Multiple Circuit Mode Overview

- Credit is maintained in the same manner as FC_AL and FC_AL2

- Arbitration is used to enter multiple circuit mode

- Devices which wish to maintain more than one circuit at a time may by applying the resources required (additional credit counters)

- Existing primitives are used

- SAT (as defined in Torn) is used

- Fully backward compatible with FC_AL and FC_AL2

- Uses many of the concepts from the Torn proposal and RIP proposals

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MCM Differs From Other Proposals

- RIP did not use end point to end point flow control (used nearest neighbor)

- Torn did not use destination addressed credit (source address only used)

- MCM uses fully addressed, end point to end point flow control

- MCM is entered and exited on the fly rather than at loop initialization time

- MCM does not require enabled frame counting

- MCM does not require a scrubber since the source can watch for its own frames

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MCM Is Similar To Other Proposal

- MCM uses the RCVyx and RCVff concept of RIP

- MCM uses buffer insertion as defined in Torn and RIP

- MCM does not require arbitration per connection allowing for spatial reuse

- MCM uses the credit concepts created in FC-AL

Entering Multiple Circuit Mode

- **NL_Port wishing the loop to enter multiple circuit mode arbitrates as normal**

- **When arbitration is won, a new primitve called   Enter Multiple Circuit Mode   is sent by winning NL_Port**

  - **A lost EMCM primitve only causes devices which do not see primitve to not enter the mode**

  - **Any device which sees the EMCM will enter multiple channel mode and can communicate with any other device on the loop which understands MCM**

- **When a NL_Port detects the EMCM primitive, it may send initiate connections using MCM**

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Exiting Multiple Circuit Mode

- **When a NL_Port detects an arbitration, all circuits are closed using normal close protocol from FC_AL**

    - **ARB may be generated by any port that wishes to use FC-AL protocol**

        - **May be an old port that does not know MCM**

        - **May be an MCM port that wished to talk to a non-MCM port**

    - **ARB may be generated by NL_Port which did not see the EMCM or lost the context for some other reason**

- **When all circuits are closed on a NL_Port, the NL_Port forwards the ARB**

- **When all devices which understand MCM have closed all cicuits, the arbitration will complete**

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Managing Circuits

- **In order to begin communicating between two NL_Ports, an RCVyx/RCVff encapsulated OPNxy is sent using the two NL_Port AL_PAs**

- **Credit is maintained as it is in FC_AL and FC_AL2 except**

  - **RRDY is addressable with the source and destination AL_PA (RCVyx RCVff encapsulated)**

  - **Login BB credit need is diminished and should be removed**

- **If credit balance is lost or zero for a long time, a close followed by an open will restore credit balance**

- **Frames sent within MCM must be RCVyx/RCVff encapsulated to identify the source and destination**

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Managing Circuits (cont)

- **Closing a circuit is performed by sending a RCVyx/RCVff encapsulated CLS which works exactly like FC_AL and FC_AL2 CLS**

- **The detection of an arbitration forces the requirement to close all MCM circuits as soon as possible**

  - **When ARB is received, a CLS should be sent at the best time (end of a sequence)**

  - **Once the corresponding CLS is received, the ARB may be forwarded**

  - **Once the ARB is forwared, no MCM circuits may be started until EMCM is seen**

- **Circuits may be kept open as long as desired**

New Primitives Required

Primitive Name	Purpose
EMCM	Enter Multiple channel mode
RCVyx	Unicate packet - send from AL_PA x to AL_PA y
RCVfx	Broadcast replicate packet - send from AL_PA x to all
RCVex	Selective replicate packet - send from AL_PA x to selective group determined by the RCVye
RCVye	Selective replicate receive - AL_PA y should accept the selective replicate packet
RCVff	End of RIP packet - denotes the end of a RIP packet

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Advantages of MCM

- **Provides spatial reuse**

- **Provides a simpler buffer to buffer credit model**

- **High traffic devices can maintain a connection and credit for a long time**

- **Large number of connections can be supported by applying appropriate resources**

- **Credit reclamation is v ery easy**

- **Credit model is similar to FC-AL enabling smoother migration**

- **Backward compatible**

- **FC-AL and MCM devices can coexist on the same loop**

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Issues

- **How does a N_Port determine that another N_Port supports MCM mode?**

    - **N_Port login parameter**

    - **Sending it and if it returns, then the N_Port did not support it**

- **If both the source and destination N_Ports disappear after a frame is started, will that frame propogate forever or will leaving MCM mode and going back to FC-AL mode get rid of it?**

- **Should all FC-AL primitives be RCVyx / RCVff encapsulated for simplicity?**