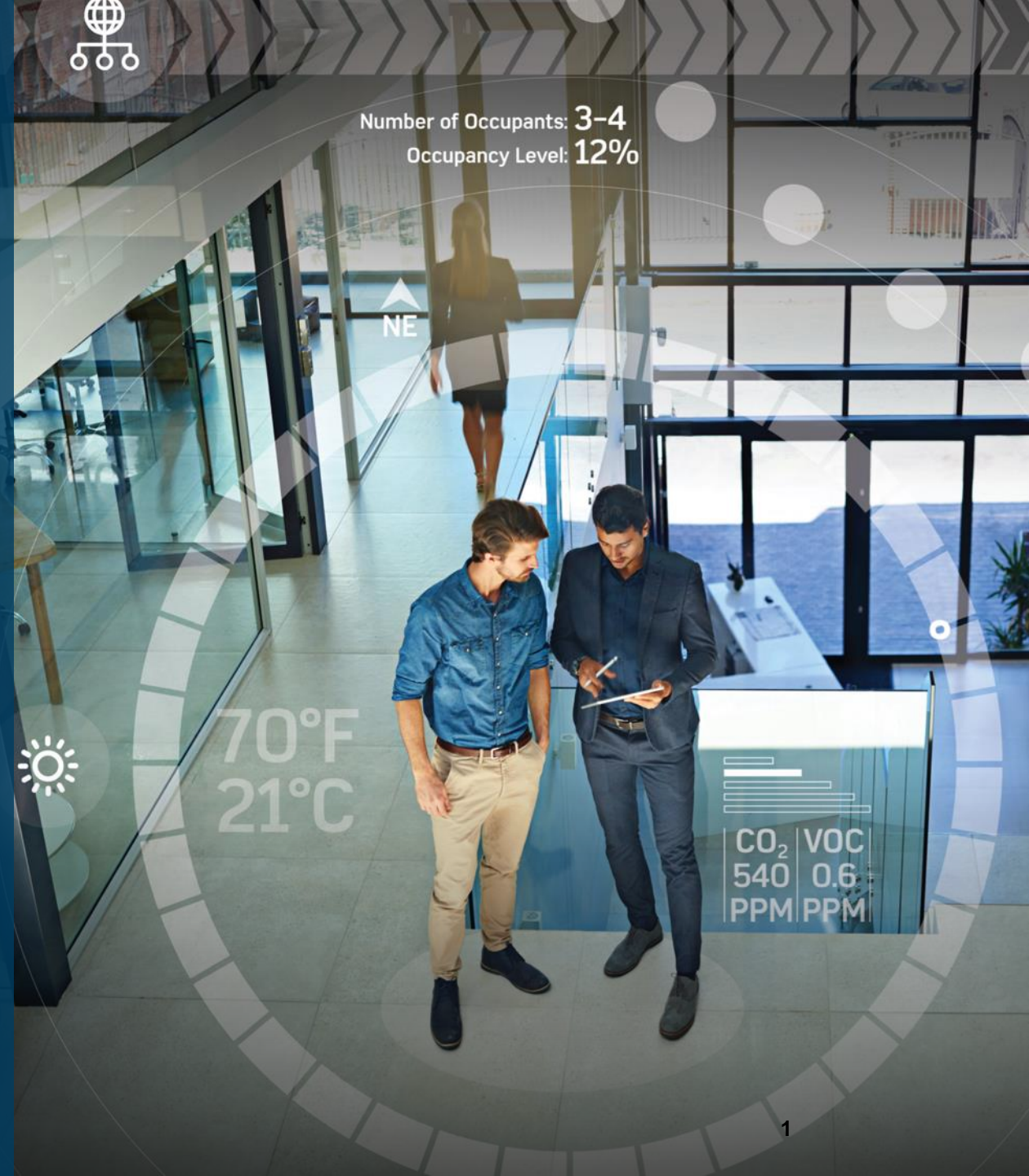


IEEE *Draft* P802.3cg/D3.0 break_link_timer duration

1 MAY 2019



break_link_timer

- ▶ break_link_timer defines duration of TRANSMIT DISABLE state of Figure 98-7 – Arbitration state diagram
- ▶ Same definition of break_link_timer in Auto-Negotiation high-speed mode (HSM) and low-speed mode (LSM); see subclause 98.5.2:

break_link_timer_[HSM]

Timer for the amount of time to wait in order to assure that the link partner enters a Link Fail state. The timer shall expire 300 μ s to 305 μ s after being started.

break_link_timer_[LSM]

Timer for the amount of time to wait in order to assure that the link partner enters a Link Fail state. The timer shall expire 300 μ s to 305 μ s after being started.

break_link_timer duration does not scale like other timers between HSM and LSM, for example:

- interval_timer_[HSM] = 30 ns
- interval_timer_[LSM] = 800 ns (= interval_timer_[HSM] x 26.67)

10BASE-T1S issue

- ▶ MASTER PHY sends heartbeat (HB) every 50 ms (hb_timer duration)
- ▶ Figure 147-11 – Heartbeat receive state diagram governs how a link is brought down:
The pcs_status is reported as NOT_OK when PCS is reset or when no valid packets nor HB messages are received within link_hold_timer ms for INACTIVE_CNT times in a row.
- ▶ link_hold_timer duration is 50 ms; INACTIVE_CNT is an integer number between 0 and 7
 - Required period of silence to provoke entry to Link Fail state in link partner is > 350 ms
 - This is not satisfied by break_link_timer duration of 300 μ s to 305 μ s
 - A 10BASE-T1S PHY might have to watch out for abrupt change to Auto-Negotiation signalling from link partner (and might have to be able to distinguish these from 10BASE-T1S heartbeat)
- ▶ Note that 10BASE-T1S PHY supporting Auto-Negotiation must support HSM.

10BASE-T1L issues

- ▶ Short break_link_timer (300 μ s to 305 μ s) might cause problems for 10BASE-T1L PHY implementations also:
 - 10BASE-T1L link startup includes SILENT state, with nominal duration of 100 ms (silent_timer_duration). This was intended to allow link partner easily observe a restart of training; observing break link would be more difficult than this.
 - 10BASE-T1L LPI QUIET duration is 6 ms. A break link during LPI mode would likely be interpreted as an LPI wake-up.
 - 10BASE-T1L PHY might also have to handle abrupt commencement of Auto-Negotiation signalling from link partner (and must ensure that Auto-Negotiation signalling is not mistaken for 10BASE-T1L signalling, and that the link comes down).

Proposed solution

- ▶ Set break_link_timer duration according to PHY technologies supported
- ▶ break_link_timer duration should be set to highest value of PHY technologies supported
 - 10BASE-T1S: 400 ms
 - 10BASE-T1L: 150 ms
 - 100BASE-T1, 1000BASE-T1: 300 μ s to 305 μ s

Thank you

break_link_timer and link_fail_inhibit_timer

- ▶ There is a potential issue in the durations of break_link_timer and link_fail_inhibit_timer.
- ▶ If Arbitration (Figure 98-7) is in the AN GOOD CHECK state, the PHYs will be engaged in link startup for the HCD PHY technology.
- ▶ The PHY will continue with link startup until link_control_[HCD] is set to DISABLE again.
 - This occurs on link_fail_inhibit_timer_done (if PHY link has not come up), and Arbitration transitions back to TRANSMIT DISABLE
- ▶ This transition, AN GOOD CHECK to TRANSMIT DISABLE, can also occur on Auto-Negotiation restart.
 - In this case, the break_link_timer is too short to guarantee that the link startup process of the link partner PHY has finished.
 - To guarantee this, we would need $\text{break_link_timer} > \text{link_fail_inhibit_timer}$.
 - Note that 10BASE-T1L has link_fail_inhibit_timer duration between 3030 ms and 3090 ms.
 - break_link_timer would need to be greater than this to ensure that any active link startup process in the link partner has ceased.