



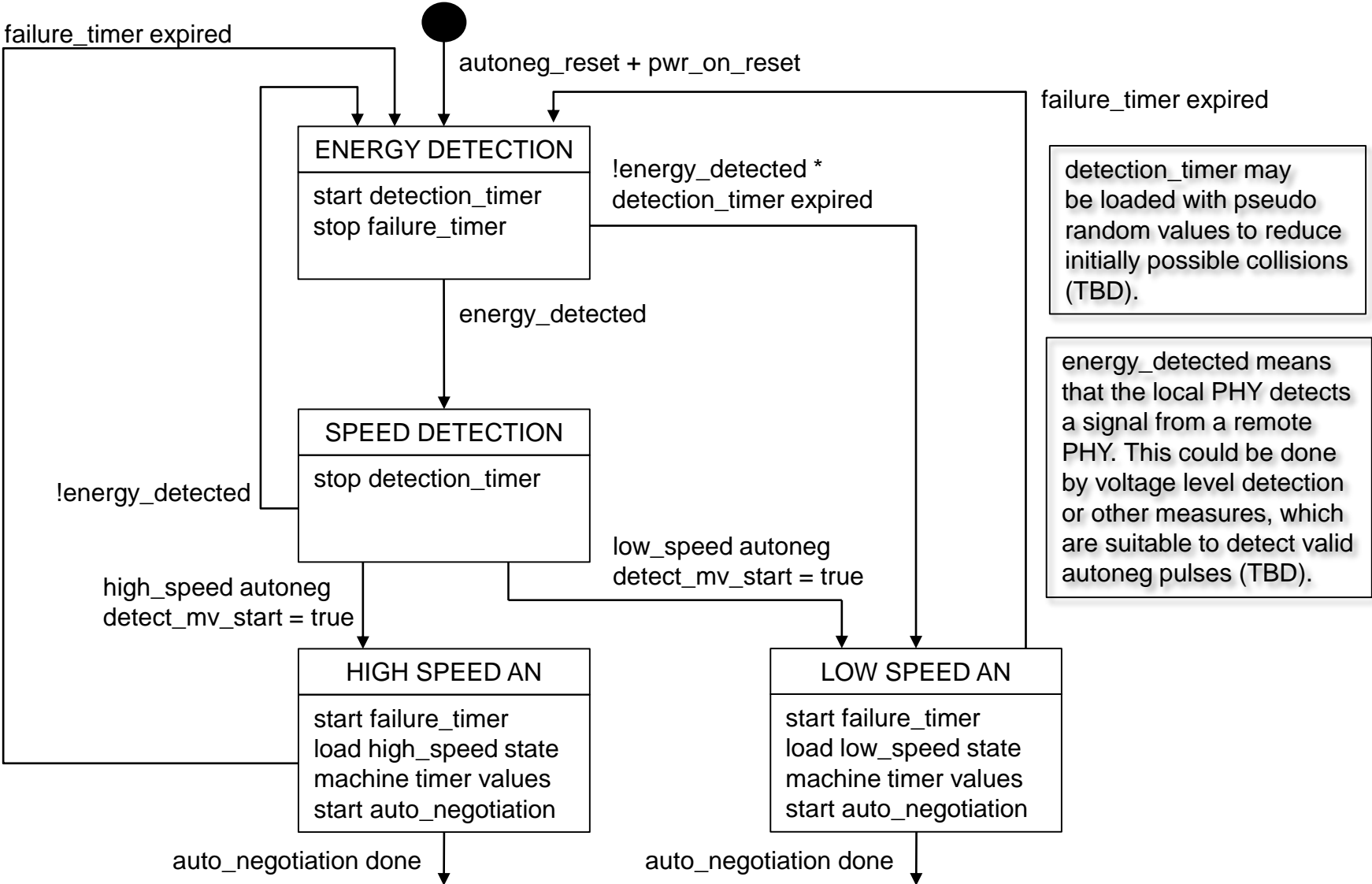
# 10 Mb/s Single Twisted Pair Ethernet Clause 98 Rate Adaption

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# Clause 98 Rate Adaption

- **Caution:**
  - The complete presentation is about auto-negotiation speed and not about the finally negotiated communication speed, which always will follow the standard rules, e.g. using the highest possible speed.
  - Therefore it is about the negotiation of the speed for the auto-negotiation itself.

# Clause 98 Rate Adaption (universal auto-neg.)

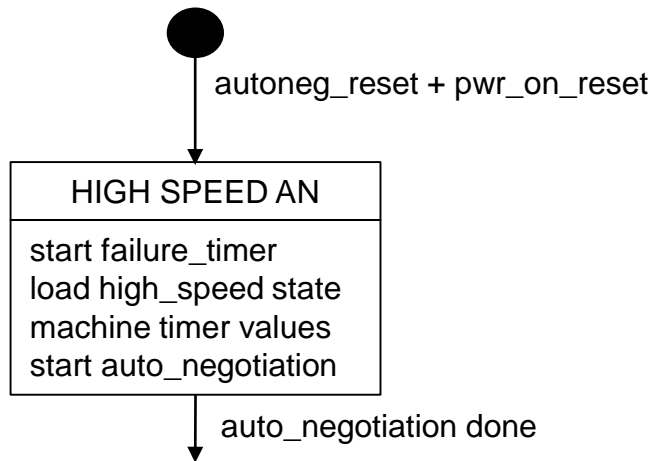


detection\_timer may be loaded with pseudo random values to reduce initially possible collisions (TBD).

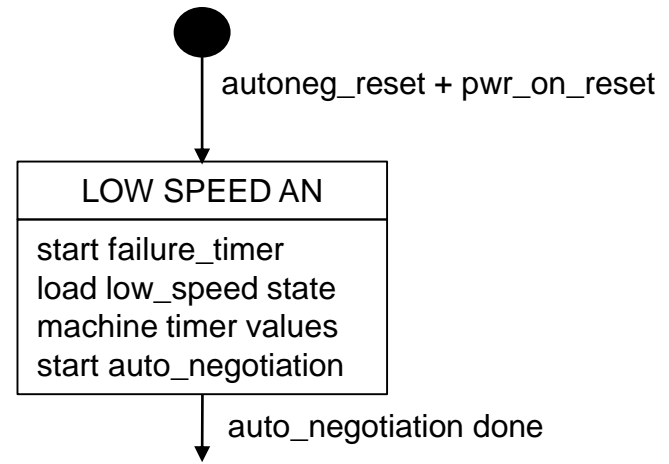
energy\_detected means that the local PHY detects a signal from a remote PHY. This could be done by voltage level detection or other measures, which are suitable to detect valid autoneg pulses (TBD).

# Clause 98 Rate Adaption (single speed auto-neg.)

High speed only auto negotiation:



Low speed only auto negotiation:



# Clause 98 Rate Adaption (detailed description)

- A PHY only supporting one auto-negotiation speed starts auto-negotiation communication immediately:
  - A 100/1000BASE-T1 PHY only supports the high speed auto-negotiation scheme, therefore such a PHY immediately starts to negotiate at 16.667 MBit/s (which is compatible to existing implementations).
  - A 10BASE-T1L PHY only supports the low speed auto-negotiation scheme, therefore such a PHY immediately starts to negotiate at 625 kBit/s.
- A universal PHY being able to do high speed and low speed auto-negotiation scheme initially listens for some defined period of time (TBD), if another PHY transmits auto-negotiation frames.
- During this time the receiver of a universal PHY tries to decode high speed and low speed auto-negotiation frames (in parallel or sequential).
- If auto-negotiation frames are received, depending on the received frame type (high speed or low speed) the auto-negotiation speed of the local universal PHY has to be adopted accordingly before starting its own auto-negotiation frame transmission.
- If there are no auto-negotiation frames received from the far end side within a defined period of time (TBD), there are three possibilities:
  - there is no link partner,
  - the link partner transmits auto-negotiation frames at a fixed speed, which is not suitable for the link segment, or
  - there is also a universal PHY.
- For the first two cases there is no way to establish an auto-negotiation communication, therefore the third case is assumed.
- In such a case the local universal PHY shall start the transmission of auto-negotiation frames after a defined period of time (TBD).
- As it is assumed that there is a universal PHY on both ends of the link segment supporting low speed auto-negotiation scheme as well as high speed auto-negotiation scheme, and there is no knowledge about the link segment, transmission shall start in low speed auto-negotiation mode, as this would also allow communication over a long reach link segment (this has nothing to do with the priority resolution during the auto-negotiation process itself).
- If there is still no response, after some time (TBD) the universal PHY needs to stop transmission again and listen, if the far end PHY is now starting to transmit data (which e.g. has been disturbed by the wrong communication speed of the local PHY), and so on.
- One possibility can be to implement this behavior in a state machine sitting on top of the existing Clause 98 state machines.

**Thank You**