

1394 Backplane Physical Layer (TSB14C01) Errata

Last Changed on 03/11/97 - bsh

1. The TSB14C01 does not properly process an immediate type Link REQuest (LREQ) if it is received by the 14C01 before the 14C01 has processed a previous fair type LREQ or a previous priority type LREQ.

If a system implements randomly occurring async (fair or priority) requests there exists the chance that a link will make an async request LREQ just as another link is sending it a small async packet. The receiving link will then send an immediate request (acknowledge) LREQ as soon as the header is confirmed. The receiving node's 14C01, instead of clearing the fair request and processing the immediate request, ignores the immediate request and processes the fair request. At this point the phy is processing a fair request but the link is processing an immediate request. This means the link is expecting its next communication to be a grant or deny of the bus. But the phy is waiting until a fair gap occurs to arbitrate to send an async packet. When the fair gap occurs on the bus the phy sends a status to the link, then arbitrates for the bus, if it wins the bus it will send a transmit grant back to the link layer. Sending a status at this point when the link is expecting a grant or deny is an error condition for the link layer. Depending on the link layer used this may cause different problems. The workaround depends on the link layer being used:

The symptoms to look for to if this error is occurring:

Symptoms on the sending node:

- The sending node does not receive an acknowledge from the receiving node. An acknowledge may be sensed by loading all but the final quadlet into the ATF, clearing the TXRdy interrupt before finishing loading the ATF in the sending node, finish loading the ATF to send the packet, then waiting for the TXRdy to be set on receipt of the acknowledge. After TXRdy is sensed the acknowledge sent may be read from the ATAck field.

Symptoms on the receiving node:

- LREQs will occur less than ~10us but more than ~140ns apart (100Mbps 7 bit bus requests, 50Mbps bus requests will be more than ~280ns apart).
- A status will be sent from the 14C01 to the link layer controller before the 14C01 grants the phy-link interface to the link to send an acknowledge packet.
- After the status is sent, the 14C01 arbitrates for the bus to send an async packet. If it wins it sends a grant back to the link layer controller, all happening instead of an ack being sent.
- Suggested workaround if the system can tolerate 1 isochronous period latency and only needs to queue up 1 async packet per isoc cycle per node. Sync up all Async requests to the start (or end) of the isochronous cycle. This may be done using the cyst (or cydne) interrupt or pin and will effectively cause the async LREQs to happen at "good" times.
 - a. Write quadlet 1 to n-1 of a packet to the ATF
 - b. Clear all interrupts (if using interrupts)
 - c. Wait until isoc cycle start (or cycle done)
 - e. Write final quadlet to ATF
- Workaround for the receiving node being a 12LV31 or 12LV21: Since the receiving node's link will just go into an idle state, the sending node just needs to retry the async packet send.

Workaround for the receiving node being a 12C01A: The TSB12C01A does not gracefully handle this error condition. The symptoms to look for are similar, however in the case of the 12C01A the receiving node will be locked up, not be able to receive packets until the receiver is reset. The following should allow you to detect when a 12C01A node has hung up and then reset the hung link:

- a. When queuing up an Async packet load all but the final quadlet into the ATF.
- b. Clear the interrupt register (RxDta & TxRdy will be used in this sequence)
- c. Write the final quadlet into the ATF.
- d. Monitor the RxDta interrupt and TxRdy interrupt. If the RxDta interrupt occurs (a packet is being received into the GRF) before the TxRdy interrupt (the ATF packet was transmitted and the acknowledge was received) then the node is hung up and needs to be reset.
- e. The node may read the packet from the GRF, it was PROBABLY received correctly, but the ACK was never sent.
- f. The node may then reset the receiver (control register bit 11) to free up the node.
- g. The packet in the ATF should not need to be reloaded, the 12C01A should issue another fair request LREQ to the 14C01.