IEEE 802.3 Timestamp and data delay measurement reference points

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IEEE Std 802.3-2018 Timestamp and data delay measurement reference points

Timestamp reference point

> 90.4.3.1 TS_TX.indication primitive
>
> > 90.4.3.1.2 Condition for generation
> >
> > This primitive is generated by the gRS sublayer in response to detection of a valid SFD in the data stream transmitted across the xMII transmit signals. Specific conditions for generation of this primitive are described in 90.5.1.
>
> 90.5.1 TS_SFD_Detect_TX function
>
> > The service primitive across the TSSI, i.e., TS_TX.indication shall be generated only when the SFD is detected on the transmit signals of the xMII (SFD=DETECTED).

Data delay measurement reference points

> 90.7 Data delay measurement
>
> > The transmit path data delay is measured from the beginning of the SFD at the xMII input to the beginning of the SFD at the MDI output.

Timestamp reference point data delay measurement reference points are not the same

> Timestamp reference point is therefore SFD on xMII
>
> Data delay measurement reference points are beginning of SFD on xMII and on MDI

IEEE P802.3cx data delay measurement reference points

Timestamp reference point

No changes

Data delay measurement reference points
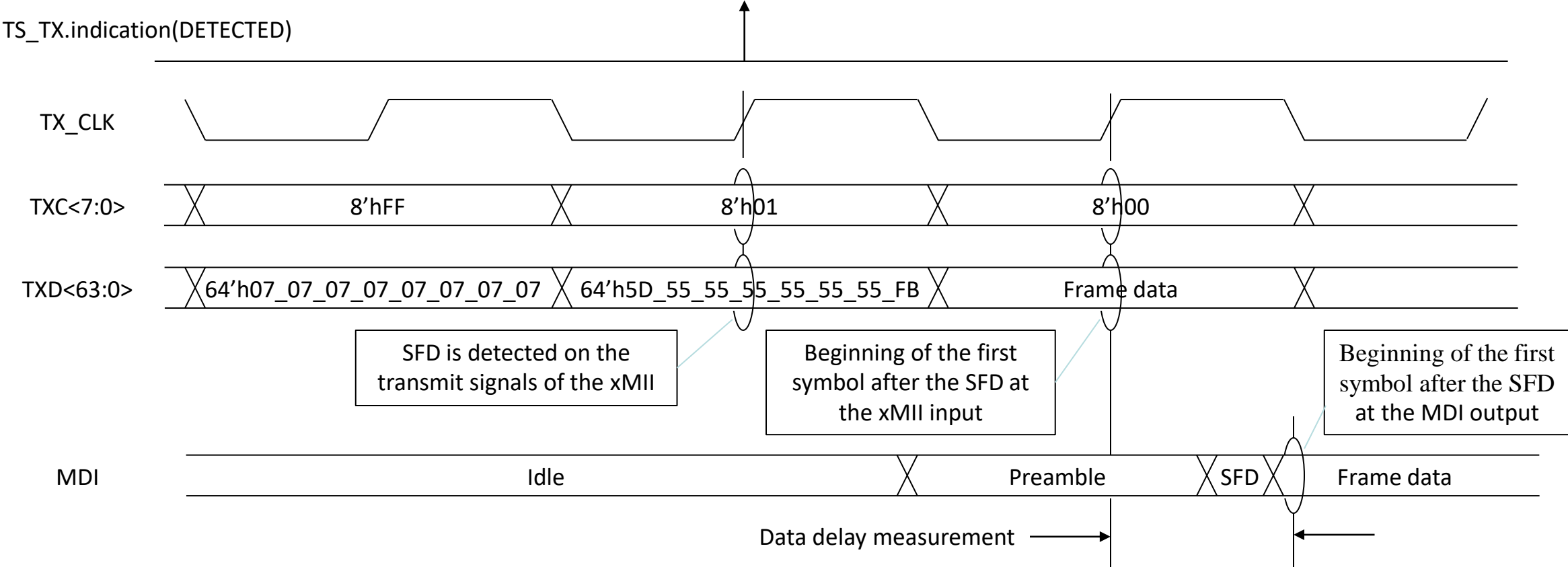
90.7 Data delay measurement

The TimeSync capability requires measurement of data delay in the transmit and receive paths, as shown in Figure 90–3. The message timestamp point shall be either the beginning of the start of frame delimiter (SFD) or the beginning of the first symbol after the SFD.

NOTE—It is recommended that the beginning of the first symbol after the SFD is used as the message timestamp point since this matches the measurement points specified in IEEE Std 802.1AS and IEEE Std 1588. The use of the beginning of the SFD as the message timestamp point may impact the accuracy that can be achieved by a time synchronization protocol using this TSSI. Further information can be found in Annex XX.
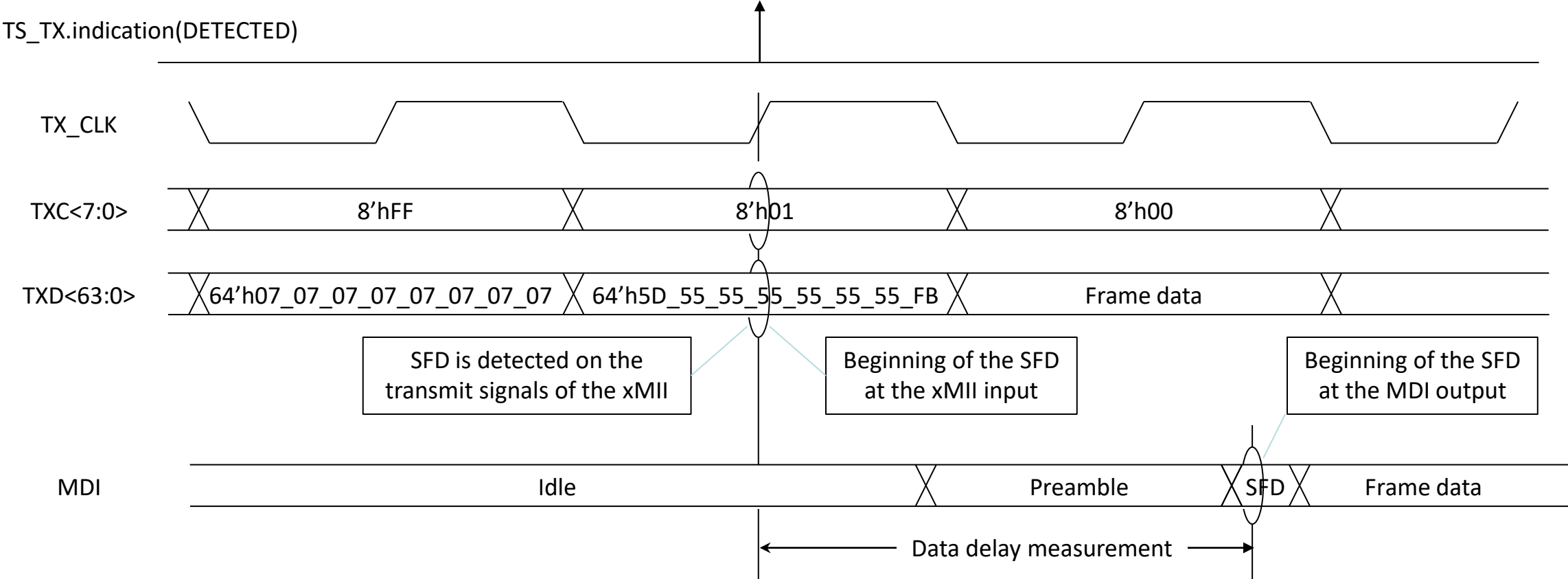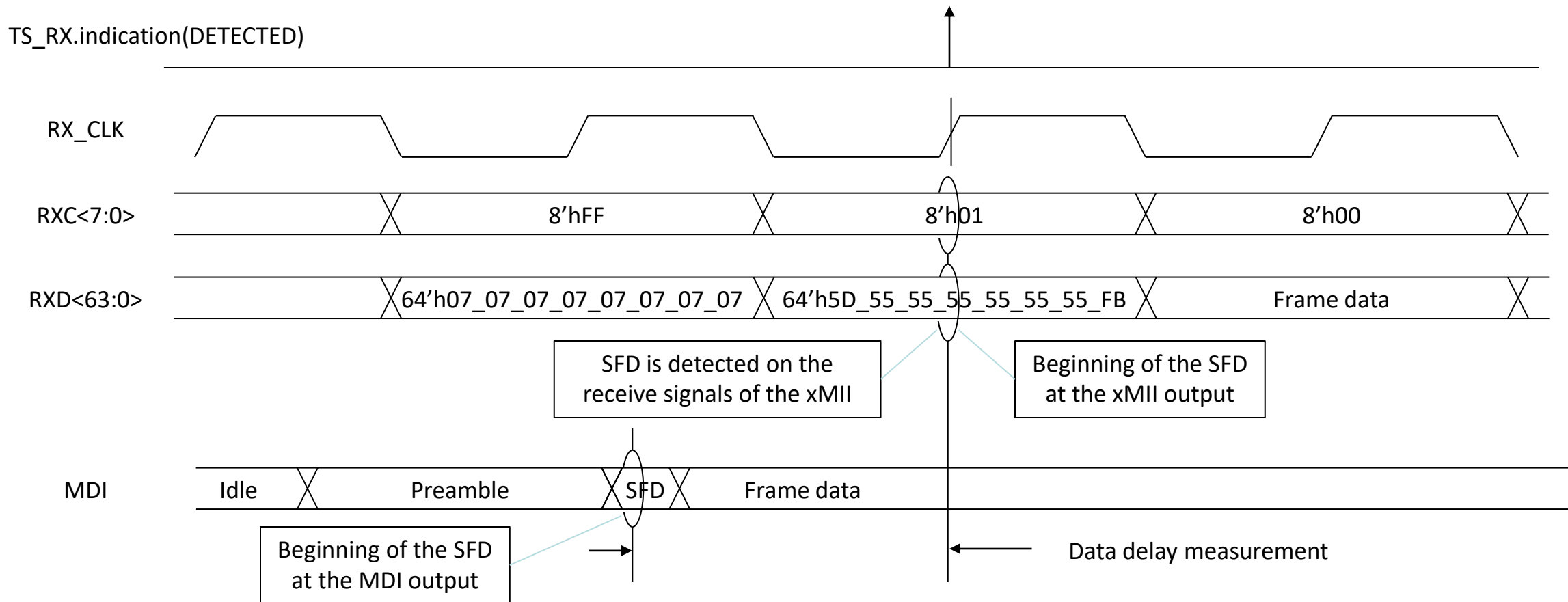
CGMII : Beginning of the SFD data delay measurement reference points on TX path
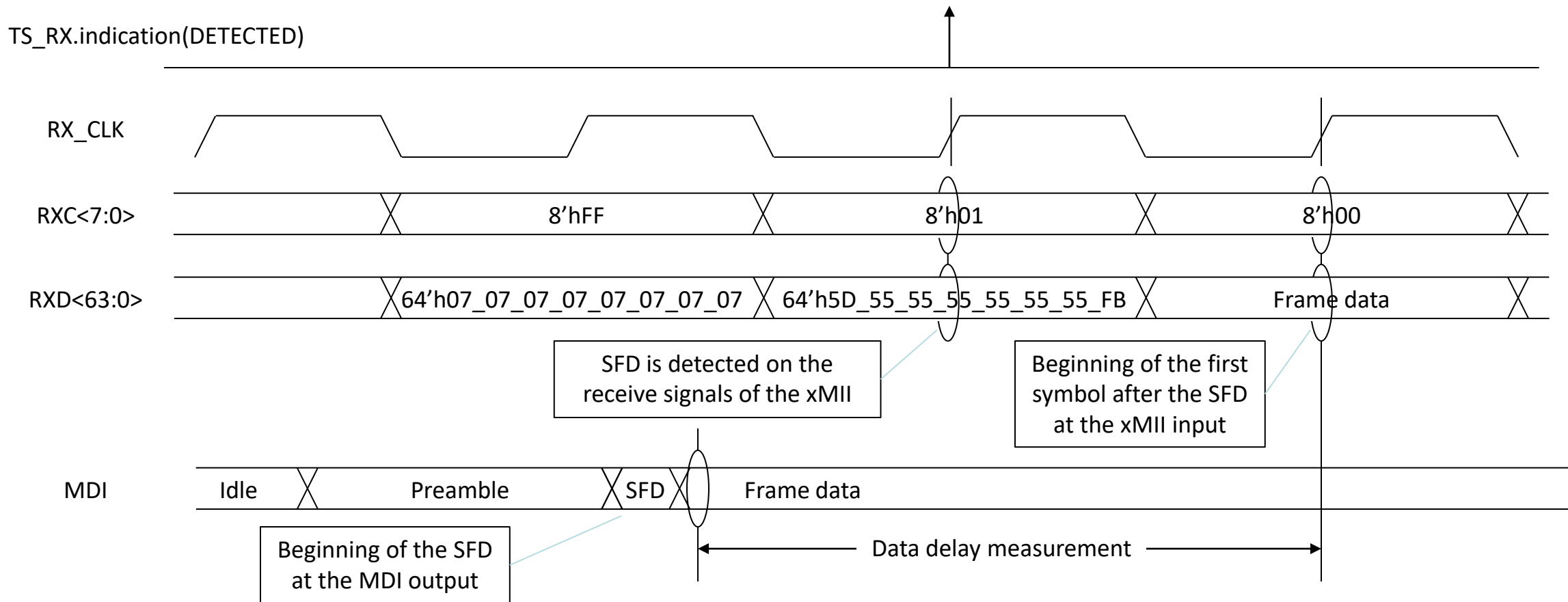
CGMII : Beginning of the first symbol after the SFD data delay measurement reference points on TX path

TS_TX.indication(DETECTED)

TX_CLK

TXC<7:0>   8'hFF   8'h01   8'h00

TXD<63:0>   64'h07_07_07_07_07_07_07_07   64'h5D_55_55_55_55_55_55_FB   Frame data

SFD is detected on the transmit signals of the xMII

Beginning of the first symbol after the SFD at the xMII input

Beginning of the first symbol after the SFD at the MDI output

MDI   Idle   Preamble   SFD   Frame data

Data delay measurement

CGMII : Beginning of the SFD data delay measurement reference points on RX path

CGMII : Beginning of the first symbol after the SFD data delay measurement reference points on RX path

Conclusion

TS_TX.indication and TS_RX.indication primitives

    Both use SFD is detected on the signals of the xMII

    Mismatch if beginning of the first symbol after the SFD used for data delay measurement

Proposal

    Allow generation of primitives based on either SFD or first symbol after the SFD

        Require the option selected match the option selected for data delay measurement

    Add additional parameter to primitives to indicate option in use

        TS_TX.indication(SFD, MM, TP), TS_RX.indication(SFD, MM, TP)

        Mandatory when generation of primitive and data delay measurement based on first bit of first symbol after SFD, optional otherwise.

        TP, when present, one of two possible values: SFD or FIRST_SYMBOL

        SFD: Generation of primitive and data delay measurement based on first bit of SFD.

        FIRST_SYMBOL: Generation of primitive and data delay measurement based on first bit of first symbol after SFD.