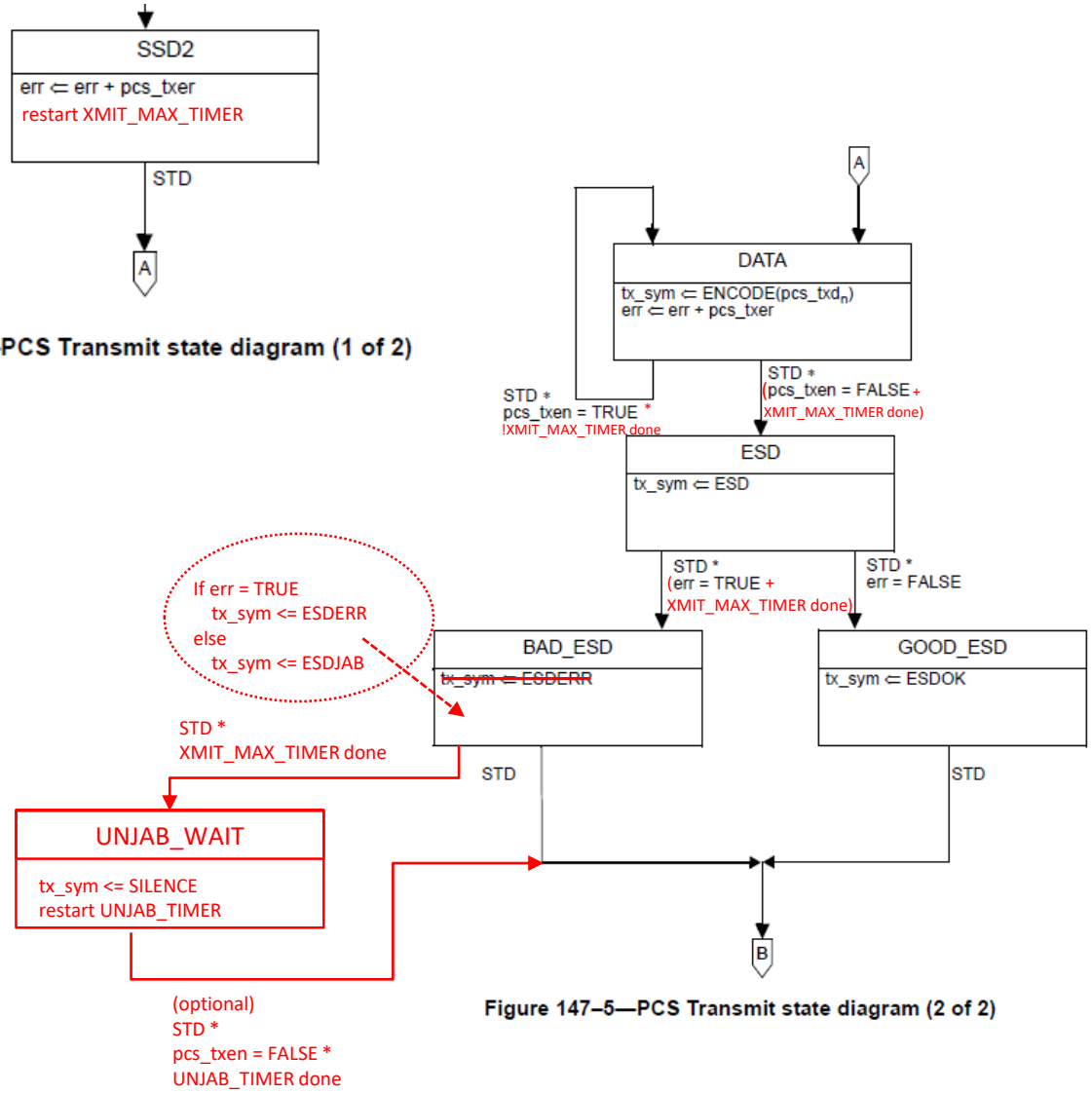

Figure 147–4—PCS Transmit state diagram (1 of 2)

Figure 147–5—PCS Transmit state diagram (2 of 2)

- Add XMIT_MAX_TIMER (2 ms ± 100 µs) to exit DATA state and notify the error to the receiving nodes
- Stay in UNJAB_WAIT state for 16 ms ± 100 µs (or forever) to allow other PHYs to transmit
- NOTE: local CRS is high (transmitting variable is still TRUE) during unjab time to prevent the MAC from transmitting as well
- Adapted from Fig. 10-3

Timers value

- In 10BASE-2 the XMIT_MAX_TIMER is specified to be in the range of 20 ms to 150 ms, while the UNJAB_TIMER is specified to be 0.5 s.
- Although these numbers were fine for 10BASE-2 use cases, they might be too long for industrial and automotive requirements.
  - propose to have a XMIT_MAX_TIMER of 2 ms ± 100 µs
    - MAX Ethernet packet size = 1522 bytes (excluding preamble, including FCS)
    - 1522 bytes @10 Mbit/s = 1.2176 ms → 2 ms is already an oversized value
  - propose to have an UNJAB_TIMER of 16 ms ± 100 µs
    - allows faster recovery from temporary errors at the expense of more traffic disruption in case of permanent (unrecoverable) error
- Feedback would be appreciated

Proposed text Changes

- Add line to table 147-1

Name	4B	5B	Special Function
S	N/A	11001	ESDJAB

- Add entry in 147.3.2.2 Variables
  ESDJAB 5B symbol defined as 'S' in 4B/5B encoding
- Modify 147.3.2.1 PCS Transmit overview line 19: replace "ESDERR" with "ESDERR / ESDJAB"
- Modify 147.3.3.1 PCS Receive Overview line 36: replace "ESDOK or ESDERR" with "ESDOK, ESDERR or ESDJAB"
- Modify 147.3.3.1 PCS Receive Overview line 40: replace "ESDOK" with "ESDOK, ESDJAB"

Proposed text Changes

- Adopt changes to Figures 147-4/1 and 147-5 as in slide #3
- 147.3.2.6 Timers
  - XMIT_MAX_TIMER
    - Defines the maximum time the PCS Transmit state machine can stay in DATA state.
      The XMIT_MAX_TIMER shall be implemented in such a way that, upon expiration, an even number of nibbles has been sent to prevent the MAC from counting false alignment errors.
      Duration: 2ms ± 100 µs
  - UNJAB_TIMER
    - Optionally times the minimum duration the PHY suppresses any transmission before reverting to normal operations.
      Duration: 16ms ± 100 µs

Proposed text Changes

- **Add new subclause: 147.3.2.7 Jabber functional requirements**
  The PCS Transmit function shall contain the capability to interrupt a transmission that exceeds a time duration determined by XMIT_MAX_TIMER. If the packet being transmitted continues longer than the specified time duration, the PCS Transmit shall send an ESD, ESDJAB symbol sequence to notify the receivers, then it shall inhibit further transmissions for at least the duration of UNJAB_TIMER. The PCS Transmit may return to normal operation automatically after UNJAB_TIMER elapsed and the error condition has been cleared, or it can keep silent until reset.
- **Add new subclause: 147.3.3.6 Jabber diagnostics**
  The ESDJAB symbol informs the PCS Receiver that a frame was terminated by the jabber function. The number of received ESDJAB events can be reported to the management entity be the means of MDIO register 3.2293 or similar functionality if MDIO is not implemented.

Proposed text Changes

- 45.2.3
  - Add register 3.2293 “10BASE-T1S PCS Diagnostic 1”
  - Add register description

Bit(s)	Name	Description	R/W
3.2293.15:0	RemJabCnt	16 bit field counting the number of remote jabber errors received since last read of this register.	RO - SC

  - RemJabCnt
    - Reports the number of received jabber events occurred since last time register 3.2293 was read.

Conclusions

- Jabber (aka Babbling Idiot) problem may happen in faulty systems and could lead to a situation where one node prevents others to transmit for a very long time.
- 10BASE-2 / 10BASE-5 along with other standards define jabber state machines in the PHY to prevent this
- A solution for 10BASE-T1S has been presented along with proposed text and state diagram changes
  - solution borrowed and adapted from Clauses 10 and 13.
- An optional way of detecting and reporting remote jabbers (i.e. at receiver side) has been presented along with text changes

THANK YOU!