Arbitration
and
Protocol
subset for the I/O bus

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1 pass arbitration

require

- unrestricted mode (power-up default)
- assign all potential masters to highest priority (1 pass)

don’t allow

- restricted mode (either all nodes use it or none may)
- requirement would change if restricted mode became default

justification

- each pass is expected to require 200ns
- arbitration priority written to CSR, don’t change "on the fly"
- priority also affects arb. settling time
- 2 priorities available, assign high priority to split response if used
arbitration messages require

- power fail

  don’t allow

- interrupts by arb. message

  justification

- only power fail is defined
- only asynchronous interrupts could be signalled with this mechanism (no DMA completion) because ordering is lost
idle bus arbitration

require
don’t allow

• idle bus arbitration

justification

• designs must tolerate long latency for high traffic conditions; short latency under light load is not important

• coupling of arbitration control with parallel bus is extra complexity
compelled and packet modes require

- compelled mode
- packet mode is reserved for future implementation, when more cost effective

don’t allow

justification

- compelled mode is simplest
- gets us 160-200 Mbyte/sec on 64-bit bus
connected and split require

- connected transactions don’t allow
  
- split transactions
- wait status

justification

- arbitration latency is long compared to split handshake
- single stream bandwidth on I/O bus suffers with split transactions
- prefetching allows us to pay the price of latency only once for long data transfer
transaction types

require

• read and write
• read and write partial

don’t allow

• all others

justification

• I/O bus transactions can and should be simple
locked transactions

require

don’t allow

• any lock transactions
• LK* bit for creating atomic operations

justification

• locks work poorly from remote busses
• protocols exist that don’t require locks
• many RISC processors don’t provide traditional locks
broadcast and broadcall transactions require
don’t allow

• broadcast or broadcall justification

• no perceived benefit
intervention and cache coherency require
don’t allow

• cache coherent transactions
• intervening status

justification

• I/O bus is not part of cache coherence domain
message passing require don’t allow

- message passing justification

- higher level protocol that is not required