

T11/10-252v2 FC-BB-6: ASFC changes for FC pseudowire

To: INCITS Technical Committee T11  
From: David L.Black, EMC Corporation  
Email: black\_david@emc.com

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Subject: FC-BB-6: ASFC for the FC pseudowire

#### Version history:

Version 0 (6 June 2010) - First version.

Version 1 (9 June 2010) - Revised to incorporate FC-BB-6 meeting discussion:

- Changed a few instances of "Primitive Signal" (copied from FC GFPT text) to "control frame" (the correct FC pseudowire [FC PW] term).
- Changed 25us FC GFPT reaction time to 1ms for FC PW.
- Added overview explanation of former SR protocol's header usage.
- Edited out some BB-6 text that is not modified by this proposal.
- Additional minor editorial cleanup.

Version 2 (13 July 2010) - Minor editorial cleanup. IETF draft is now at version -11.

#### Overview:

Changes to the IETF approach to standardizing the MPLS-related portion of the FC pseudo-wire (PW) have removed the Selective Retransmission (SR) protocol that provided retransmission and rate-based flow control. It is necessary to replace SR's flow control functionality to ensure correct FC operation (e.g., apply backpressure across the WAN when received traffic cannot be forwarded on-ward via FC), but rate-based flow control is not an absolute requirement.

This proposal replaces SR's flow-control functionality with an FC PW adaptation of the ASFC (Alternate Simple Flow Control) protocol used by FC GFPT.

The adaptation of ASFC to the FC PW is based on FC PW control frames; two new control frames are specified by this proposal. The SR protocol was based on use of the 4 byte FC Encapsulation Header that is prefixed to every FC PW frame, including control frames and data frames, as specified in the IETF portion of the FC PW specification. The current IETF Internet Draft text on the FC Encapsulation Header recommends (SHOULD) setting that header to zero on transmission and requires (MUST) receivers to ignore it.

Removed text is in ~~red strikethrough~~, added text is in blue underline.

**Editor's Notes** are in red and indented.

**Proposed Changes:**

**Editor's Note:** The current IETF reference for the FC-PW Internet-Draft is draft-ietf-fc-encap-11.txt, and there is likely to be at least a -12 version. Please update the IETF reference to -11 or the current version and ensure that all fc-encap draft references in the body of FC-BB-6 are to that version.

**4.4.6 Flow control**

FC-BB\_IP devices shall ensure that TCP flow control and error recovery acts in proper concert with the Fibre Channel BB\_Credit flow control mechanism.

Flow control at E\_Ports, F\_Ports, VE\_Ports, and B\_Ports shall operate as defined in FC-SW-5.

The Alternate Simple Flow Control (ASFC) mechanism (see 6.4.4) shall be used between FC-BB\_GFPT devices and between FC-BB\_PW devices. Flow control on FC\_Port-facing links is specified in clause 6.

Flow control at FC-BB\_GFPT and FC-BB\_PW physical interfaces to attached FC devices shall operate as defined in FC-SW-5 or FC-FS-3, as appropriate.

~~Flow control between two FC-BB\_PW devices shall operate as specified in draft-ietf-pwe3-fc-encap-09.~~

**Editor's Note:** Next change is in 6.4.4

**6.4.4 Port initialization parameter observation and modification**

Transparent FC-BB devices shall note the ISL Flow Control Mode value on inbound (see 3.3.8) and outbound (see 3.3.10) ELP request/reply SW\_ACC frames of open LEMs. When the LEM is successfully closed and flow control other than either R\_RDY flow control or VC\_RDY flow control has been established between the interconnected FC\_Ports, the Transparent FC-BB devices behavior is outside the scope of this standard.

If the use of R\_RDY or VC\_RDY flow control has been negotiated between the interconnected FC\_Ports, the FC-BB\_GFPT devices shall operate using unchannelized ASFC (see 6.4.7) and FC-BB\_PW devices shall operate using FC-BB\_PW ASFC (see 6.4.7) ~~Selective Retransmission mode as specified in draft-ietf-pwe3-fc-encap-10.~~

**Editor's Note:** Next Change is in 6.4.7

## 6.4.7 Transparent FC-BB flow control

### 6.4.7.1 Overview

Alternate Simple Flow Control (ASFC) ~~(see 6.4.7.2)~~ shall be supported between FC-BB\_GFPT devices ~~(see 6.4.7.2) and between FC-BB\_PW devices (see 6.4.7.3).~~

~~FC-BB\_PW devices shall support Selective Retransmission as specified in draft ietf-pwe3-fc-encap-40.~~

### 6.4.7.2 FC-BB\_GFPT Alternate Simple Flow Control (ASFC)

ASFC defines two Primitive Signals, ASFC\_PAUSE and ASFC\_RESUME (see table 16), that may be sent by one FC-BB\_GFPT device to a remote FC-BB\_GFPT device.

Table 16 specifies the Ordered Set values for the ASFC\_PAUSE and ASFC\_RESUME FC-BB\_GFPT WAN Primitive Signals.

**Table 16 – Values of FC-BB\_GFPT ASFC\_PAUSE and ASFC\_RESUME Primitive Signals**

<b>FC-BB_GFPT Primitive Signal</b>	<b>Ordered Set (Value)</b>
ASFC_PAUSE	K28.1 D00.0 D00.0 D00.0 - unchannelized
ASFC_RESUME	K28.1 D04.0 D00.0 D00.0 - unchannelized

An FC-BB\_GFPT device sends ASFC\_PAUSE to a remote FC-BB\_GFPT device to direct that device to cease forwarding FC frames and non-GFPT\_WAN Primitive Signals. Reception of a single ASFC\_PAUSE Primitive Signal suffices to trigger such cessation, which shall take effect:

- a) within 25 microseconds of reception of the ASFC\_PAUSE Primitive Signal; or
- b) immediately upon completion of the forwarding of a frame or Primitive Signal if forwarding of a frame or non-GFPT\_WAN Primitive Signal is in progress when the ASFC\_PAUSE Primitive Signal is received and the time required for such completion is greater than 25 microseconds.

When FC frame and non-GFPT\_WAN Primitive Signal forwarding has been suspended due to reception of an ASFC\_PAUSE Primitive Signal, it shall remain suspended until at least one ASFC\_RESUME Primitive Signal has been received. FC-BB\_GFPT devices shall:

- a) not insert ASFC\_PAUSE or ASFC\_RESUME Primitive Signals within any FC Order Set;
- b) insert ASFC\_PAUSE or ASFC\_RESUME Primitive Signals on transmission word boundaries; and
- c) not insert more than two ASFC\_PAUSE and ASFC\_RESUME Primitive Signals within the boundaries of any frame.

Otherwise, ASFC\_PAUSE and ASFC\_RESUME Primitive Signals are sent at times, in numbers, and at frequencies at the discretion of the sending FC-BB\_GFPT device.

**Editor's Note:** No change to 6.4.7.2 - it's included here for comparison with the new 6.4.7.3.

### 6.4.7.3 FC-BB\_PW Alternate Simple Flow Control (ASFC)

ASFC defines two control frames, ASFC\_PAUSE and ASFC\_RESUME (see Figure X and Table Y), that may be sent by one FC-BB\_PW device to a remote FC-BB\_PW device.

Figure X specifies the control frame formats for ASFC\_PAUSE and ASFC\_RESUME.

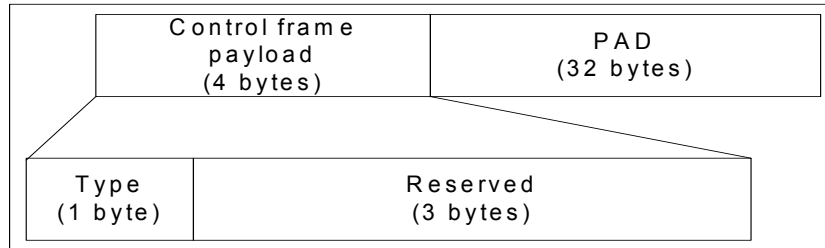


Figure X – FC-BB\_PW error indication control frame format

Table Y specifies the control frame payloads for ASFC\_PAUSE and ASFC\_RESUME.

Table Y – FC-BB\_PW ASFC\_PAUSE and ASFC\_RESUME control frame payload values.

Field	Value	Description
Type	0x41 0x42	ASFC_PAUSE ASFC_RESUME
PAD	Zeroes	Set to all zeroes.

This standard specifies the use of Type field value 0x11 for transmission of error indications (see 6.4.8.2.2) and specifies the use of Type field values 0x81 and 0x82 for transmission of FC-BB\_PW PING and PING\_ACK (see 6.4.7.4.3).

An FC-BB\_PW device sends ASFC\_PAUSE to a remote FC-BB\_PW device to direct that device to cease forwarding FC frames and FC Primitive Signals. Reception of a single ASFC\_PAUSE control frame suffices to trigger such cessation, which shall take effect:

- a) within 1 millisecond of reception of the ASFC\_PAUSE control frame; or
- b) immediately upon completion of the forwarding of an FC frame or FC Primitive Signal if forwarding of a frame or Primitive Signal is in progress when the ASFC\_PAUSE control frame is received and the time required for such completion is greater than 1 millisecond.

**Editor's Note:** FC-BB\_PW devices have considerably more functionality and buffering than FC-BB\_GFPT devices, hence the 25 microsecond reaction time value for GFPT was changed to 1 millisecond. Case b) is unlikely in practice, but is included for completeness.

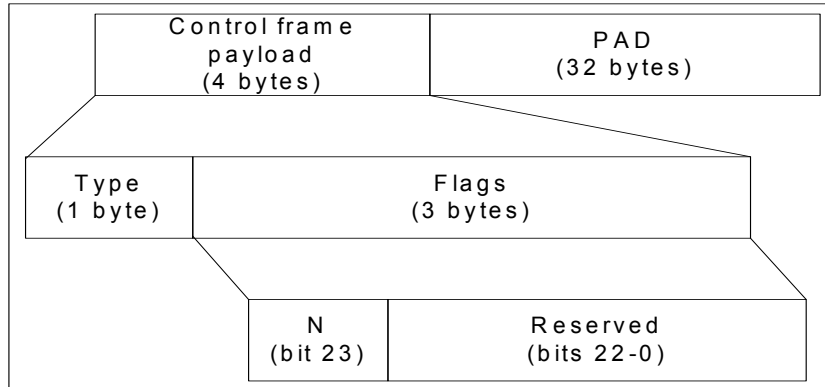
When FC frame and FC Primitive Signal forwarding has been suspended due to reception of an ASFC\_PAUSE control frame, it shall remain suspended until at least one ASFC\_RESUME control frame has been received. FC-BB\_PW devices may send ASFC\_PAUSE and ASFC\_RESUME control frames at times, in numbers, and at frequencies at the discretion of the sending FC-BB\_PW device.

#### 6.4.7.4 PING and PING\_ACK signals

**Editor’s Note:** Renumber 6.4.7.3 and subsections to 6.4.7.4 and subsections, next change is in 6.4.7.4.3 (re-numbered from 6.4.7.3.3)

##### 6.4.7.4.3 FC-BB\_PW PING and PING\_ACK

The FC-BB\_PW PING and PING\_ACK control frame format is specified in figure 23.



**Figure 23 – FC-BB\_PW PING and PING\_ACK control frame format**

The FC-BB\_PW PING and PING\_ACK control frame payload shall be set as specified in table 19.

**Table 19 – FC-BB\_PW PING and PING\_ACK control frame payload values**

Field	Value	Description
Type	0x81 0x82	PING PING_ACK
N	0b or 1b	The N bit is set to alternating 0b and 1b. For PING_ACK the N bit is set to the same value as the associated PING.
PAD	Zeroes	Set to all zeroes.

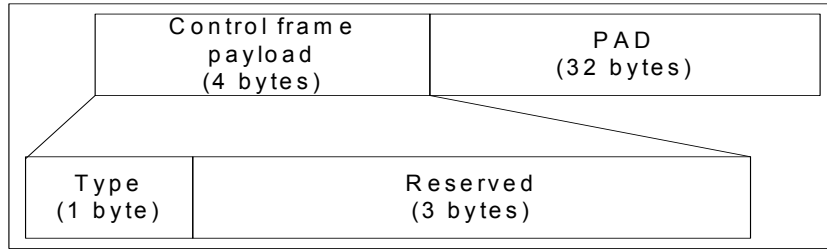
This standard specifies the use of Type field value 0x11 for transmission of error indications (see 6.4.8.2.2) [and specifies the use of Type field values 0x41 and 0x42 for ASFC\\_PAUSE and ASFC\\_RESUME \(see 6.4.7.3\).](#)

The FC-BB\_PW PING and PING\_ACK control frames are encapsulated and formatted for transmission as specified in draft-ietf-pwe3-fc-encap-10.

**Editor’s Note:** Next change is in 6.4.8.2.2

### 6.4.8.2.2 FC-BB\_PW error indication control frame

The FC-BB\_PW error indication control frame format is specified in figure 24.



**Figure 24 – FC-BB\_PW error indication control frame format**

The FC-BB\_PW error indication control frame payload shall be set as specified in table 20.

**Table 20 – FC-BB\_PW error indication control frame payload values**

Field	Value	Description
Type	0x11	FC-ERROR - indicates a received character error or Loss of Synchronization.
PAD	Zeroes	Set to all zeroes.

This standard specifies the use of Type field values 0x81 and 0x82 for transmission of FC-BB\_PW PING and PING\_ACK (see 6.4.7.4.3) [and specifies the use of Type field values 0x41 and 0x42 for ASFC\\_PAUSE and ASFC\\_RESUME \(see 6.4.7.3\).](#)

The FC-BB\_PW error indication control frame is encapsulated and formatted for transmission as specified in draft-ietf-pwe3-fc-encap-10.