

# Improved alignment marker table and description

Piers Dawe, Nvidia

# Introduction

- The presentation and description of alignment markers in Clause 172 can be improved

# At 40G and 100G it was simpler

The format of the alignment markers is shown in Figure 82–9.

The content of the alignment markers shall be as shown in Table 82–2 for 100GBASE-R and in Table 82–3 for 40GBASE-R. The contents depend on the PCS lane number and the octet number. Note that M4 through M6 are the bit-wise inversion of M0 through M2, respectively. Also BIP 7 is the bit-wise inversion of BIP3. This property allows the alignment markers to be DC-balanced. Lane markers 0 to 19 from Table 82–2 are used for the 100GBASE-R PCS and lane markers 0 to 3 from Table 82–3 are used for the 40GBASE-R PCS.

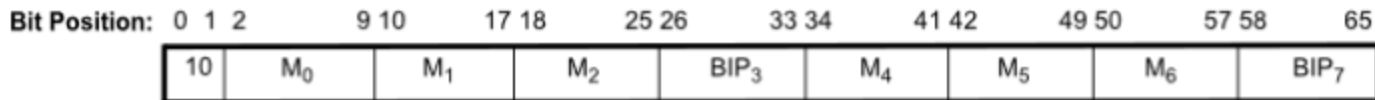


Figure 82–9—Alignment marker format

Table 82–3—40GBASE-R Alignment marker encodings

PCS lane number	Encoding <sup>a</sup> {M <sub>0</sub> , M <sub>1</sub> , M <sub>2</sub> , BIP <sub>3</sub> , M <sub>4</sub> , M <sub>5</sub> , M <sub>6</sub> , BIP <sub>7</sub> }
0	0x90, 0x76, 0x47, BIP <sub>3</sub> , 0x6F, 0x89, 0xB8, BIP <sub>7</sub>
1	0xF0, 0xC4, 0xE6, BIP <sub>3</sub> , 0x0F, 0x3B, 0x19, BIP <sub>7</sub>
2	0xC5, 0x65, 0x9B, BIP <sub>3</sub> , 0x3A, 0x9A, 0x64, BIP <sub>7</sub>
3	0xA2, 0x79, 0x3D, BIP <sub>3</sub> , 0x5D, 0x86, 0xC2, BIP <sub>7</sub>

<sup>a</sup>Each octet is transmitted LSB to MSB.

- For 40GBASE-R, there are 4 alignment markers, each with 8 elements
- The characteristics of the elements are described in the text
- 82.2.8 BIP calculations (not shown) defines the contents of BIP3

# 100G

**Table 82–2—100GBASE-R Alignment marker encodings**

*The headers are misaligned to the sub-columns by less than one sub-column*

PCS lane number	Encoding <sup>a</sup> {M <sub>0</sub> , M <sub>1</sub> , M <sub>2</sub> , BIP <sub>3</sub> , M <sub>4</sub> , M <sub>5</sub> , M <sub>6</sub> , BIP <sub>7</sub> }	PCS lane number	Encoding <sup>a</sup> {M <sub>0</sub> , M <sub>1</sub> , M <sub>2</sub> , BIP <sub>3</sub> , M <sub>4</sub> , M <sub>5</sub> , M <sub>6</sub> , BIP <sub>7</sub> }
0	0xC1, 0x68, 0x21, BIP <sub>3</sub> , 0x3E, 0x97, 0xDE, BIP <sub>7</sub>	10	0xFD, 0x6C, 0x99, BIP <sub>3</sub> , 0x02, 0x93, 0x66, BIP <sub>7</sub>
1	0x9D, 0x71, 0x8E, BIP <sub>3</sub> , 0x62, 0x8E, 0x71, BIP <sub>7</sub>	11	0xB9, 0x91, 0x55, BIP <sub>3</sub> , 0x46, 0x6E, 0xAA, BIP <sub>7</sub>
2	0x59, 0x4B, 0xE8, BIP <sub>3</sub> , 0xA6, 0xB4, 0x17, BIP <sub>7</sub>	12	0x5C, 0xB9, 0xB2, BIP <sub>3</sub> , 0xA3, 0x46, 0x4D, BIP <sub>7</sub>
3	0x4D, 0x95, 0x7B, BIP <sub>3</sub> , 0xB2, 0x6A, 0x84, BIP <sub>7</sub>	13	0x1A, 0xF8, 0xBD, BIP <sub>3</sub> , 0xE5, 0x07, 0x42, BIP <sub>7</sub>
4	0xF5, 0x07, 0x09, BIP <sub>3</sub> , 0x0A, 0xF8, 0xF6, BIP <sub>7</sub>	14	0x83, 0xC7, 0xCA, BIP <sub>3</sub> , 0x7C, 0x38, 0x35, BIP <sub>7</sub>
5	0xDD, 0x14, 0xC2, BIP <sub>3</sub> , 0x22, 0xEB, 0x3D, BIP <sub>7</sub>	15	0x35, 0x36, 0xCD, BIP <sub>3</sub> , 0xCA, 0xC9, 0x32, BIP <sub>7</sub>
6	0x9A, 0x4A, 0x26, BIP <sub>3</sub> , 0x65, 0xB5, 0xD9, BIP <sub>7</sub>	16	0xC4, 0x31, 0x4C, BIP <sub>3</sub> , 0x3B, 0xCE, 0xB3, BIP <sub>7</sub>
7	0x7B, 0x45, 0x66, BIP <sub>3</sub> , 0x84, 0xBA, 0x99, BIP <sub>7</sub>	17	0xAD, 0xD6, 0xB7, BIP <sub>3</sub> , 0x52, 0x29, 0x48, BIP <sub>7</sub>
8	0xA0, 0x24, 0x76, BIP <sub>3</sub> , 0x5F, 0xDB, 0x89, BIP <sub>7</sub>	18	0x5F, 0x66, 0x2A, BIP <sub>3</sub> , 0xA0, 0x99, 0xD5, BIP <sub>7</sub>
9	0x68, 0xC9, 0xFB, BIP <sub>3</sub> , 0x97, 0x36, 0x04, BIP <sub>7</sub>	19	0xC0, 0xF0, 0xE5, BIP <sub>3</sub> , 0x3F, 0x0F, 0x1A, BIP <sub>7</sub>

<sup>a</sup>Each octet is transmitted LSB to MSB.

*In a larger table, the clutter makes it hard to read*

- 100GBASE-R has 20 alignment markers, each with 8 elements

# 200G and 400G

The format of each PCS lane's alignment marker is shown in Figure 119–4. There is a portion that is common across all alignment markers (designated as CM0 to CM5), a unique portion per PCS lane (designated as UM0 to UM 5 ), and finally a unique pad per PCS lane (designated as UP0 to UP2). Common synchronization logic independent of the received PCS lane number can be used with the common portion of the alignment marker. The unique pad (UP0 to UP2) within the alignment markers and the PRBS9 pad at the end of the alignment maker group are ignored on receive.

The content of the alignment markers shall be as shown in Table 119–1 for the 200GBASE-R PCS and as shown in Table 119–2 for the 400GBASE-R PCS. The contents depend on the PCS lane number and the octet number, with CM0 through CM 5 being identical across all alignment markers to allow for common synchronization across lanes.

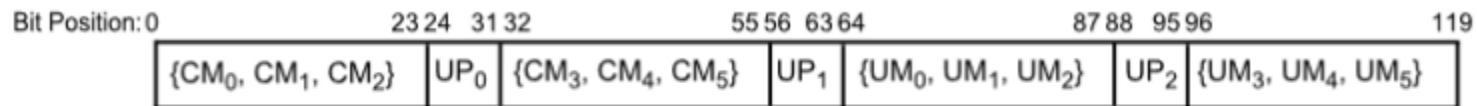


Figure 119–4—Alignment marker format

- Each alignment marker has 15 elements
- The characteristics of the elements are described in the text

**Table 119–1—200GBASE-R alignment marker encodings**  
*The headers are misaligned to the sub-columns*

# Getting crowded ...

PCS lane number	Encoding <sup>a</sup> {CM <sub>0</sub> , CM <sub>1</sub> , CM <sub>2</sub> , UP <sub>0</sub> , CM <sub>3</sub> , CM <sub>4</sub> , CM <sub>5</sub> , UP <sub>1</sub> , UM <sub>0</sub> , UM <sub>1</sub> , UM <sub>2</sub> , UP <sub>2</sub> , UM <sub>3</sub> , UM <sub>4</sub> , UM <sub>5</sub> }														
0	0x9A, 0x4A, 0x26	0x05	0x65, 0xB5, 0xD9	0xD6, 0xB3, 0xC0, 0x8C, 0x29, 0x4C, 0x3F, 0x73											
1	0x9A, 0x4A, 0x26	0x04	0x65, 0xB5, 0xD9	0x67, 0x5A, 0xDE, 0x7E, 0x98, 0xA5, 0x21, 0x81											
2	0x9A, 0x4A, 0x26	0x46	0x65, 0xB5, 0xD9	0xFE, 0x3E, 0xF3, 0x56, 0x01, 0xC1, 0x0C, 0xA9											
3	0x9A, 0x4A, 0x26	0x5A	0x65, 0xB5, 0xD9	0x84, 0x86, 0x80, 0xD0, 0x7B, 0x79, 0x7F, 0x2F											
4	0x9A, 0x4A, 0x26	0xE1	0x65, 0xB5, 0xD9	0x19, 0x2A, 0x51, 0xF2, 0xE6, 0xD5, 0xAE, 0x0D											
5	0x9A, 0x4A, 0x26	0xF2	0x65, 0xB5, 0xD9	0x4E, 0x12, 0x4F, 0xD1, 0xB1, 0xED, 0xB0, 0x2E											
6	0x9A, 0x4A, 0x26	0x3D	0x65, 0xB5, 0xD9	0xEE, 0x42, 0x9C, 0xA1, 0x11, 0xBD, 0x63, 0x5E											
7	0x9A, 0x4A, 0x26	0x22	0x65, 0xB5, 0xD9	0x32, 0xD6, 0x76, 0x5B, 0xCD, 0x29, 0x89, 0xA4											

**GBASE-R alignment marker encodings**

<sup>a</sup> Each octet is transmitted LSB to MSB.

- 200GBASE-R has 8 alignment markers, each with 15 elements
- 400GBASE-R has 16 alignment markers, each with 15 elements
- The tables are on different pages, which is unfortunate
- Some columns are the same for both 200G and 400G, although the text does not say so
- The UPs for lanes 1 to 7 seem to be the same at 200G and 400G (although different for each lane) but this is not true for lane 0

number	Encoding <sup>a</sup> {CM <sub>0</sub> , CM <sub>1</sub> , CM <sub>2</sub> , UP <sub>0</sub> , CM <sub>3</sub> , CM <sub>4</sub> , CM <sub>5</sub> , UP <sub>1</sub> , UM <sub>0</sub> , UM <sub>1</sub> , UM <sub>2</sub> , UP <sub>2</sub> , UM <sub>3</sub> , UM <sub>4</sub> , UM <sub>5</sub> }														
0	0x9A, 0x4A, 0x26	0xB6	0x65, 0xB5, 0xD9	0xD9, 0x01, 0x71, 0xF3, 0x26, 0xFE, 0x8E, 0x0C											
1	0x9A, 0x4A, 0x26	0x04	0x65, 0xB5, 0xD9	0x67, 0x5A, 0xDE, 0x7E, 0x98, 0xA5, 0x21, 0x81											
2	0x9A, 0x4A, 0x26	0x46	0x65, 0xB5, 0xD9	0xFE, 0x3E, 0xF3, 0x56, 0x01, 0xC1, 0x0C, 0xA9											
3	0x9A, 0x4A, 0x26	0x5A	0x65, 0xB5, 0xD9	0x84, 0x86, 0x80, 0xD0, 0x7B, 0x79, 0x7F, 0x2F											
4	0x9A, 0x4A, 0x26	0xE1	0x65, 0xB5, 0xD9	0x19, 0x2A, 0x51, 0xF2, 0xE6, 0xD5, 0xAE, 0x0D											
5	0x9A, 0x4A, 0x26	0xF2	0x65, 0xB5, 0xD9	0x4E, 0x12, 0x4F, 0xD1, 0xB1, 0xED, 0xB0, 0x2E											
6	0x9A, 0x4A, 0x26	0x3D	0x65, 0xB5, 0xD9	0xEE, 0x42, 0x9C, 0xA1, 0x11, 0xBD, 0x63, 0x5E											
7	0x9A, 0x4A, 0x26	0x22	0x65, 0xB5, 0xD9	0x32, 0xD6, 0x76, 0x5B, 0xCD, 0x29, 0x89, 0xA4											
8	0x9A, 0x4A, 0x26	0x60	0x65, 0xB5, 0xD9	0x9F, 0xE1, 0x73, 0x75, 0x60, 0x1E, 0x8C, 0x8A											
9	0x9A, 0x4A, 0x26	0x6B	0x65, 0xB5, 0xD9	0xA2, 0x71, 0xC4, 0x3C, 0x5D, 0x8E, 0x3B, 0xC3											
10	0x9A, 0x4A, 0x26	0xFA	0x65, 0xB5, 0xD9	0x04, 0x95, 0xEB, 0xD8, 0xFB, 0x6A, 0x14, 0x27											
11	0x9A, 0x4A, 0x26	0x6C	0x65, 0xB5, 0xD9	0x71, 0x22, 0x66, 0x38, 0x8E, 0xDD, 0x99, 0xC7											
12	0x9A, 0x4A, 0x26	0x18	0x65, 0xB5, 0xD9	0x5B, 0xA2, 0xF6, 0x95, 0xA4, 0x5D, 0x09, 0x6A											
13	0x9A, 0x4A, 0x26	0x14	0x65, 0xB5, 0xD9	0xCC, 0x31, 0x97, 0xC3, 0x33, 0xCE, 0x68, 0x3C											
14	0x9A, 0x4A, 0x26	0xD0	0x65, 0xB5, 0xD9	0xB1, 0xCA, 0xFB, 0xA6, 0x4E, 0x35, 0x04, 0x59											
15	0x9A, 0x4A, 0x26	0xB4	0x65, 0xB5, 0xD9	0x56, 0xA6, 0xBA, 0x79, 0xA9, 0x59, 0x45, 0x86											

<sup>a</sup> Each octet is transmitted LSB to MSB.

Table 172–2—800GBASE-R flow 0 alignment marker encodings

PCS lane number	Encoding <sup>a</sup> {CM <sub>0</sub> ,CM <sub>1</sub> ,CM <sub>2</sub> ,UP <sub>0</sub> ,CM <sub>3</sub> ,CM <sub>4</sub> ,CM <sub>5</sub> ,UP <sub>1</sub> ,UM <sub>0</sub> ,UM <sub>1</sub> ,UM <sub>2</sub> ,UP <sub>2</sub> ,UM <sub>3</sub> ,UM <sub>4</sub> ,UM <sub>5</sub> }														
0	0x9A, 0x4A, 0x26	0xB6, 0x65, 0xB5, 0xD9	0xD9	0xFE, 0x71, 0xF3	0x26	0x01, 0x8E, 0x0C									
1	0x9A, 0x4A, 0x26	0x04, 0x65, 0xB5, 0xD9	0x67	0xA5, 0xDE, 0x7E	0x98	0x5A, 0x21, 0x81									
2	0x9A, 0x4A, 0x26	0x46, 0x65, 0xB5, 0xD9	0xFE	0xC1, 0xF3, 0x56	0x01	0x3E, 0x0C, 0xA9									
3	0x9A, 0x4A, 0x26	0x5A, 0x65, 0xB5, 0xD9	0x84	0x79, 0x80, 0xD0	0x7B	0x86, 0x7F, 0x2F									
4	0x9A, 0x4A, 0x26	0xE1, 0x65, 0xB5, 0xD9	0x19	0xD5, 0x51, 0xF2	0xE6	0x2A, 0xAE, 0x0D									
5	0x9A, 0x4A, 0x26	0xF2, 0x65, 0xB5, 0xD9	0x4E	0xED, 0x4F, 0xD1	0xB1	0x12, 0xB0, 0x2E									
6	0x9A, 0x4A, 0x26	0x3D, 0x65, 0xB5, 0xD9	0xEE	0xBD, 0x9C, 0xA1	0x11	0x42, 0x63, 0x5E									
7	0x9A, 0x4A, 0x26	0x22, 0x65, 0xB5, 0xD9	0x32	0x29, 0x76, 0x5B	0xCD	0xD6, 0x89, 0xA4									
8	0x9A, 0x4A, 0x26	0x60, 0x65, 0xB5, 0xD9	0x9F	0x1E, 0x73, 0x75	0x60	0xE1, 0x8C, 0x8A									
9	0x9A, 0x4A, 0x26	0x6B, 0x65, 0xB5, 0xD9	0xA2	0x8E, 0xC4, 0x3C	0x5D	0x71, 0x3B, 0xC3									
10	0x9A, 0x4A, 0x26	0xFA, 0x65, 0xB5, 0xD9	0x04	0x6A, 0xEB, 0xD8	0xFB	0x95, 0x14, 0x27									
11	0x9A, 0x4A, 0x26	0x6C, 0x65, 0xB5, 0xD9	0x71	0xDD, 0x66, 0x38	0x8E	0x22, 0x99, 0xC7									
12	0x9A, 0x4A, 0x26	0x18, 0x65, 0xB5, 0xD9	0x5B	0x5D, 0xF6, 0x95	0xA4	0xA2, 0x09, 0x6A									
13	0x9A, 0x4A, 0x26	0x14, 0x65, 0xB5, 0xD9	0xCC	0xCE, 0x97, 0xC3	0x33	0x31, 0x68, 0x3C									
14	0x9A, 0x4A, 0x26	0xD0, 0x65, 0xB5, 0xD9	0xB1	0x35, 0xFB, 0xA6	0x4E	0xCA, 0x04, 0x59									
15	0x9A, 0x4A, 0x26	0xB4, 0x65, 0xB5, 0xD9	0x56	0x59, 0xBA, 0x79	0xA9	0xA6, 0x45, 0x86									

<sup>a</sup> Each octet is transmitted LSB to MSB.

Table 172–3—800GBASE-R flow 1 alignment marker encodings

PCS lane number	Encoding <sup>a</sup> {CM <sub>0</sub> ,CM <sub>1</sub> ,CM <sub>2</sub> ,UP <sub>0</sub> ,CM <sub>3</sub> ,CM <sub>4</sub> ,CM <sub>5</sub> ,UP <sub>1</sub> ,UM <sub>0</sub> ,UM <sub>1</sub> ,UM <sub>2</sub> ,UP <sub>2</sub> ,UM <sub>3</sub> ,UM <sub>4</sub> ,UM <sub>5</sub> }														
16	0x9A, 0x4A, 0x26	0xB6, 0x65, 0xB5, 0xD9	0xD9	0x01, 0x8E, 0x0C	0x26	0xFE, 0x71, 0xF3									
17	0x9A, 0x4A, 0x26	0x04, 0x65, 0xB5, 0xD9	0x67	0x5A, 0x21, 0x81	0x98	0xA5, 0xDE, 0x7E									
18	0x9A, 0x4A, 0x26	0x46, 0x65, 0xB5, 0xD9	0xFE	0x3E, 0x0C, 0xA9	0x01	0xC1, 0xF3, 0x56									
19	0x9A, 0x4A, 0x26	0x5A, 0x65, 0xB5, 0xD9	0x84	0x86, 0x7F, 0x2F	0x7B	0x79, 0x80, 0xD0									
20	0x9A, 0x4A, 0x26	0xE1, 0x65, 0xB5, 0xD9	0x19	0x2A, 0xAE, 0x0D	0xE6	0xD5, 0x51, 0xF2									
21	0x9A, 0x4A, 0x26	0xF2, 0x65, 0xB5, 0xD9	0x4E	0x12, 0xB0, 0x2E	0xB1	0xED, 0x4F, 0xD1									
22	0x9A, 0x4A, 0x26	0x3D, 0x65, 0xB5, 0xD9	0xEE	0x42, 0x63, 0x5E	0x11	0xBD, 0x9C, 0xA1									
23	0x9A, 0x4A, 0x26	0x22, 0x65, 0xB5, 0xD9	0x32	0xD6, 0x89, 0xA4	0xCD	0x29, 0x76, 0x5B									
24	0x9A, 0x4A, 0x26	0x60, 0x65, 0xB5, 0xD9	0x9F	0xE1, 0x8C, 0x8A	0x60	0x1E, 0x73, 0x75									
25	0x9A, 0x4A, 0x26	0x6B, 0x65, 0xB5, 0xD9	0xA2	0x71, 0x3B, 0xC3	0x5D	0x8E, 0xC4, 0x3C									
26	0x9A, 0x4A, 0x26	0xFA, 0x65, 0xB5, 0xD9	0x04	0x95, 0x14, 0x27	0xFB	0x6A, 0xEB, 0xD8									
27	0x9A, 0x4A, 0x26	0x6C, 0x65, 0xB5, 0xD9	0x71	0x22, 0x99, 0xC7	0x8E	0xDD, 0x66, 0x38									

Table 172–3—800GBASE-R flow 1 alignment marker encodings

PCS lane number	Encoding <sup>a</sup> {CM <sub>0</sub> ,CM <sub>1</sub> ,CM <sub>2</sub> ,UP <sub>0</sub> ,CM <sub>3</sub> ,CM <sub>4</sub> ,CM <sub>5</sub> ,UP <sub>1</sub> ,UM <sub>0</sub> ,UM <sub>1</sub> ,UM <sub>2</sub> ,UP <sub>2</sub> ,UM <sub>3</sub> ,UM <sub>4</sub> ,UM <sub>5</sub> }														
28	0x9A, 0x4A, 0x26	0x18, 0x65, 0xB5, 0xD9	0x5B	0xA2, 0x09, 0x6A	0xA4	0x5D, 0xF6, 0x95									
29	0x9A, 0x4A, 0x26	0x14, 0x65, 0xB5, 0xD9	0xCC	0x31, 0x68, 0x3C	0x33	0xCE, 0x97, 0xC3									
30	0x9A, 0x4A, 0x26	0xD0, 0x65, 0xB5, 0xD9	0xB1	0xCA, 0x04, 0x59	0x4E	0x35, 0xFB, 0xA6									
31	0x9A, 0x4A, 0x26	0xB4, 0x65, 0xB5, 0xD9	0x56	0xA6, 0x45, 0x86	0xA9	0x59, 0xBA, 0x79									

<sup>a</sup> Each octet is transmitted LSB to MSB.

# Draft for 800GBASE

The alignment marker mapping and insertion in each flow is identical to the 400GBASE-R alignment marker and insertion function specified in 119.2.4.4 with the following exceptions:

— Alignment marker encoding values for flow 0 are specified in Table 172–2.

— Alignment marker encoding values for flow 1 are specified in Table 172–3 ...

- 800GBASE-R has 32 alignment markers, each with 15 elements – **twice as much as 400GBASE-R**
- The tables are spread over two pages
- One table is split over two pages
- Way too much clutter in these big tables – needs a different way of presenting the info
- The description of what is the same or different vs. tables 119-1 and 119-2 is missing
- The statement of what the same for each lane, or each lane in a flow, is missing
  - As the text says that these AMs are different, the reader cannot assume that any description in 119 applies here
- The statement of what is the same for both flows, and where they are different, how they differ, is missing

PCS lane number	CM <sub>0</sub> , CM <sub>1</sub> , CM <sub>2</sub>	UP <sub>0</sub>	CM <sub>3</sub> , CM <sub>4</sub> , CM <sub>5</sub>	UP <sub>1</sub> , UM <sub>0</sub> , UM <sub>1</sub> , UM <sub>2</sub> , UP <sub>2</sub> , UM <sub>3</sub> , UM <sub>4</sub> , UM <sub>5</sub>
0	0x9A, 0x4A, 0x26	0xB6	0x65, 0xB5, 0xD9	0xD9, 0xFE, 0x71, 0xF3, 0x26, 0x01, 0x8E, 0x0C
1		0x04		0x67, 0xA5, 0xDE, 0x7E, 0x98, 0x5A, 0x21, 0x81
2		0x46		0xFE, 0xC1, 0xF3, 0x56, 0x01, 0x3E, 0x0C, 0xA9
...		...		...

- The common elements can be shown by the usual method

– Aside – it would be better if the CM, UP and UM numbers were not subscripts



# It's one table not two, and will fit on one page

*Proper table columns avoid column misalignment even in the official font*

PCS lane number	CM <sub>0</sub>	CM <sub>1</sub>	CM <sub>2</sub>	UP <sub>0</sub>	CM <sub>3</sub>	CM <sub>4</sub>	CM <sub>5</sub>	UP <sub>1</sub>	UM <sub>0</sub>	UM <sub>1</sub>	UM <sub>2</sub>	UP <sub>2</sub>	UM <sub>3</sub>	UM <sub>4</sub>	UM <sub>5</sub>
Flow 0															
0	0x9A	0x4A	0x26	0xB6	0x65	0xB5	0xD9	0xD9	0xFE	0x71	0xF3	0x26	0x01	0x8E	0x0C
1	0x9A	0x4A	0x26	0x04	0x65	0xB5	0xD9	0x67	0xA5	0xDE	0x7E	0x98	0x5A	0x21	0x81
2	0x9A	0x4A	0x26	0x46	0x65	0xB5	0xD9	0xFE	0xC1	0xF3	0x56	0x01	0x3E	0x0C	0xA9
3	0x9A	0x4A	0x26	0x5A	0x65	0xB5	0xD9	0x84	0x79	0x80	0xD0	0x7B	0x86	0x7F	0x2F
4	0x9A	0x4A	0x26	0xE1	0x65	0xB5	0xD9	0x19	0xD5	0x51	0xF2	0xE6	0x2A	0xAE	0x0D
5	0x9A	0x4A	0x26	0xF2	0x65	0xB5	0xD9	0x4E	0xED	0x4F	0xD1	0xB1	0x12	0xB0	0x2E
6	0x9A	0x4A	0x26	0x3D	0x65	0xB5	0xD9	0xEE	0xBD	0x9C	0xA1	0x11	0x42	0x63	0x5E
7	0x9A	0x4A	0x26	0x22	0x65	0xB5	0xD9	0x32	0x29	0x76	0x5B	0xCD	0xD6	0x89	0xA4
8	0x9A	0x4A	0x26	0x60	0x65	0xB5	0xD9	0x9F	0x1E	0x73	0x75	0x60	0xE1	0x8C	0x8A
9	0x9A	0x4A	0x26	0x6B	0x65	0xB5	0xD9	0xA2	0x8E	0xC4	0x3C	0x5D	0x71	0x3B	0xC3
10	0x9A	0x4A	0x26	0xFA	0x65	0xB5	0xD9	0x04	0x6A	0xEB	0xD8	0xFB	0x95	0x14	0x27
11	0x9A	0x4A	0x26	0x6C	0x65	0xB5	0xD9	0x71	0xDD	0x66	0x38	0x8E	0x22	0x99	0xC7
12	0x9A	0x4A	0x26	0x18	0x65	0xB5	0xD9	0x5B	0x5D	0xF6	0x95	0xA4	0xA2	0x09	0x6A
13	0x9A	0x4A	0x26	0x14	0x65	0xB5	0xD9	0xCC	0xCE	0x97	0xC3	0x33	0x31	0x68	0x3C
14	0x9A	0x4A	0x26	0xD0	0x65	0xB5	0xD9	0xB1	0x35	0xFB	0xA6	0x4E	0xCA	0x04	0x59
15	0x9A	0x4A	0x26	0xB4	0x65	0xB5	0xD9	0x56	0x59	0xBA	0x79	0xA9	0xA6	0x45	0x86
Flow 1															
16	0x9A	0x4A	0x26	0xB6	0x65	0xB5	0xD9	0xD9	0x01	0x8E	0x0C	0x26	0xFE	0x71	0xF3
17	0x9A	0x4A	0x26	0x04	0x65	0xB5	0xD9	0x67	0x5A	0x21	0x81	0x98	0xA5	0xDE	0x7E
18	0x9A	0x4A	0x26	0x46	0x65	0xB5	0xD9	0xFE	0x3E	0x0C	0xA9	0x01	0xC1	0xF3	0x56
19	0x9A	0x4A	0x26	0x5A	0x65	0xB5	0xD9	0x84	0x86	0x7F	0x2F	0x7B	0x79	0x80	0xD0
20	0x9A	0x4A	0x26	0xE1	0x65	0xB5	0xD9	0x19	0x2A	0xAE	0x0D	0xE6	0xD5	0x51	0xF2
21	0x9A	0x4A	0x26	0xF2	0x65	0xB5	0xD9	0x4E	0x12	0xB0	0x2E	0xB1	0xED	0x4F	0xD1
22	0x9A	0x4A	0x26	0x3D	0x65	0xB5	0xD9	0xEE	0x42	0x63	0x5E	0x11	0xBD	0x9C	0xA1
23	0x9A	0x4A	0x26	0x22	0x65	0xB5	0xD9	0x32	0xD6	0x89	0xA4	0xCD	0x29	0x76	0x5B
24	0x9A	0x4A	0x26	0x60	0x65	0xB5	0xD9	0x9F	0xE1	0x8C	0x8A	0x60	0x1E	0x73	0x75
25	0x9A	0x4A	0x26	0x6B	0x65	0xB5	0xD9	0xA2	0x71	0x3B	0xC3	0x5D	0x8E	0xC4	0x3C
26	0x9A	0x4A	0x26	0xFA	0x65	0xB5	0xD9	0x04	0x95	0x14	0x27	0xFB	0x6A	0xEB	0xD8
27	0x9A	0x4A	0x26	0x6C	0x65	0xB5	0xD9	0x71	0x22	0x99	0xC7	0x8E	0xDD	0x66	0x38
28	0x9A	0x4A	0x26	0x18	0x65	0xB5	0xD9	0x5B	0xA2	0x09	0x6A	0xA4	0x5D	0xF6	0x95
29	0x9A	0x4A	0x26	0x14	0x65	0xB5	0xD9	0xCC	0x31	0x68	0x3C	0x33	0xCE	0x97	0xC3
30	0x9A	0x4A	0x26	0xD0	0x65	0xB5	0xD9	0xB1	0xCA	0x04	0x59	0x4E	0x35	0xFB	0xA6
31	0x9A	0x4A	0x26	0xB4	0x65	0xB5	0xD9	0x56	0xA6	0x45	0x86	0xA9	0x59	0xBA	0x79

<sup>a</sup> Each octet is transmitted LSB to MSB.

# It's one table not two, and will fit on one page

*With fewer rows and an extra column*

Flow	PCS lane number	CM <sub>0</sub>	CM <sub>1</sub>	CM <sub>2</sub>	UP <sub>0</sub>	CM <sub>3</sub>	CM <sub>4</sub>	CM <sub>5</sub>	UP <sub>1</sub>	UM <sub>0</sub>	UM <sub>1</sub>	UM <sub>2</sub>	UP <sub>2</sub>	UM <sub>3</sub>	UM <sub>4</sub>	UM <sub>5</sub>
0	0	0x9A	0x4A	0x26	0xB6	0x65	0xB5	0xD9	0xD9	0xFE	0x71	0xF3	0x26	0x01	0x8E	0x0C
	1	0x9A	0x4A	0x26	0x04	0x65	0xB5	0xD9	0x67	0xA5	0xDE	0x7E	0x98	0x5A	0x21	0x81
	2	0x9A	0x4A	0x26	0x46	0x65	0xB5	0xD9	0xFE	0xC1	0xF3	0x56	0x01	0x3E	0x0C	0xA9
	3	0x9A	0x4A	0x26	0x5A	0x65	0xB5	0xD9	0x84	0x79	0x80	0xD0	0x7B	0x86	0x7F	0x2F
	4	0x9A	0x4A	0x26	0xE1	0x65	0xB5	0xD9	0x19	0xD5	0x51	0xF2	0xE6	0x2A	0xAE	0x0D
	5	0x9A	0x4A	0x26	0xF2	0x65	0xB5	0xD9	0x4E	0xED	0x4F	0xD1	0xB1	0x12	0xB0	0x2E
	6	0x9A	0x4A	0x26	0x3D	0x65	0xB5	0xD9	0xEE	0xBD	0x9C	0xA1	0x11	0x42	0x63	0x5E
	7	0x9A	0x4A	0x26	0x22	0x65	0xB5	0xD9	0x32	0x29	0x76	0x5B	0xCD	0xD6	0x89	0xA4
	8	0x9A	0x4A	0x26	0x60	0x65	0xB5	0xD9	0x9F	0x1E	0x73	0x75	0x60	0xE1	0x8C	0x8A
	9	0x9A	0x4A	0x26	0x6B	0x65	0xB5	0xD9	0xA2	0x8E	0xC4	0x3C	0x5D	0x71	0x3B	0xC3
	10	0x9A	0x4A	0x26	0xFA	0x65	0xB5	0xD9	0x04	0x6A	0xEB	0xD8	0xFB	0x95	0x14	0x27
	11	0x9A	0x4A	0x26	0x6C	0x65	0xB5	0xD9	0x71	0xDD	0x66	0x38	0x8E	0x22	0x99	0xC7
	12	0x9A	0x4A	0x26	0x18	0x65	0xB5	0xD9	0x5B	0x5D	0xF6	0x95	0xA4	0xA2	0x09	0x6A
	13	0x9A	0x4A	0x26	0x14	0x65	0xB5	0xD9	0xCC	0xCE	0x97	0xC3	0x33	0x31	0x68	0x3C
	14	0x9A	0x4A	0x26	0xD0	0x65	0xB5	0xD9	0xB1	0x35	0xFB	0xA6	0x4E	0xCA	0x04	0x59
15	0x9A	0x4A	0x26	0xB4	0x65	0xB5	0xD9	0x56	0x59	0xBA	0x79	0xA9	0xA6	0x45	0x86	
1	16	0x9A	0x4A	0x26	0xB6	0x65	0xB5	0xD9	0xD9	0x01	0x8E	0x0C	0x26	0xFE	0x71	0xF3
	17	0x9A	0x4A	0x26	0x04	0x65	0xB5	0xD9	0x67	0x5A	0x21	0x81	0x98	0xA5	0xDE	0x7E
	18	0x9A	0x4A	0x26	0x46	0x65	0xB5	0xD9	0xFE	0x3E	0x0C	0xA9	0x01	0xC1	0xF3	0x56
	19	0x9A	0x4A	0x26	0x5A	0x65	0xB5	0xD9	0x84	0x86	0x7F	0x2F	0x7B	0x79	0x80	0xD0
	20	0x9A	0x4A	0x26	0xE1	0x65	0xB5	0xD9	0x19	0x2A	0xAE	0x0D	0xE6	0xD5	0x51	0xF2
	21	0x9A	0x4A	0x26	0xF2	0x65	0xB5	0xD9	0x4E	0x12	0xB0	0x2E	0xB1	0xED	0x4F	0xD1
	22	0x9A	0x4A	0x26	0x3D	0x65	0xB5	0xD9	0xEE	0x42	0x63	0x5E	0x11	0xBD	0x9C	0xA1
	23	0x9A	0x4A	0x26	0x22	0x65	0xB5	0xD9	0x32	0xD6	0x89	0xA4	0xCD	0x29	0x76	0x5B
	24	0x9A	0x4A	0x26	0x60	0x65	0xB5	0xD9	0x9F	0xE1	0x8C	0x8A	0x60	0x1E	0x73	0x75
	25	0x9A	0x4A	0x26	0x6B	0x65	0xB5	0xD9	0xA2	0x71	0x3B	0xC3	0x5D	0x8E	0xC4	0x3C
	26	0x9A	0x4A	0x26	0xFA	0x65	0xB5	0xD9	0x04	0x95	0x14	0x27	0xFB	0x6A	0xEB	0xD8
	27	0x9A	0x4A	0x26	0x6C	0x65	0xB5	0xD9	0x71	0x22	0x99	0xC7	0x8E	0xDD	0x66	0x38
	28	0x9A	0x4A	0x26	0x18	0x65	0xB5	0xD9	0x5B	0xA2	0x09	0x6A	0xA4	0x5D	0xF6	0x95
	29	0x9A	0x4A	0x26	0x14	0x65	0xB5	0xD9	0xCC	0x31	0x68	0x3C	0x33	0xCE	0x97	0xC3
	30	0x9A	0x4A	0x26	0xD0	0x65	0xB5	0xD9	0xB1	0xCA	0x04	0x59	0x4E	0x35	0xFB	0xA6
	31	0x9A	0x4A	0x26	0xB4	0x65	0xB5	0xD9	0x56	0xA6	0x45	0x86	0xA9	0x59	0xBA	0x79

<sup>a</sup> Each octet is transmitted LSB to MSB.

# Taking out some clutter

PCS lane number	CM <sub>0</sub>	CM <sub>1</sub>	CM <sub>2</sub>	UP <sub>0</sub>	CM <sub>3</sub>	CM <sub>4</sub>	CM <sub>5</sub>	UP <sub>1</sub>	UM <sub>0</sub>	UM <sub>1</sub>	UM <sub>2</sub>	UP <sub>2</sub>	UM <sub>3</sub>	UM <sub>4</sub>	UM <sub>5</sub>
Flow 0															
0	0x9A	0x4A	0x26	0xB6	0x65	0xB5	0xD9	0xD9	0xFE	0x71	0xF3	0x26	0x01	0x8E	0x0C
1				0x04				0x67	0xA5	0xDE	0x7E	0x98	0x5A	0x21	0x81
2				0x46				0xFE	0xC1	0xF3	0x56	0x01	0x3E	0x0C	0xA9
3				0x5A				0x84	0x79	0x80	0xD0	0x7B	0x86	0x7F	0x2F
4				0xE1				0x19	0xD5	0x51	0xF2	0xE6	0x2A	0xAE	0x0D
5				0xF2				0x4E	0xED	0x4F	0xD1	0xB1	0x12	0xB0	0x2E
6				0x3D				0xEE	0xBD	0x9C	0xA1	0x11	0x42	0x63	0x5E
7				0x22				0x32	0x29	0x76	0x5B	0xCD	0xD6	0x89	0xA4
8				0x60				0x9F	0x1E	0x73	0x75	0x60	0xE1	0x8C	0x8A
9				0x6B				0xA2	0x8E	0xC4	0x3C	0x5D	0x71	0x3B	0xC3
10				0xFA				0x04	0x6A	0xEB	0xD8	0xFB	0x95	0x14	0x27
11				0x6C				0x71	0xDD	0x66	0x38	0x8E	0x22	0x99	0xC7
12				0x18				0x5B	0x5D	0xF6	0x95	0xA4	0xA2	0x09	0x6A
13				0x14				0xCC	0xCE	0x97	0xC3	0x33	0x31	0x68	0x3C
14				0xD0				0xB1	0x35	0xFB	0xA6	0x4E	0xCA	0x04	0x59
15				0xB4				0x56	0x59	0xBA	0x79	0xA9	0xA6	0x45	0x86
Flow 1															
16	0x9A	0x4A	0x26	0xB6	0x65	0xB5	0xD9	0xD9	0x01	0x8E	0x0C	0x26	0xFE	0x71	0xF3
17				0x04				0x67	0x5A	0x21	0x81	0x98	0xA5	0xDE	0x7E
18				0x46				0xFE	0x3E	0x0C	0xA9	0x01	0xC1	0xF3	0x56
19				0x5A				0x84	0x86	0x7F	0x2F	0x7B	0x79	0x80	0xD0
20				0xE1				0x19	0x2A	0xAE	0x0D	0xE6	0xD5	0x51	0xF2
21				0xF2				0x4E	0x12	0xB0	0x2E	0xB1	0xED	0x4F	0xD1
22				0x3D				0xEE	0x42	0x63	0x5E	0x11	0xBD	0x9C	0xA1
23				0x22				0x32	0xD6	0x89	0xA4	0xCD	0x29	0x76	0x5B
24				0x60				0x9F	0xE1	0x8C	0x8A	0x60	0x1E	0x73	0x75
25				0x6B				0xA2	0x71	0x3B	0xC3	0x5D	0x8E	0xC4	0x3C
26				0xFA				0x04	0x95	0x14	0x27	0xFB	0x6A	0xEB	0xD8
27				0x6C				0x71	0x22	0x99	0xC7	0x8E	0xDD	0x66	0x38
28				0x18				0x5B	0xA2	0x09	0x6A	0xA4	0x5D	0xF6	0x95
29				0x14				0xCC	0x31	0x68	0x3C	0x33	0xCE	0x97	0xC3
30				0xD0				0xB1	0xCA	0x04	0x59	0x4E	0x35	0xFB	0xA6
31				0xB4				0x56	0xA6	0x45	0x86	0xA9	0x59	0xBA	0x79

Same

Same

Same

<sup>a</sup> Each octet is transmitted LSB to MSB.  
802.3df May 2023

# Taking out more clutter

Flow	PCS lane number	CM <sub>0</sub>	CM <sub>1</sub>	CM <sub>2</sub>	UP <sub>0</sub>	CM <sub>3</sub>	CM <sub>4</sub>	CM <sub>5</sub>	UP <sub>1</sub>	UM <sub>0</sub>	UM <sub>1</sub>	UM <sub>2</sub>	UP <sub>2</sub>	UM <sub>3</sub>	UM <sub>4</sub>	UM <sub>5</sub>
0	0	9A	4A	26	B6	65	B5	D9	D9	FE	71	F3	26	01	8E	0C
	1				04				67	A5	DE	7E	98	5A	21	81
	2				46				FE	C1	F3	56	01	3E	0C	A9
	3				5A				84	79	80	D0	7B	86	7F	2F
	4				E1				19	D5	51	F2	E6	2A	AE	0D
	5				F2				4E	ED	4F	D1	B1	12	B0	2E
	6				3D				EE	BD	9C	A1	11	42	63	5E
	7				22				32	29	76	5B	CD	D6	89	A4
	8				60				9F	1E	73	75	60	E1	8C	8A
	9				6B				A2	8E	C4	3C	5D	71	3B	C3
	10				FA				04	6A	EB	D8	FB	95	14	27
	11				6C				71	DD	66	38	8E	22	99	C7
	12				18				5B	5D	F6	95	A4	A2	09	6A
	13				14				CC	CE	97	C3	33	31	68	3C
	14				D0				B1	35	FB	A6	4E	CA	04	59
	15				B4				56	59	BA	79	A9	A6	45	86
1	16	9A	4A	26	B6	65	B5	D9	D9	01	8E	0C	26	FE	71	F3
	17				04				67	5A	21	81	98	A5	DE	7E
	18				46				FE	3E	0C	A9	01	C1	F3	56
	19				5A				84	86	7F	2F	7B	79	80	D0
	20				E1				19	2A	AE	0D	E6	D5	51	F2
	21				F2				4E	12	B0	2E	B1	ED	4F	D1
	22				3D				EE	42	63	5E	11	BD	9C	A1
	23				22				32	D6	89	A4	CD	29	76	5B
	24				60				9F	E1	8C	8A	60	1E	73	75
	25				6B				A2	71	3B	C3	5D	8E	C4	3C
	26				FA				04	95	14	27	FB	6A	EB	D8
	27				6C				71	22	99	C7	8E	DD	66	38
	28				18				5B	A2	09	6A	A4	5D	F6	95
	29				14				CC	31	68	3C	33	CE	97	C3
	30				D0				B1	CA	04	59	4E	35	FB	A6
	31				B4				56	A6	45	86	A9	59	BA	79

Same

Same

Same

<sup>a</sup> Values are in hexadecimal. Each octet is transmitted LSB to MSB.