

# Supporting materials for 802.3dj D2.0 comment #460


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Time limit requirement exists from AN data -> full rate data

### **73.4.3 Transmit Switch function**

During Auto-Negotiation and prior to entry into the AN\_GOOD\_CHECK state (see [Figure 73–11](#)), the Transmit Switch function shall connect only the DME page generator controlled by the Transmit State Diagram to the MDI.

Upon entry into the AN\_GOOD\_CHECK state, the Transmit Switch function shall connect the transmit path from a single technology-dependent (highest common denominator) PHY to the MDI.

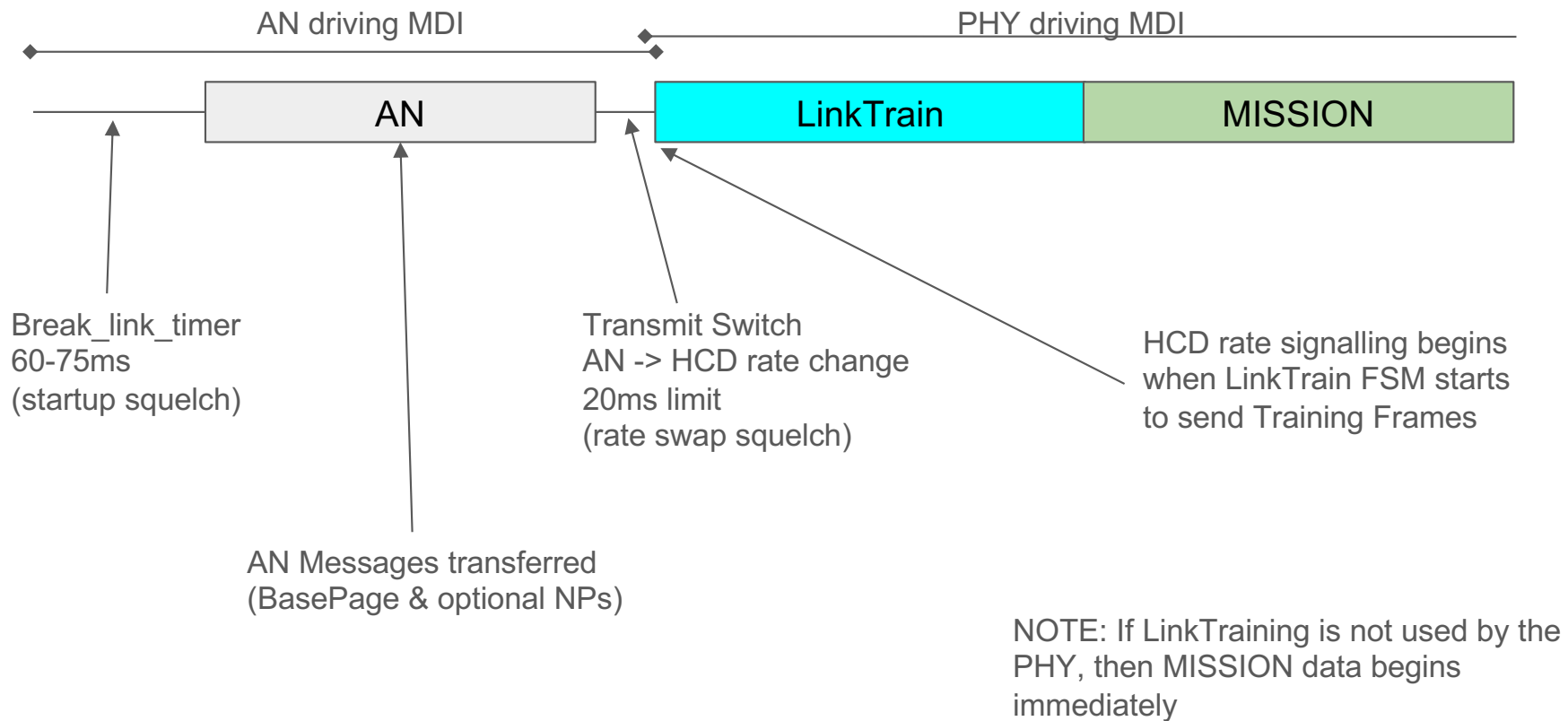
When a PHY is connected to the MDI through the Transmit Switch function, the signals at the MDI shall conform to all of the PHY specifications within 20 ms. 

NOTE: this is from 802.3dj and is identical to 73.6.10 in 2022 IEEE Std 802.3, DJ has renumbered the clause.

## Why is there a time limit

The time limit was added in 802.3bj when 25G NRZ data rates were added and SerDes began to potentially need to change VCO configurations to swap between AN mode and HCD rates. Depending upon the design this could be quick or very slow. So a time limit was established to bound implementations and provide interop expectations.

# Flow of AN process



# Link Training startup for signalling rates of 10G -> 100G

Figure 72-5 exert (10/25Gbps NRZ)

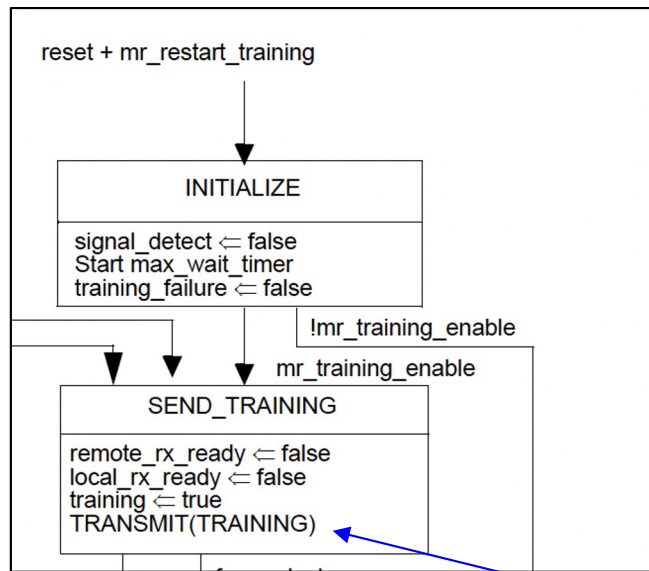
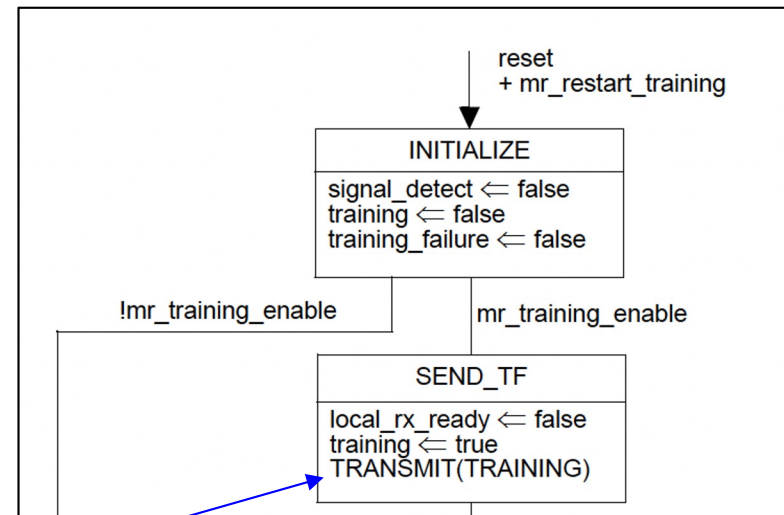


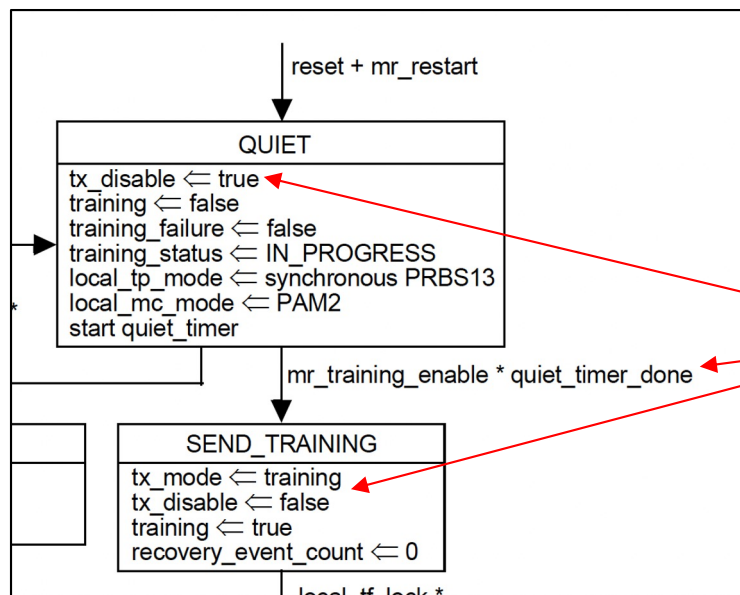
Figure 136-7 exert (50/100Gbps PAM4)



Frames begin transmission upon reset removal when mr\_training\_enable = 1

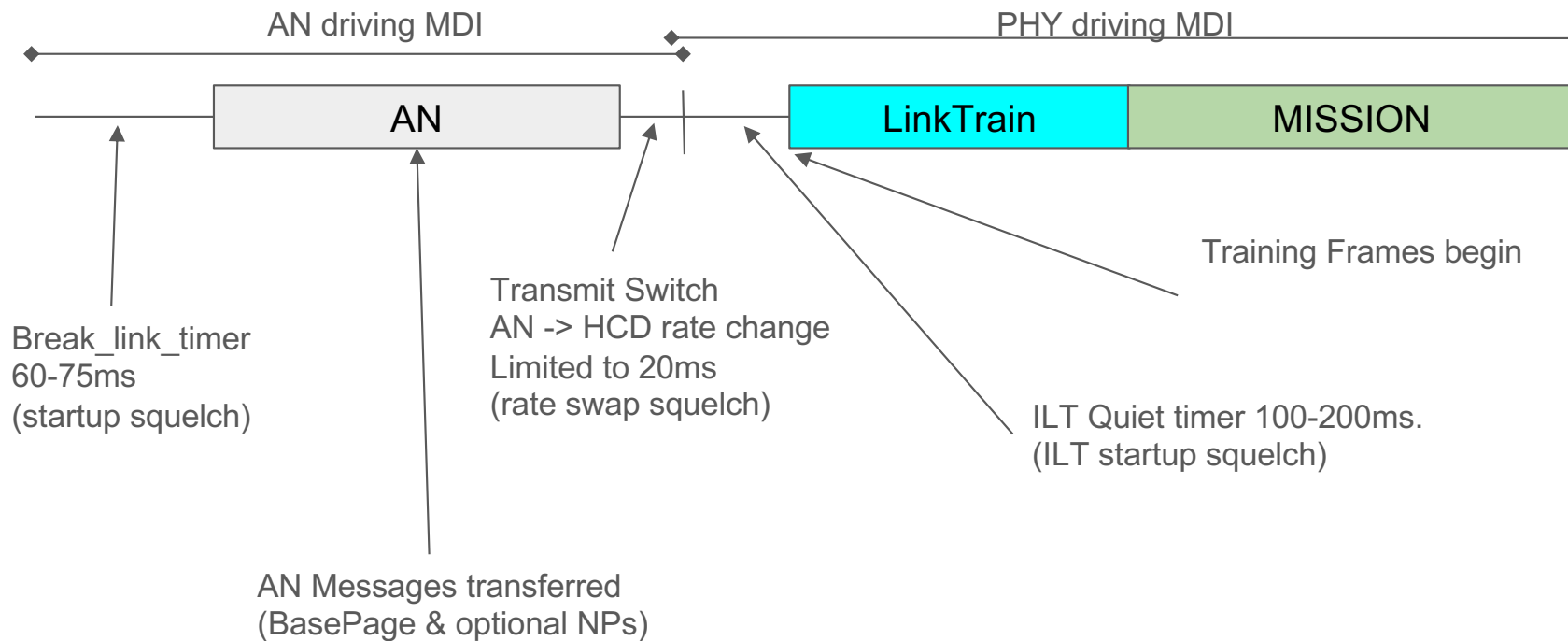
# Link Training startup for signalling rates of 200G

Figure 178B-8 exert (200Gbps PAM4)

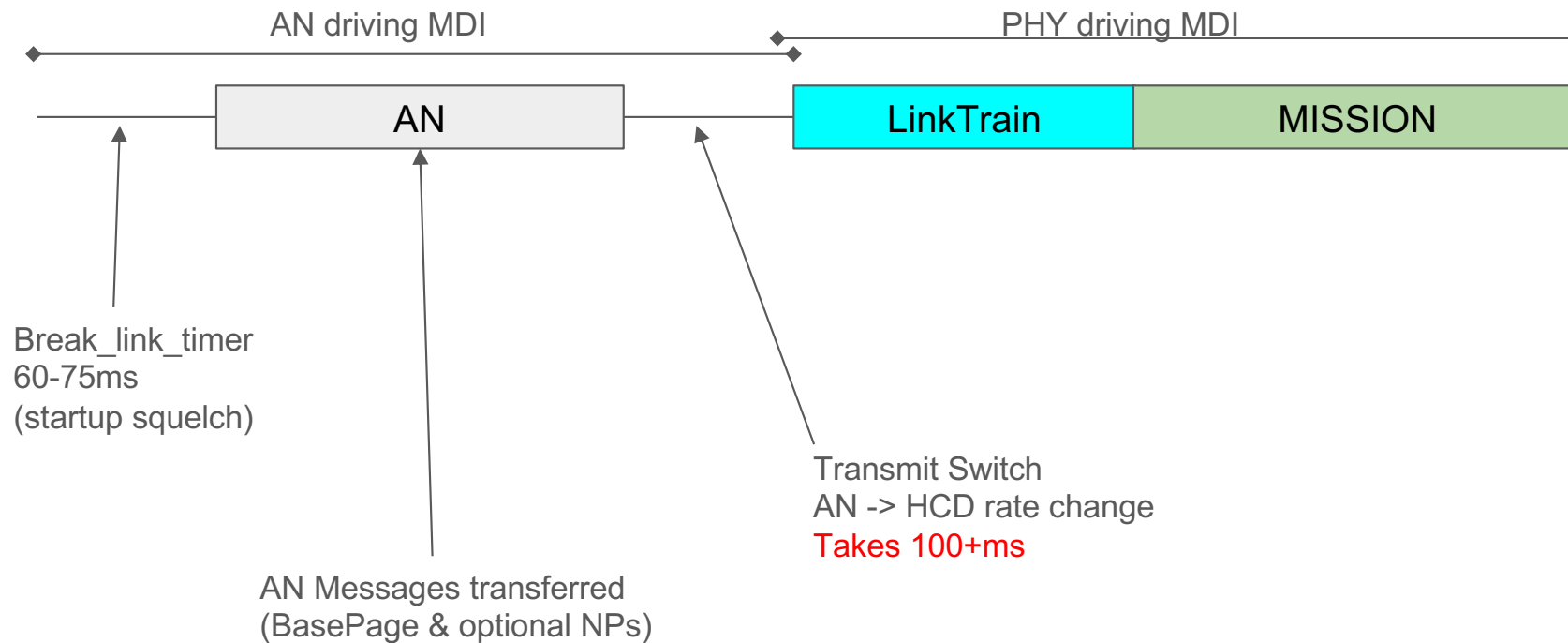


Frames begin transmission after reset removal when mr\_training\_enable = 1 and quiet\_timer expires (100-200ms)

# Flow of AN process with 178B LinkTrain



# Outside world view with 178B LinkTrain





# How to address this

## Options

- 1) Change the CL73 Transmit switch function check time to be much larger for PHYs that contain a 200Gbps or greater links.
- 2) Change 178B quiet\_timer duration when using AN.

# Option 1

Change 73.4.3 to read as follows:

When a PHY is connected to the MDI through the Transmit Switch function, the signals at the MDI shall conform to all of the PHY specifications within 20 ms unless the PHY is using the Clause 178B Inter-sublayer link training, then it shall conform within 250ms.

## Option 2

Update the duration of the 178B quiet\_timer so that during AN startups ILT doesn't do an extremely long squelch at startup.

Add this variable to 178B.43.3.1:

an\_in\_use

Boolean variable that is set to TRUE if the PHY is using Clause 73 Auto-Negotiation, otherwise it is FALSE.

In 178B.14.3.3 change the definition of the quiet timer to be:

quiet\_timer

This timer is started when the training control state diagram on a lane enters the QUIET state (see Figure 178B–8). The terminal count of this timer is between 100 ms and 200 ms **except when an\_in\_use is TRUE, then the terminal count is between 1ms and 10ms.**

# Recommendation

Option 2 is the better approach in my opinion.

The quiet\_timer at the start of ILT is there to facilitate non-AN link startup methods. AN already includes a long squelch during its startup process to communicate a (re)start of the startup process and transition from the AN data to HCD data is aligned by the AN FSM. So a long delay to transition from AN data to LinkTrain data is not necessary and just artificially slows down the link-up process.

Option 1 requires knowledge of the components in the PHYs to determine which duration to use. Since you don't know the link partners composition all PHYs using 200Gbps Ethernet or faster would need to start using the new value. So this change could affect deployed devices.