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Item 11-11-00003.003

Subject: Link Response Clarification

Background: In specification revision 2.2, the Link-response port-status field is focussed on reporting input port status. For various reasons, it is desirable to allow software to be able to interrogate the status of a link partner without using packets. It is proposed to amend the 3.0 specification to extend the link-response port-status field.

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Comment Expiration Date:

Distribution: RapidIO TA Technical Working Group members



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1.2 Introduction

The SType0 Link-response control symbol includes a “Port_status” field, which is encoded as follows in Part 6 Section 3.4.6 for Baud Rate Class 1 and 2 devices:

Table 1-1.

Port_Status	Status	Description
0b00000 - 0b00001	-----	Reserved
0b00010	Error	The port has encountered an unrecoverable error and is unable to accept packets.
0b00011	-----	Reserved
0b00100	Retry-stopped	The port has retried a packet and is waiting in the input retry-stopped state to be restarted.
0b00101	Error-stopped	The port has encountered a transmission error and is waiting in the input error-stopped state to be restarted.
0b00110-0b01111	-----	Reserved
0b10000	OK	The port is accepting packets
0b10001 - 0b1111	-----	Reserved

The use of Retry-stopped and Error-stopped is straight forward, as these are explicitly linked to clearly defined input port status.

The Error condition is not linked to any specific state in the specification. It is assumed to be implementation specific.

The OK state is less straight forward, primarily because of the Port Error condition. The Port Error condition occurs when error recovery has failed on the output side of the port. The port can therefore accept packets, but cannot transmit responses to those packets.

Many devices have therefore decided to return “OK” when the port has a Port Error condition. This creates confusion, as it is possible to send requests successfully, but no responses can be sent back.

1.3 Discussion

It is useful to know when the other end of the link has entered the Port Error state.

Given the lack of clarity around the Error condition, and the OK state, it is proposed that a new port status values be defined to clearly communicate the input and output status of the link partner for Baud Rate Class 3 devices.

Recovery from some of these conditions may not be possible, or may require a per-port reset.

1.4 Proposal

Change the definition of Part 6, section 3.4.6, table 3-6 Port_status Field Definitions to make use of the 12 bits available in the CS64 parameter as follows. The intent is to communicate the status bits of the Port n Error and Status CSR, as well as other standard Part 8 Error Management/Hot Swap Extensions related status indications:

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Table 1-2. Port_status Field Definitions

Port_status bit number	Description
0	Reserved
1-2	Input Port Status 0b00 -No input error condition exists 0b01 - Port n Error and Status CSR “Input retry-stopped” status bit is asserted 0b10 - Port n Error and Status CSR “Input Error-Stopped” status bit is asserted 0b11 - Input Port Fatal Error condition The values are encoded in increasing order of priority. 0b00 is the lowest priority. When multiple conditions exist simultaneously the highest priority condition shall be encoded.
3	Input Port Enabled This bit shall be set if all of the following conditions are true, otherwise this bit shall be cleared: - The Port n Control CSR Input Port Enabled bit is set. - All implementation specific bits allow physical layer packet acceptance.
4	Reserved
5-6	Output Port Status 0b00 -No output error condition exists 0b01 - Port n Error and Status CSR “Output retry-stopped” bit is asserted 0b10 - Port n Error and Status CSR “Output Error-Stopped” status bit is asserted 0b11 - Port n Error and Status CSR “Output Port Error” status bit is asserted The values are encoded in increasing order of priority. 0b00 is the lowest priority. When multiple conditions exist simultaneously the highest priority condition shall be encoded.
7	Output Port Enabled This bit shall be set if all of the following conditions are true, otherwise this bit shall be cleared: - The Port n Control CSR Output Port Enabled bit is set. - All implementation specific bits allow physical layer packet acceptance.
8	Port-Write Pending 0 - The link partner does not have a port-write event pending 1 - The link partner does have a port-write event pending
9-11	Reserved

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In part 6, globally change the name of the “Link-Request/Input-Status” control symbol to be “Link-Request/Port-Status”.

Add the following section to the Part 8 Error Management/Hot Swap Extensions

specification:

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Section 1.6 Baud Rate Class 3 Port_Status Extension

The Error Management and Hot Swap functions can affect the operation of a ports input and output directions. Some of these conditions prevent acceptance or transmission of any packets by a processing element, causing errors to be detected by the link partner. In response to these error conditions, the link partner will initiate the standard error recovery protocol as defined in Part 6. Depending on the state of both link partners, software intervention may be necessary to resume packet exchange.

To enable software interrogation of link partner Error Management/Hot Swap status without using packets, the link-response port_status field is extended for Baud Rate Class 3 devices as defined in Table 1-2. Baud Rate Class 1 and 2 devices shall not use port_status values other than those defined in Part 6.

Table 1-3. Port_status Field Definitions

Port_status bit number	Description
0-2	Reserved
3	Input Port Enabled The conditions defined for this bit to be set is extended as follows: - The Port n Control CSR “Port Lockout” bit is cleared.
4-6	Reserved
7	Output Port Enabled The conditions defined for this bit to be set are extended as follows . - The Port n Control CSR “Port Lockout” bit is cleared.
8	Reserved
9	Output Port Failed. This bit shall be asserted when at least one of the following conditions is true, otherwise deasserted: - The Port n Error and Status CSR “Output Failed-Encountered” bit is set - The Port n Error Detect CSR “Link Uninit Packet Discard Active” bit is set - An implementation specific condition exists which forces continuous output port packet discard
10-11	Reserved

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