

Serial Communications

FC-AL-3

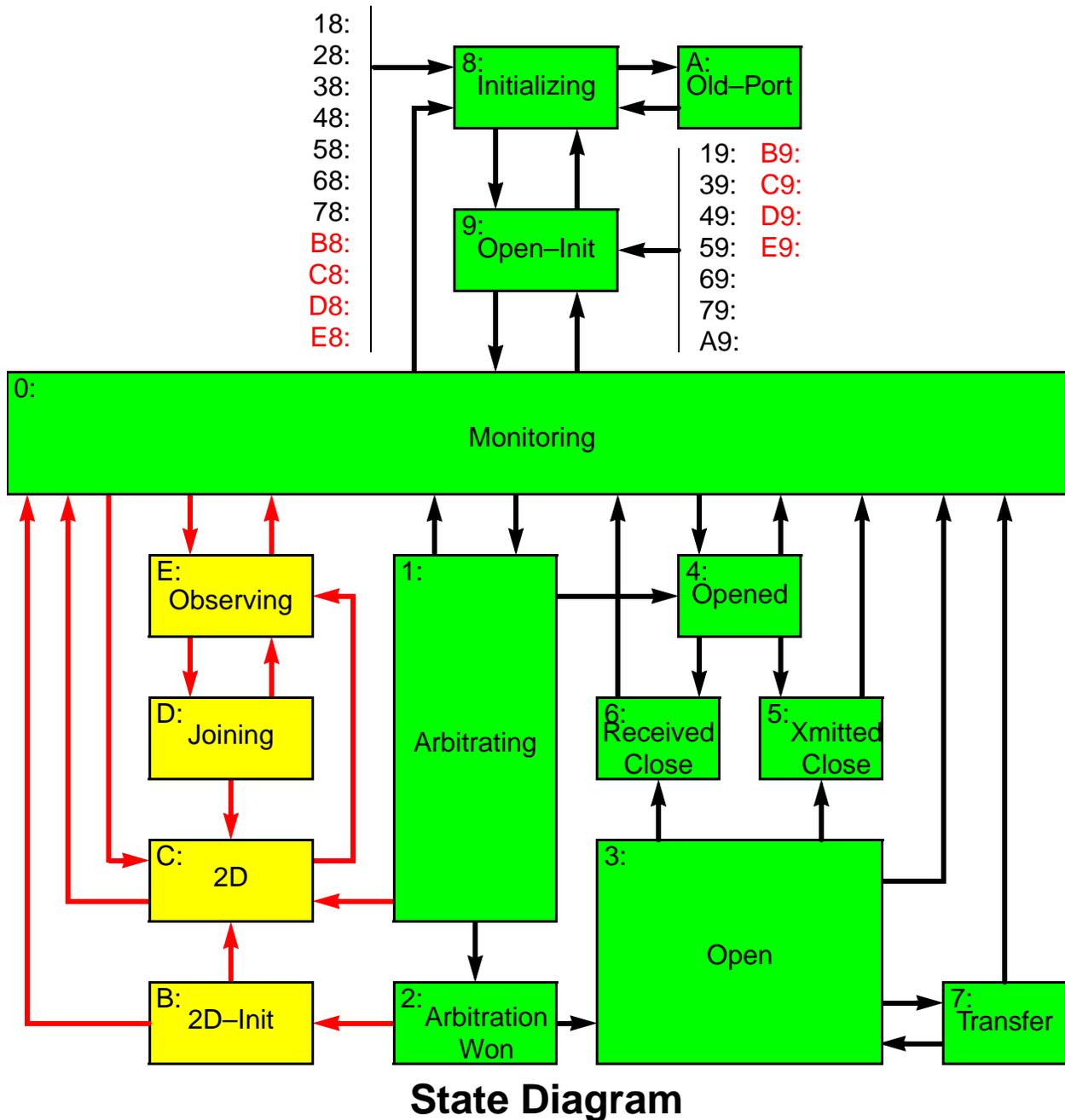
2D Loop Loop Identification

T11 9 Feb. 1998

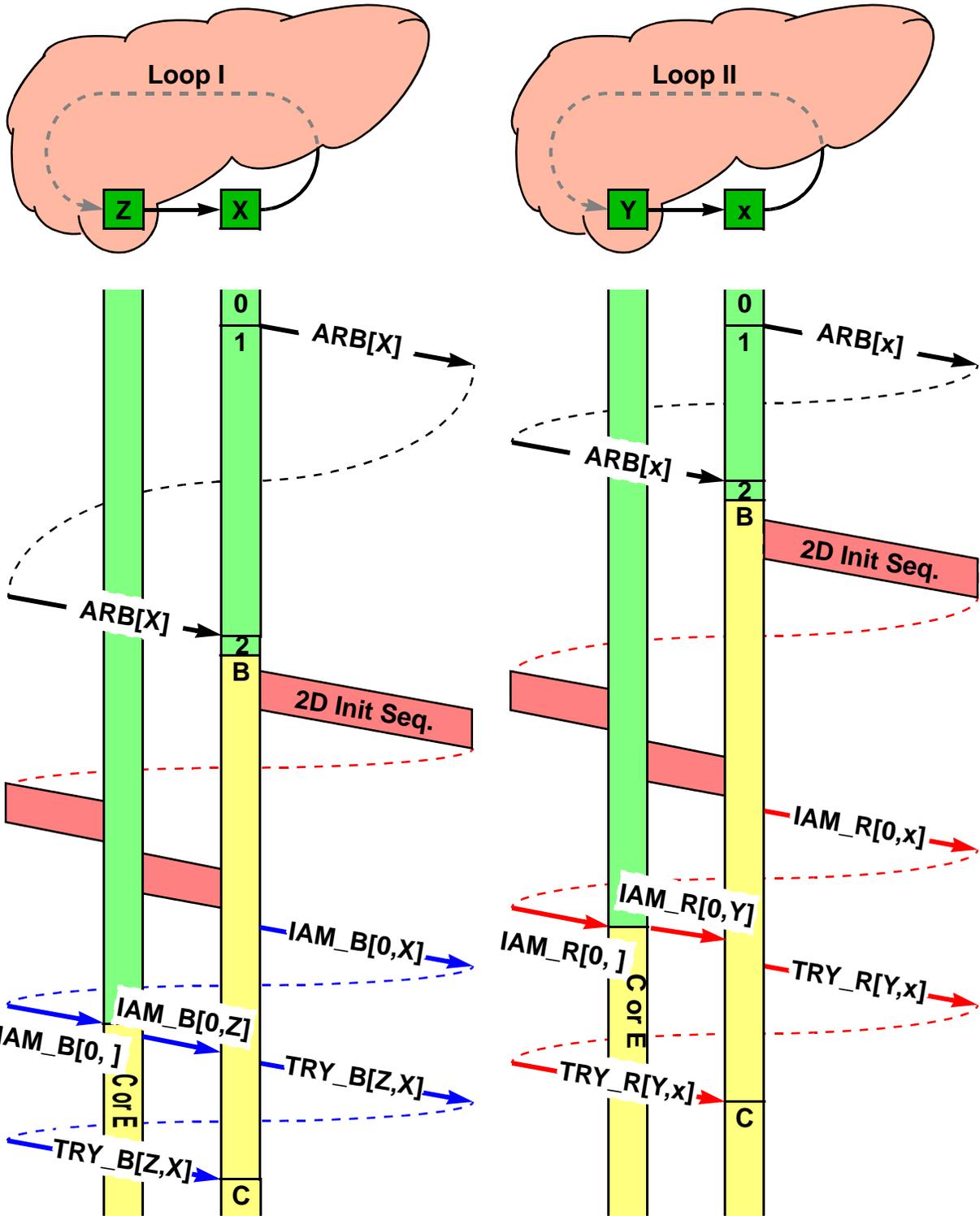
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FC-AL-3 – Loop Identification

2D Loop State Diagram



FC-AL-3 – Loop Identification



Successful 2D Loop Initialization Example

FC-AL-3 – Loop Identification

2D Loop Initialization

- ☯ Only dual ported entities may request entry to the 2D mode
 - ☐ The requesting dual ported entity shall, before it proceed to attempt to activate the 2D mode
 - ↪ Successfully complete FC-AL-2 loop initialization on both ports
 - ↪ Attempt Fabric Login on both loops
 - * If a Fabric is present then the requesting entity shall not proceed before it successfully completes Fabric Login
 - ↪ Ensure both loops are on the same Fabric if both ports are on a Public Loop
 - * If the Fabric Names are different, then operation in 2D mode shall not be requested

- ☯ The requesting entity shall Arbitrate on both loops
 - ☐ The requesting entity shall send the single frame '2D Initialization Sequence' when it wins Arbitration and enters the 2D-Init state on that port
 - ↪ Initialization shall proceed independently on the two loops
 - ☐ The requesting L_Port shall select an IAM_x[,X] Primitive Signal as its Fill Word, once the '2D Initialization Sequence' returns to the entity requesting 2D Loop operation
 - ↪ X = AL_PA of the sending L_Port
 - ↪ IAM_R[-,X] shall be used for the Red Loop
 - * The loop with the lower valued addresses
 - ↪ IAM_B[-,X] shall be used for the Blue Loop
 - * The loop with the higher valued addresses

FC-AL-3 – Loop Identification

2D Loop Initialization

- The requesting L_Port shall transmit FLT_x[FF,FF] Primitive Signals continuously until the port either receive a FLT_x[FF,FF] Primitive Signal or 5 ms have lapsed, if the requesting L_Port receive a FLT_x[X,X] Primitive Signal or if it continuously receives an IAM_x Primitive of the wrong colour
 - ↪ The requesting L_Port shall return to the Monitoring state once it cease to transmit the FLT_x[FF,FF] Primitive Signal
 - ↪ FLT_R shall be used for the Red Loop
 - ↪ FLT_B shall be used for the Blue Loop
- The requesting L_Port shall transmit a TRY_x[Z,X] Primitive Signal once it receive a IAM_x Primitive Signal, valid for the loop
 - ↪ X = AL_PA of the L_Port originating the TRY Primitive Signal
 - ↪ Z = AL_PA of the originating L_Ports upstream neighbour
 - ↪ TRY_R[Z,X] shall be used for the Red Loop
 - ↪ TRY_B[Z,X] shall be used for the Blue Loop
- The requesting L_Port shall enter the 2D state, when it receives and discard the transmitted TRY_x[Z,X] Primitive Signal
 - ↪ The requesting entity shall continue its attempts to establish 2D loop operation on the adjoining loop if this isn't already done
 - ↪ Another dual ported entity may complete or have completed the transition to 2D Loop operation on the adjoining loop

FC–AL–3 – Loop Identification

2D Loop Initialization

Timeouts

- The entity attempting to establish a working 2D loop complex, shall, if it have not succeeded within LP_TOV, restore Arbitrated Loop operation
 - ↪ The LP_TOV starts from the time an L_Port on the requesting entity first wins arbitration
 - ↪ The L_Port shall transmit FLT_x[FF,FF] Primitive Signals to restore Arbitrated Loop operation
 - * FLT_R shall be used for the Red Loop
 - * FLT_B shall be used for the Blue Loop
 - * Transmission of FLT_x[FF,FF] Primitive Signals shall cease when FLT_x[FF,FF] Primitive Signals are received by the originator or after 5 ms

2D compatible L_Ports shall promiscuously receive, validate and forward the single frame '2D Initialization Sequence'

- Both Participating and Non–Participating entities shall perform the described actions
 - ↪ Non–Participating L_Port on an operational 2D Loop partake in Primitive Signal processes, but are prohibited from extracting and originating Data Frames

FC-AL-3 – Loop Identification

2D Loop Initialization

- The '2D Initialization Sequence' shall only be forwarded if it is validated successfully
 - ↪ The 'LISM Master Port_Name for this loop' field shall match the receiving L_Ports value for this field
 - ↪ The 'This' Loop Fabric Address' field shall, for L_Port's having successfully completed Fabric Login, match the receiving L_Port's value for this field
 - ↪ The 'LISM Master Port_Name for the adjoining loop' field should, for dual ported entities, match the receiving L_Ports value
 - ↪ The 'Adjoining Loop Fabric Address' field shall, for dual ported entities, match the receiving L_Ports value, if that port have completed Fabric Login successfully
 - ↪ The L_Port shall transmit a FLT_R[AL_PA,AL_PA] Primitive Signal if the port elects to discard the single frame '2D Initialization Sequence'
 - * Non-Participating L_Ports shall transmit a FLT_RF7,F7] Primitive Signal
- L_Ports shall delay forwarding the '2D Initialization Sequence' for at most 1 ms
- Participating L_Port shall enter the 2D state when they receive an IAM_x[-,X] Primitive Signal
 - ↪ If the L_Port have not received and validated the '2D Initialization Sequence' then it should insert a FLT_x[AL_PA,AL_PA] Primitive Signal, matching the colour of the received IAM
- A Non-Participating L_Port shall enter the Observing state when they receive an IAM_x[-,X] Primitive Signal and set its Fill Word to Idle

FC–AL–3 – Loop Identification

2D Loop Initialization

2D Initialization Sequence

0	SOFiL		Frame_Header	
1	hex '22'	hex '000000'		
2	hex '00'	hex '000000'		
3	hex '01'	hex '380000'		
4	hex '00'	hex '00'		hex '0000'
5	hex 'FFFF'	hex 'FFFF'		
6	hex '00000000'			
7	hex '11100000'		Payload	
8	hex '00'	'This' Loop Fabric Address		
9	LISM Master Port_Name for this loop			
10				
11	hex '00'	Adjoining Loop Fabric Address		
12	LISM Master Port_Name for the adjoining loop			
13				
14	CRC			
15	EOFt			

-  Frame Delimiters, as specified in FC–AL–2 for Loop Initialization
-  Frame Header, as specified in FC–AL–2, for Loop Initialization by an FL_Port
-  CRC field, as specified by FC–PH

FC-AL-3 – Loop Identification

2D Loop Initialization

2D Initialization Sequence fields

'This' Loop Fabric Address

 The Loop Fabric Address for the loop on which the 2D Initialization Sequence is sent

 hex '000000' if both loops are Private and this loop's LISM Master Port_Name is the lower valued name

 hex '000100' if both loops are Private and this loop's LISM Master Port_Name is the higher valued name

LISM Master Port_Name for this loop

 The Port_Name of the entity which won LISM mastership for the loop on which the 2D Initialization Sequence is sent

Adjoining Loop Fabric Address

 The Loop Fabric Address for the companion loop

LISM Master Port_Name for the adjoining loop

 The Port_Name of the entity which won LISM mastership for the companion loop

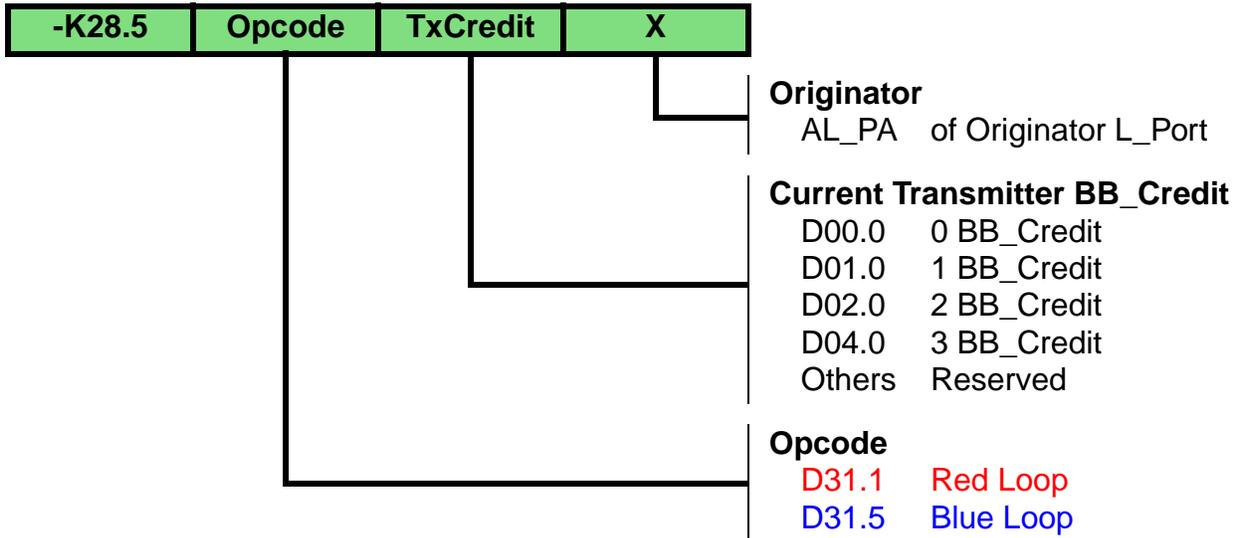
 hex '000000' if both loops are Private and the companion loop's LISM Master Port_Name is the lower valued name

 hex '000100' if both loops are Private and the companion loop's LISM Master Port_Name is the higher valued name

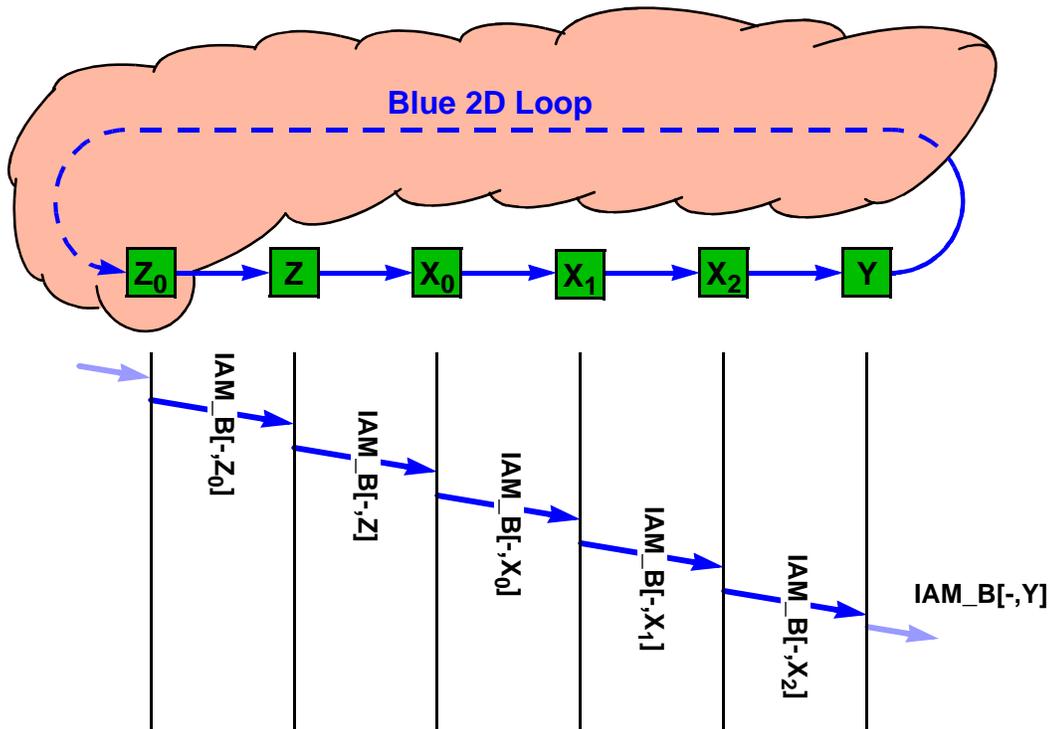
FC-AL-3 – Loop Identification

New Primitive Signals

IAM Primitive Signal



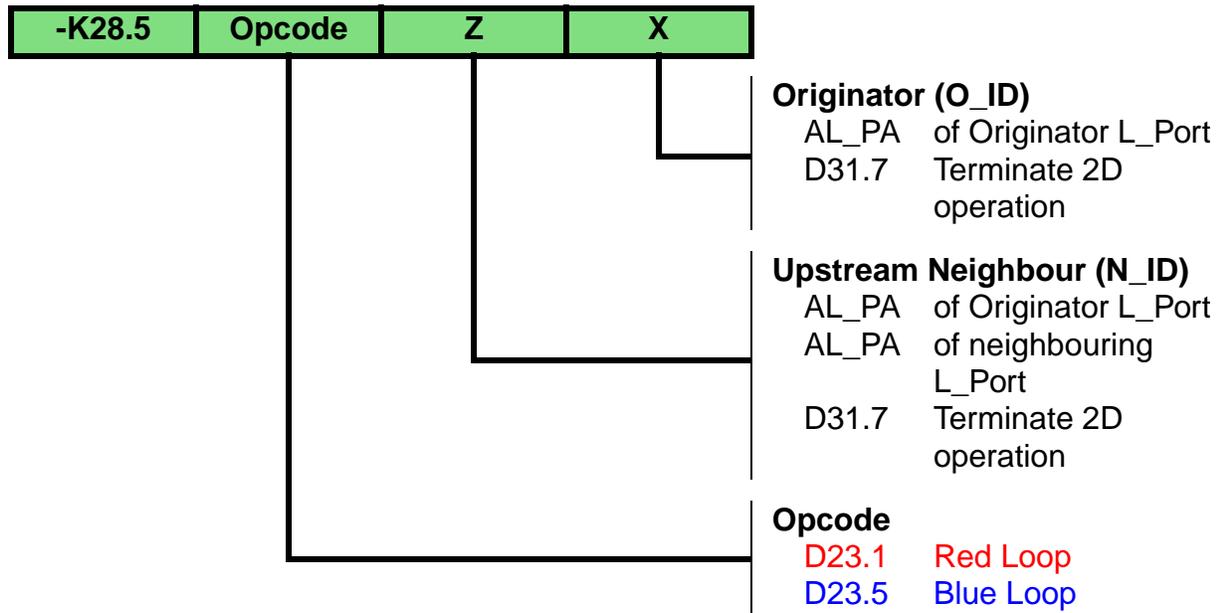
- Fill Word for Participating L_Ports (traverses a single 'split' link only)



FC-AL-3 – Loop Identification

New Primitive Signals

☯ Fault (FLT) Primitive Signal



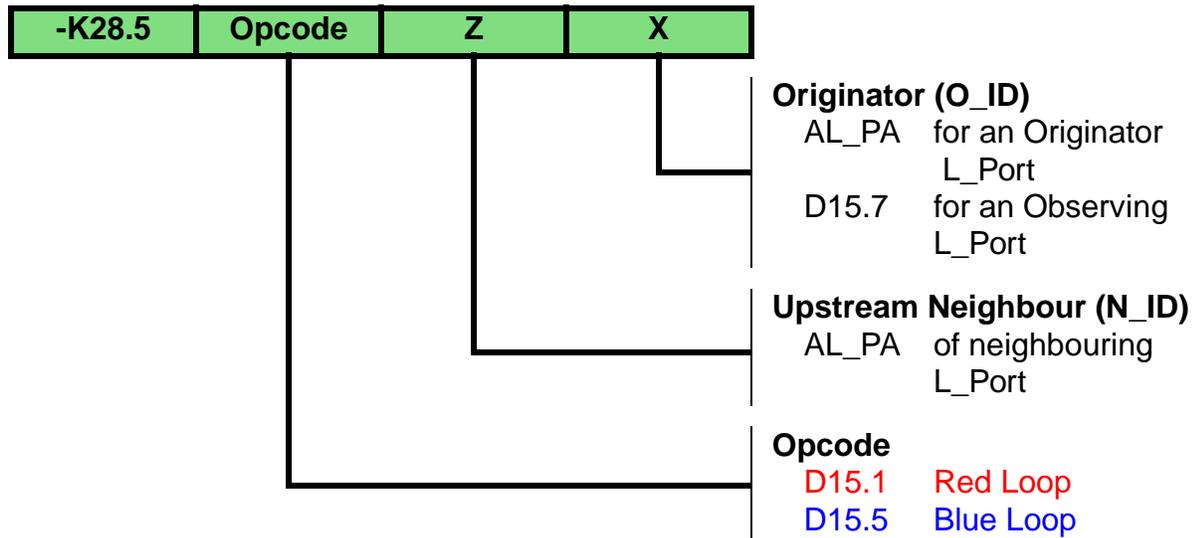
□ Announces error conditions on the loop (traverses the entire loop)

- ↪ L_Ports shall insert a FLT_x[Z,X] every 8 to 10 ms in response to 'Loss of Signal' or 'Loss of Sync.' for more than R_T_TOV
 - * FLT_R[Z,X] shall be used for the red loop
 - * FLT_B[Z,X] shall be used for the blue loop
- ↪ L_Ports shall insert a FLT_R[X,X] Primitive Signal to signify its rejection and discarding of the '2D Initialization Sequence'
- ↪ L_Ports shall insert FLT_x[FF,FF] Primitive Signals to restore the Loop to Arbitrated Loop mode
 - * FLT_R[FF,FF] shall be used for the red loop, or if the colour of the loop is unknown
 - * FLT_B[FF,FF] shall be used for the blue loop

FC-AL-3 – Loop Identification

New Primitive Signals

TRY Primitive Signal



- Announces the originator's location on the loop (traverses the entire loop)
 - ↪ An L_Port shall insert its TRY_x[Z,X] Primitive Signal at the most once every 4 to 5 ms (Repetition limit)
 - * If one or more insertions are delayed by the repetition limit then a single TRY_x[Z,X] Primitive Signal shall be sent when the repetition timeout limit is satisfied
 - ↪ An L_Port shall insert its TRY_x[Z,X] Primitive Signal, in response to receipt of a TRY_x[Z,X] or FLT_x[Z,X] Primitive Signal originated by the upstream neighbour
 - * The insertion shall be delayed 40 to 50 μs for L_Ports in the Observing state
 - * The insertion shall be delayed 80 to 100 μs for L_Ports in the Joining or 2D state, subject to the 5 ms repetition limit
 - ↪ An L_Port in the 2D state shall insert its TRY_x[Z,X] Primitive Signal at least once every 16 to 20 ms
 - ↪ TRY_R[Z,X] shall be used on the red loop
 - ↪ TRY_B[Z,X] shall be used on the blue loop