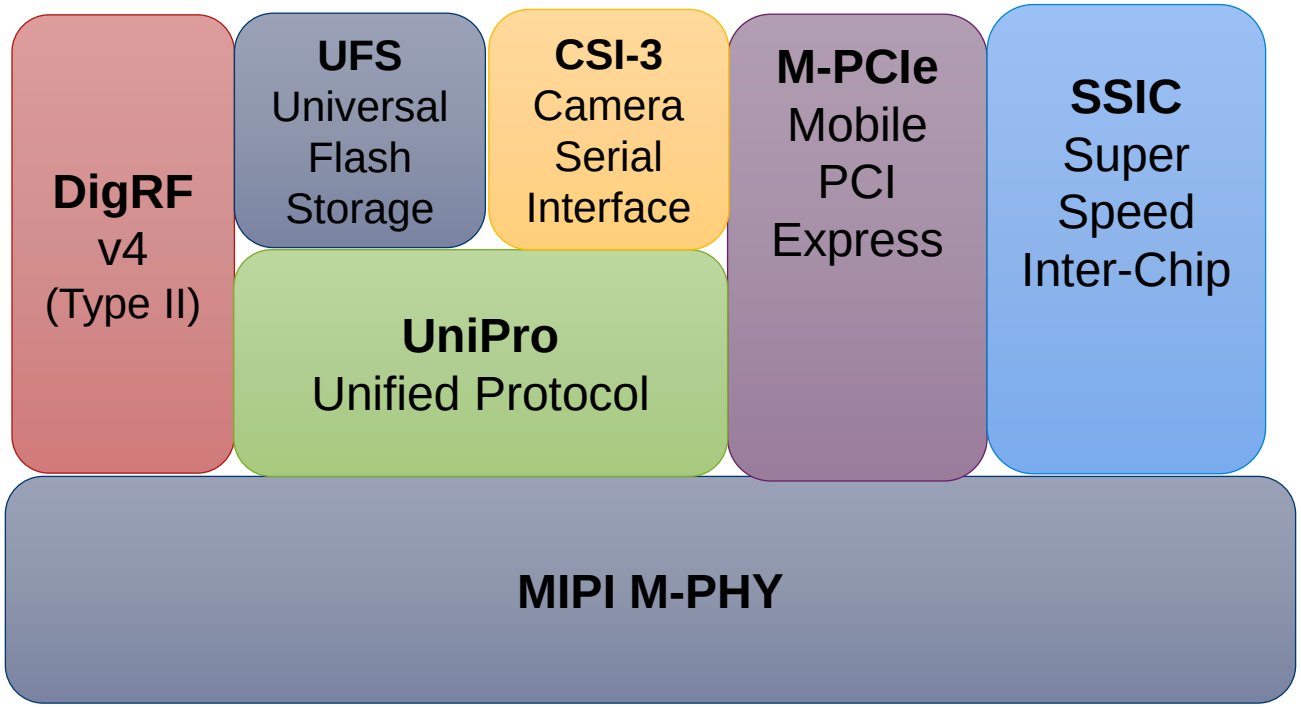
2 - M-PHY from Phy to Raw

Mobile Computing Protocol

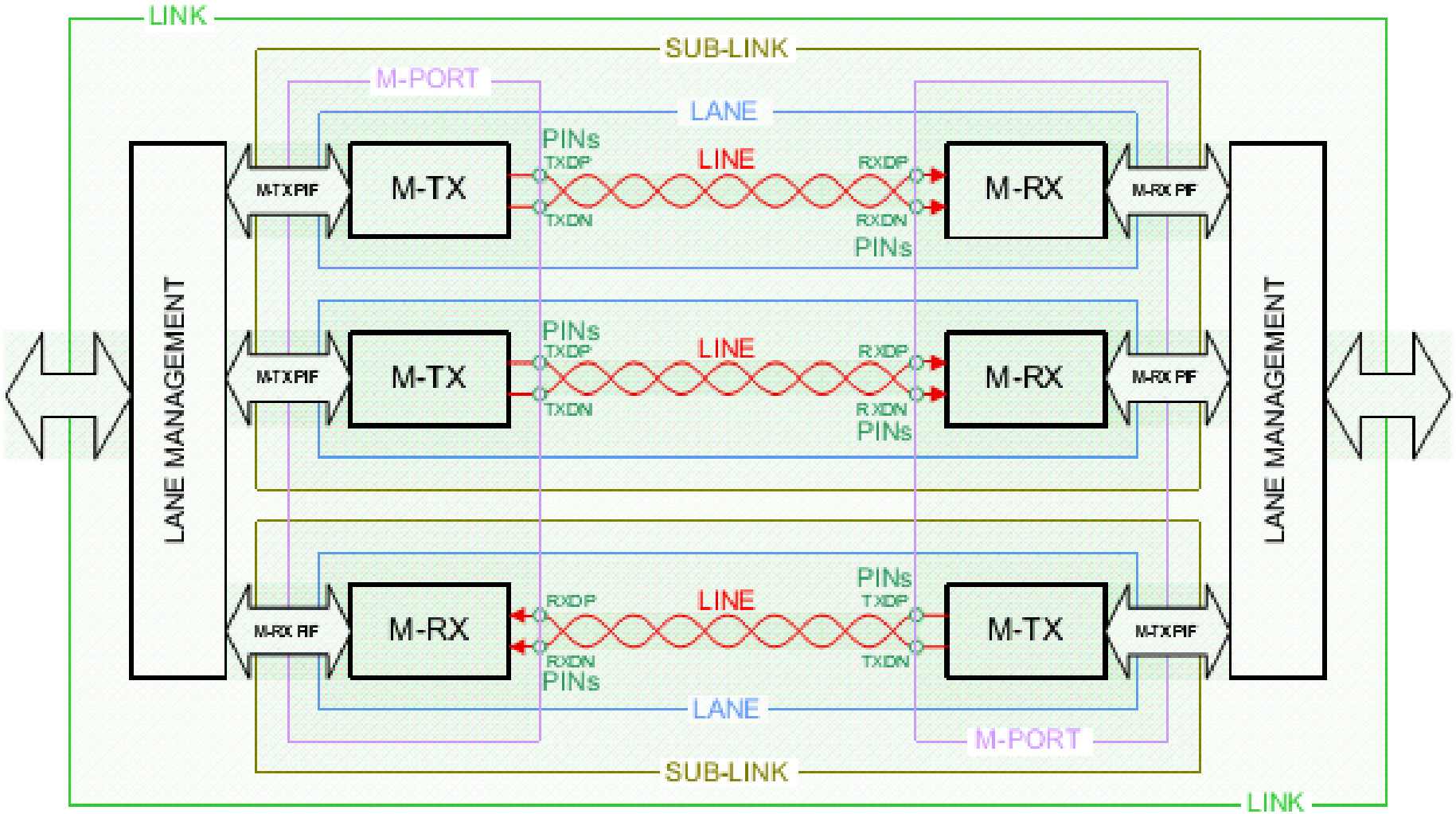
M-PHY

- Note the information provided here just covers Type-I M-PHY
- M-PHY is designed to be protocol agnostic, all it provides is a way to transport data
- It is left up to the protocol to define how to use it and control it



Line, Lane, Sub-Link, Link

§ 4.1 (M-PHY v3.0)



Line States and Rates

§ 4.2 (M-PHY v3.0)

Differential LINE Voltage	M-TX Output Impedance	M-RX Input Impedance	LINE State Set by	LINE State Name
Positive	Low	Any	M-TX	DIF-P
Negative	Low	Any	M-TX	DIF-N
Zero	High	Medium	M-RX	DIF-Z
Unknown or floating	High	High	None	DIF-Q

Table 9 HS-BURST: RATE Series and GEARs

RATE A-series (Mbps)	RATE B-series[1] (Mbps)	High-Speed GEARs
1248	1457.6	HS-G1 (A/B)
2496	2915.2	HS-G2 (A/B)
4992	5830.4	HS-G3 (A/B)

Table 10 PWM-BURST GEARs

PWM-GEARs	Min. (Mbps)	Max. (Mbps)
PWM-G0	0.01	3
PWM-G1	3	9
PWM-G2	6	18
PWM-G3	12	36
PWM-G4	24	72
PWM-G5	48	144
PWM-G6	96	288
PWM-G7	192	576

HS is the HIGH speed mode

HS has 2 rate series: A & B,

B is faster then A

PWM is LOW speed mode

PWM-G1 is required

Line States and Rates FIX Signaling Schemes

§ 4.2 (M-PHY v3.0)

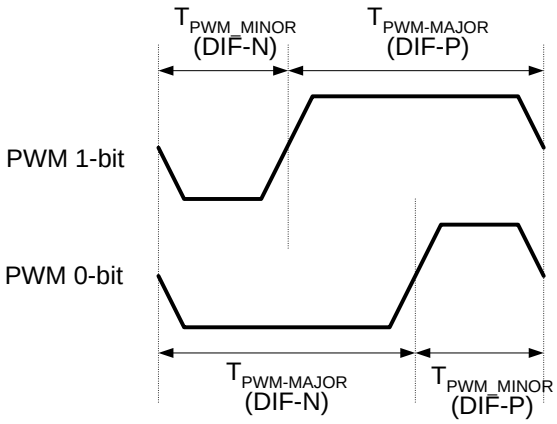
High-Speed NRZ

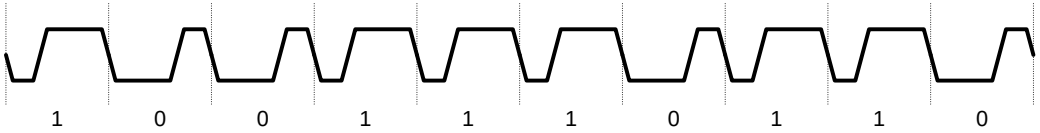
- 8b/10b encoded
- Non-Return-to-Zero (Trivial)

Type I: PWM

- Pulse-Width-Modulation
- Self-Clocking
- Falling edge to Falling edge is fixed
- Rising edge modulates
- 1/3 High 2/3 Low = 0
- 1/3 Low 2/3 High = 1

PWM Scheme





Control Symbols

§ 4.3 (M-PHY v3.0)

8b/10b K characters are mapped to Markers

Marker0 is the M-PHY deskew symbol

Fillers are idle symbols

Marker1, 2, 3 & FILLER are used in Unipro

Table 4 Control Symbols

Input		RD = -1	RD = +1	Name	Function
Symbol	HGF EDCBA	abcdei fghj	abcdei fghj		
K.28.0	000 11100	001111 0100	110000 1011	Reserved	
K.28.1[1]	001 11100	001111 1001	110000 0110	FILLER	NOP
K.28.2	010 11100	001111 0101	110000 1010	Reserved	
K.28.3	011 11100	001111 0011	110000 1100	MARKER1	Protocol Separator
K.28.4	100 11100	001111 0010	110000 1101	Reserved	
K.28.5[1]	101 11100	001111 1010	110000 0101	MARKER0	HEAD-OF-BURST; Start-of-FRAME; Symbol Alignment
K.28.6	110 11100	001111 0110	110000 1001	MARKER2	Protocol Separator
K.28.7[2]	111 11100	001111 1000	110000 0111	Reserved	
K.23.7	111 10111	111010 1000	000101 0111	MARKER3	Defined in protocol specification
K.27.7	111 11011	110110 1000	001001 0111	MARKER4	Defined in protocol specification
K.29.7	111 11101	101110 1000	010001 0111	MARKER5	Defined in protocol specification
K.30.7	111 11110	011110 1000	100001 0111	MARKER6	Defined in protocol specification

Type-I State Machine

§ 4.6.1 (M-PHY v3.0)

We don’t support LINE-CFG or Optical Media Converters (OMC)

See § 4.7 for state descriptions

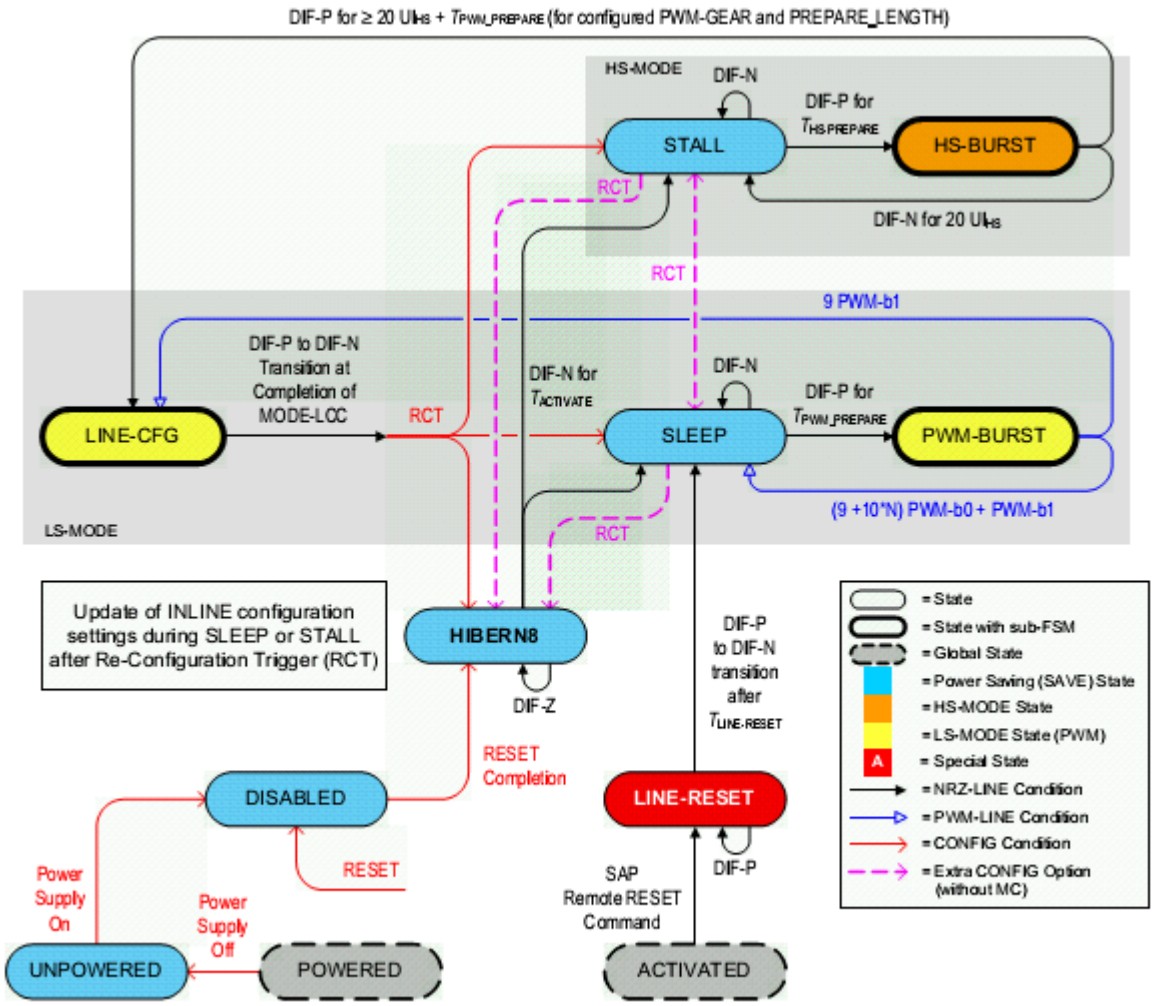


Figure 7 State Diagram for Type-I M-TX

Burst Sub State Machine

§ 4.7.2 (M-PHY v3.0)

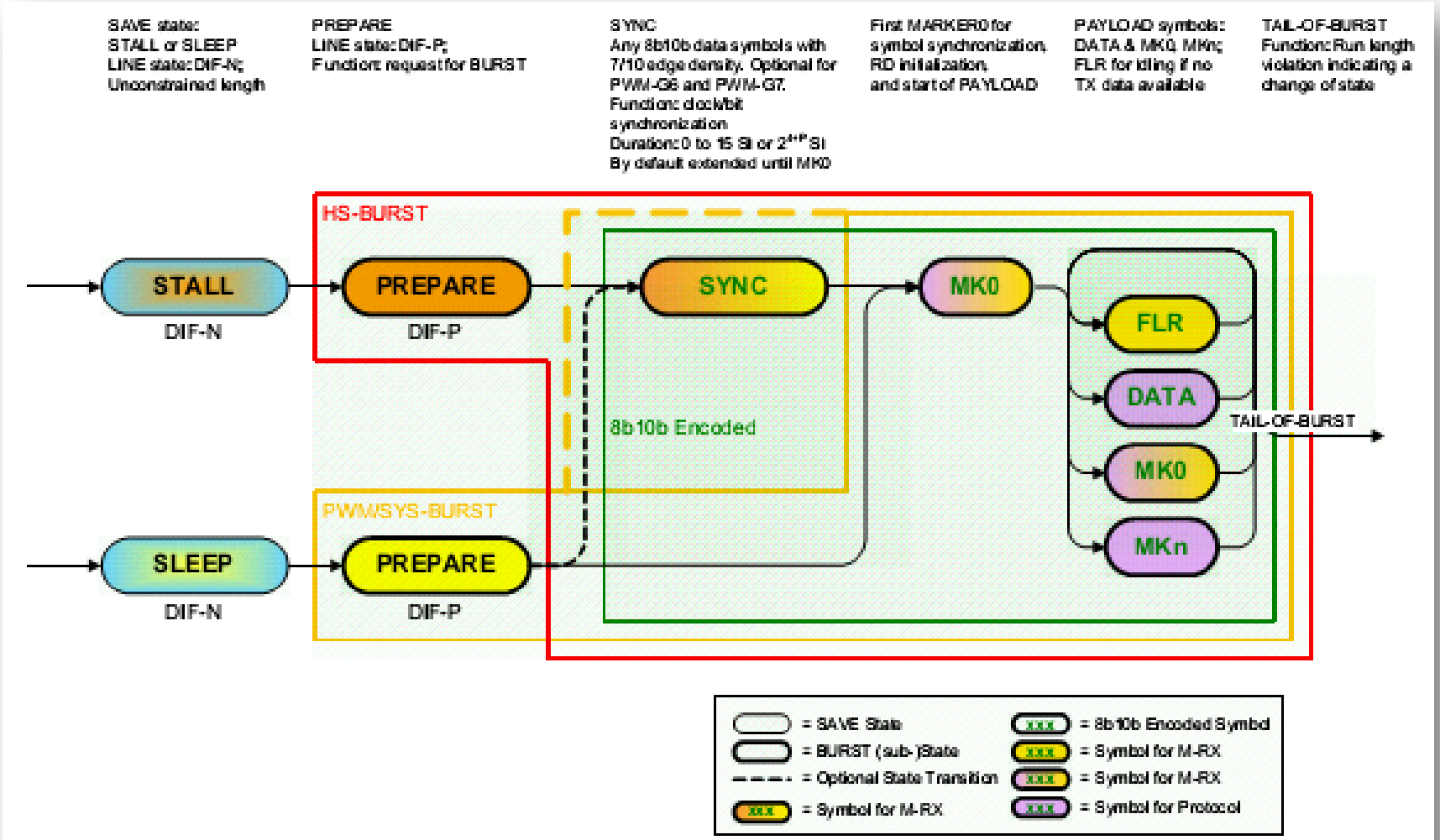
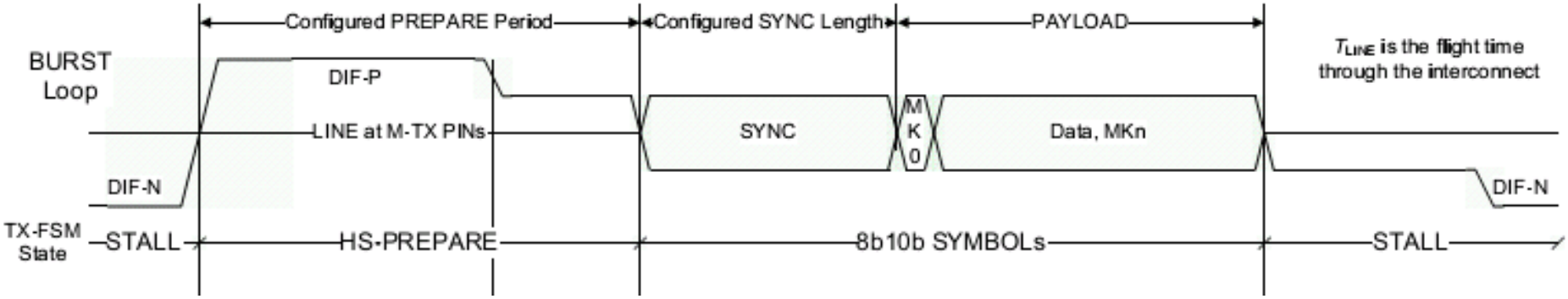


Figure 14 BURST-SAVE: Detailed Sub-FSM

Waveforms

§ 4.7.2 (M-PHY v3.0)



BURST Operation

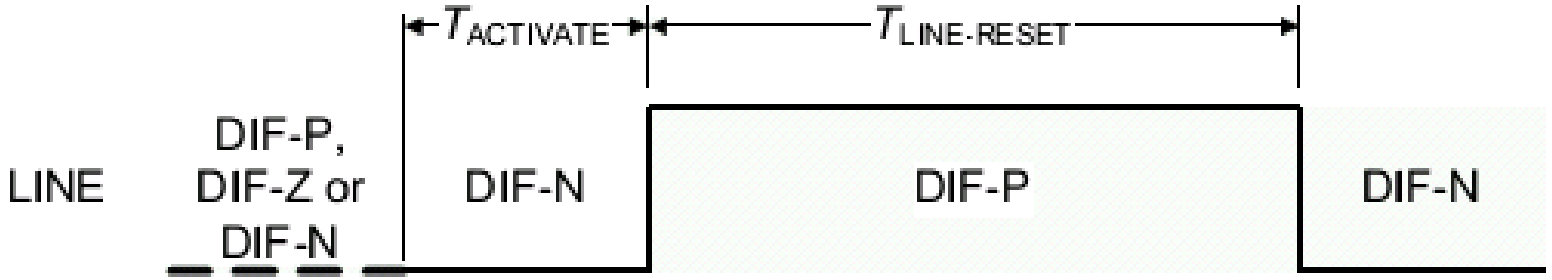


Figure 17 LINE-RESET Timing