

Fibre Channel CJTPAT modified for SAS

This document describes a modification to the Fibre Channel Compliant Receive Jitter Tolerance Pattern (CJTPAT) described in FC-MJSQ that would make the CJTPAT suitable for SAS.

The modification takes into account the fact that for a given set of 8B test pattern data the actual bit pattern on the wire (that is, the 10B pattern) depends on the current running disparity (RD) at the beginning of the test pattern.

Specifically in the CJTPAT the different pattern resulting from the different RD affects the transitions between the low transition density pattern segment and the high transition density pattern segment. The CJTPAT was designed to stress the receiver with certain phase jumps, represented through a certain bit sequence in the data stream. The pattern was designed for a protocol frame starting with negative current RD. When this pattern is encoded with positive RD, the different resulting 10B data does not provide the same phase jumps as when encoded with negative starting RD.

The pattern below essentially is a concatenation of two runs of the CJTPAT. The first run is the original CJTPAT which provides the desired phase jumps with negative starting RD. The second run of the CJTPAT was modified to provide the desired phase jumps with positive starting RD.

Table 1 below shows the 8B pattern and the resulting 10B pattern for negative starting RD in a complete SSP frame format (CRC not calculated). Table 2 shows the same 8B pattern but with the 10B resulting from positive starting RD.

Both tables show the pattern without scrambling, that is, the pattern that has to be applied to the 8B/10B encoder after the scrambler in the transmitter. The pattern that has to be fed into the scrambler can be derived by scrambling the payload contents of the frame.

Table 1 - 8B/10B values with negative (-) starting RD (unscrambled)

-	K28.5(bc)			D24.0(18)			D04.7(e4)			D07.3(67)			+
	0011	1110	1000	1100	1011	0010	1011	1000	0111	0011			
SOF													
+	D30.3(7e)			D30.3(7e)			D30.3(7e)			D30.3(7e)			+
	1000	0111	0001	1110	0011	1000	0111	0001	1110	0011			
Above 4 byte low density pattern is repeated 41 times													
+	D30.3(7e)			D30.3(7e)			D30.3(7e)			D20.3(74)			-
	1000	0111	0001	1110	0011	1000	0111	0000	1011	1100			
For - starting RD: phase jump 11100001011													
-	D30.3(7e)			D11.5(ab)			D21.5(b5)			D21.5(b5)			+
	0111	1000	1111	0100	1010	1010	1010	1010	1010	1010			
For - starting RD: phase jump 00011110100													
+	D21.5(b5)			D21.5(b5)			D21.5(b5)			D21.5(b5)			+
	1010	1010	1010	1010	1010	1010	1010	1010	1010	1010			
Above 4 byte high density pattern is repeated 12 times													
+	D21.5(b5)			D30.2(5e)			D10.2(4a)			D30.3(7e)			+
	1010	1010	1010	0001	0101	0101	0101	0101	1110	0011			
For - starting RD: Phase jump 01010000 and 10101111													
+	D30.3(7e)			D30.3(7e)			D30.3(7e)			D30.3(7e)			+
	1000	0111	0001	1110	0011	1000	0111	0001	1110	0011			
Above 4 byte low density pattern is repeated 41 times													
+	D30.3(7e)			D30.3(7e)			D30.3(7e)			D11.3(6b)			-
	1000	0111	0001	1110	0011	1000	0111	0011	0100	1100			
For + starting RD: phase jump 0001110100													
-	D30.3(7e)			D20.2(54)			D10.2(4a)			D10.2(4a)			+
	0111	1000	1100	1011	0101	0101	0101	0101	0101	0101			
For + starting RD: phase jump 11100001011													
+	D10.2(4a)			D10.2(4a)			D10.2(4a)			D10.2(4a)			+
	0101	0101	0101	0101	0101	0101	0101	0101	0101	0101			
Above 4 byte high density pattern is repeated 12 times													
+	D10.2(4a)			D30.5(be)			D21.5(b5)			D30.3(7e)			+
	0101	0101	0110	0001	1010	1010	1010	1001	1110	0011			
For + starting RD: Phase jump 10101111 and 01010000													
+													
CRC													
	k28.5(bc)			D24.0(18)			D16.7(f0)			D27.4(9b)			
EOF													

Table 2 - 8B/10B values with positive (+) starting RD (unscrambled)

+	K28.5(bc)			D24.0(18)			D04.7(e4)			D07.3(67)			-
	1100	0001	0111	0011	0100	1101	0100	0111	1000	1100			
SOF													
-	D30.3(7e)			D30.3(7e)			D30.3(7e)			D30.3(7e)			-
	0111	1000	1110	0001	1100	0111	1000	1110	0001	1100			
Above 4 byte low density pattern is repeated 41 times													
-	D30.3(7e)			D30.3(7e)			D30.3(7e)			D20.3(74)			+
	0111	1000	1110	0001	1100	0111	1000	1100	1011	0011			
For - starting RD: phase jump 11100001011													
+	D30.3(7e)			D11.5(ab)			D21.5(b5)			D21.5(b5)			-
	1000	0111	0011	0100	1010	1010	1010	1010	1010	1010			
For - starting RD: phase jump 00011110100													
-	D21.5(b5)			D21.5(b5)			D21.5(b5)			D21.5(b5)			-
	1010	1010	1010	1010	1010	1010	1010	1010	1010	1010			
Above 4 byte high density pattern is repeated 12 times													
-	D21.5(b5)			D30.2(5e)			D10.2(4a)			D30.3(7e)			-
	1010	1010	1001	1110	0101	0101	0101	0110	0001	1100			
For - starting RD: Phase jump 01010000 and 10101111													
-	D30.3(7e)			D30.3(7e)			D30.3(7e)			D30.3(7e)			-
	0111	1000	1110	0001	1100	0111	1000	1110	0001	1100			
Above 4 byte low density pattern is repeated 41 times													
-	D30.3(7e)			D30.3(7e)			D30.3(7e)			D11.3(6b)			+
	0111	1000	1110	0001	1100	0111	1000	1111	0100	0011			
For + starting RD: phase jump 0001110100													
+	D30.3(7e)			D20.2(54)			D10.2(4a)			D10.2(4a)			-
	1000	0111	0000	1011	0101	0101	0101	0101	0101	0101			
For + starting RD: phase jump 11100001011													
-	D10.2(4a)			D10.2(4a)			D10.2(4a)			D10.2(4a)			-
	0101	0101	0101	0101	0101	0101	0101	0101	0101	0101			
Above 4 byte high density pattern is repeated 12 times													
-	D10.2(4a)			D30.5(be)			D21.5(b5)			D30.3(7e)			-
	0101	0101	0101	1110	1010	1010	1010	1010	0001	1100			
For + starting RD: Phase jump 10101111 and 01010000													
-													
CRC													
	k28.5(bc)			D24.0(18)			D16.7(f0)			D27.4(9b)			
EOF													