Bus Arbiter and Mode Control

- Bus arbitration is needed since there are three external (to IOP 80186) bus masters, viz. rigid disk DMA controller, Ethernet controller, and PCE 80186

- Bus mode control is needed to switch between the IOP 80186 and the PCE 80186 execution

- Arbitration functions:

  Field HOLD requests from rigid disk and Ethernet controllers

  Determine highest priority device (Ethernet - 1, rigid disk- 2)

  Pass HOLD request to Mode Control

  Pass HOLDA from Mode Control to controller being granted the bus

  Suspend rigid disk DMA acrivity when Ethernet requests service
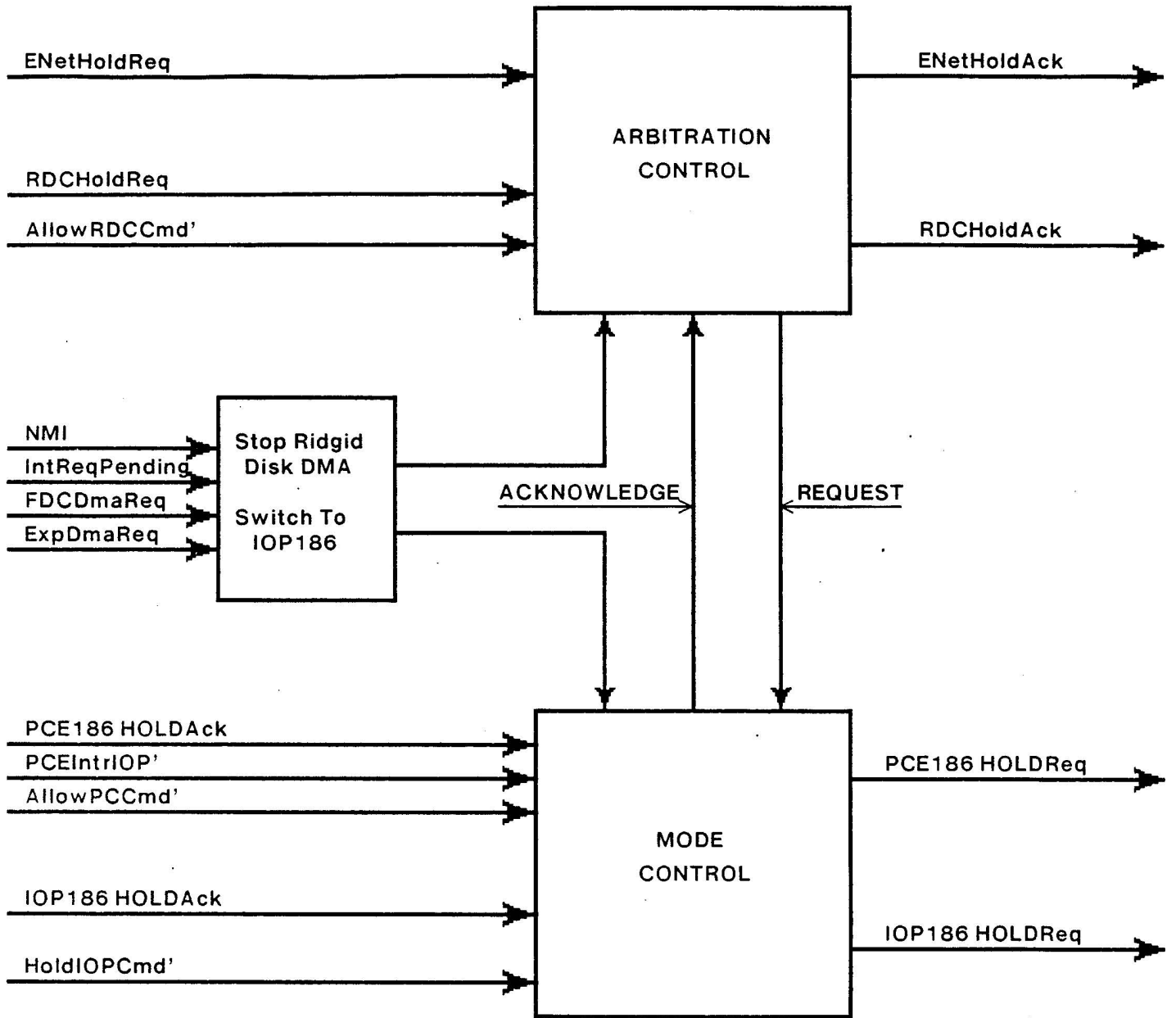
- Mode control functions:

  Determine which of the 80186s should be bus master

  Pass HOLD request from Arbiter to current 80186 bus master

  Pass HOLDA from bus master to Arbiter

  IOP to PCE switch is under IOP control (output instruction)

  PCE to IOP switch is caused by any interrupt, PCE I/O trap, or RESET

```
ENetHoldReq ──────────────▶┌──────────────┐──────────────▶ ENetHoldAck
                           │              │
                           │ ARBITRATION  │
                           │   CONTROL    │
RDCHoldReq ───────────────▶│              │──────────────▶ RDCHoldAck
AllowRDCCmd' ─────────────▶│              │
                           └──────────────┘
```

ARBITRATION CONTROL

ENetHoldReq
RDCHoldReq
AllowRDCCmd'

ENetHoldAck
RDCHoldAck

NMI
IntReqPending
FDCDmaReq
ExpDmaReq

Stop Ridgid
Disk DMA

Switch To
IOP186

ACKNOWLEDGE

REQUEST

PCE186 HOLDAck
PCEIntrIOP'
AllowPCCmd'

IOP186 HOLDAck

HoldIOPCmd'

MODE
CONTROL

PCE186 HOLDReq

IOP186 HOLDReq

MAJOR FLOW CONTROL

o   Arbitration Control Fields Hold Requests from Ethernet and Ridgid Disk

o   Arbitration Control Generates Hold Request to Mode Control

o   Mode Control Generates Hold Request to Current 186 Bus Master

o   Current 186 Bus Master Notifies Mode Control Through Hold Acknowledge
    When Bus Mastership is Treminated

o   Mode Control Passes Hold Acknowledge to Arbitration Control

o   Arbitration Control Acknowledges Highest Priority Requesting Device

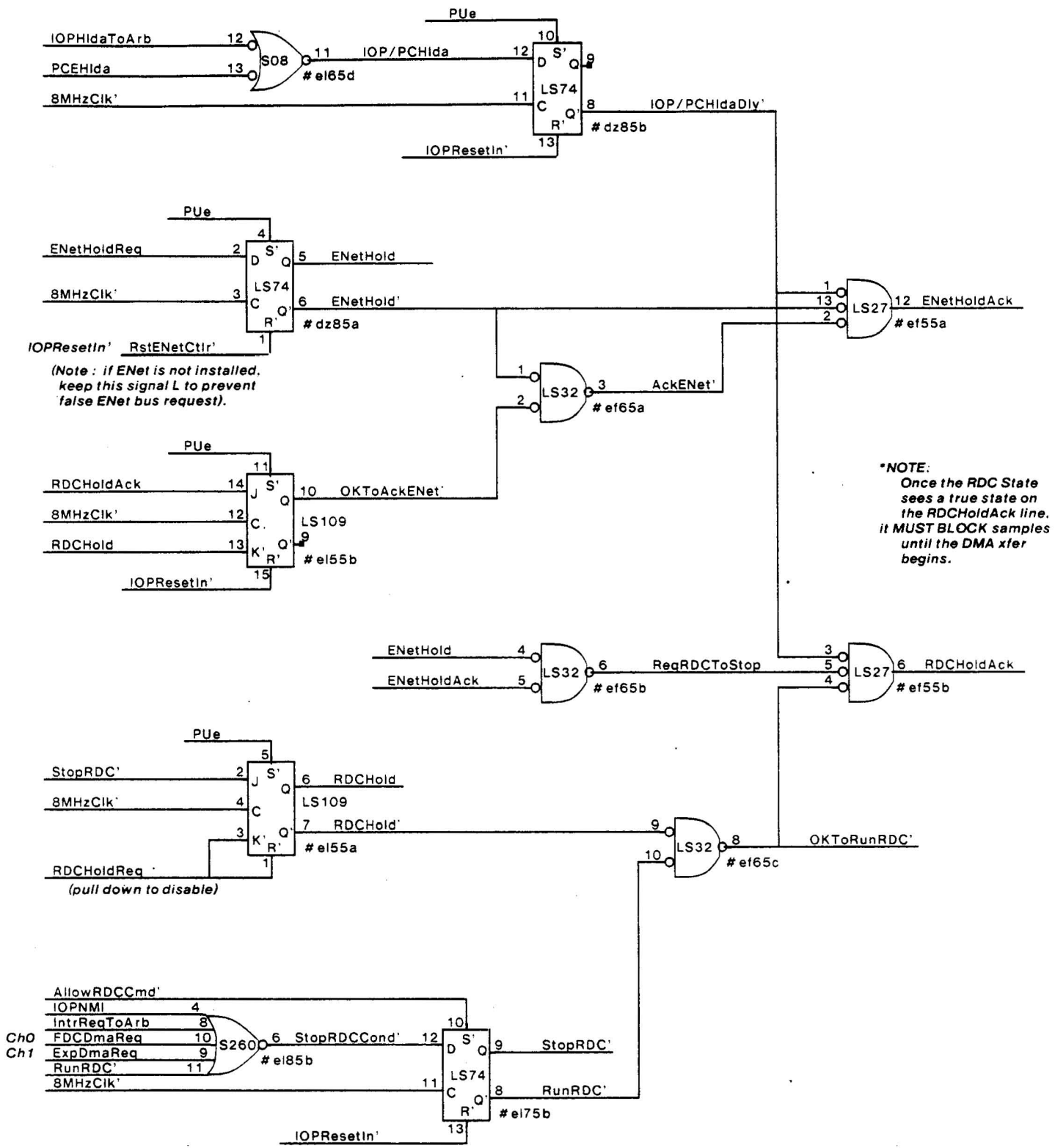   Priority #1 = Ethernet
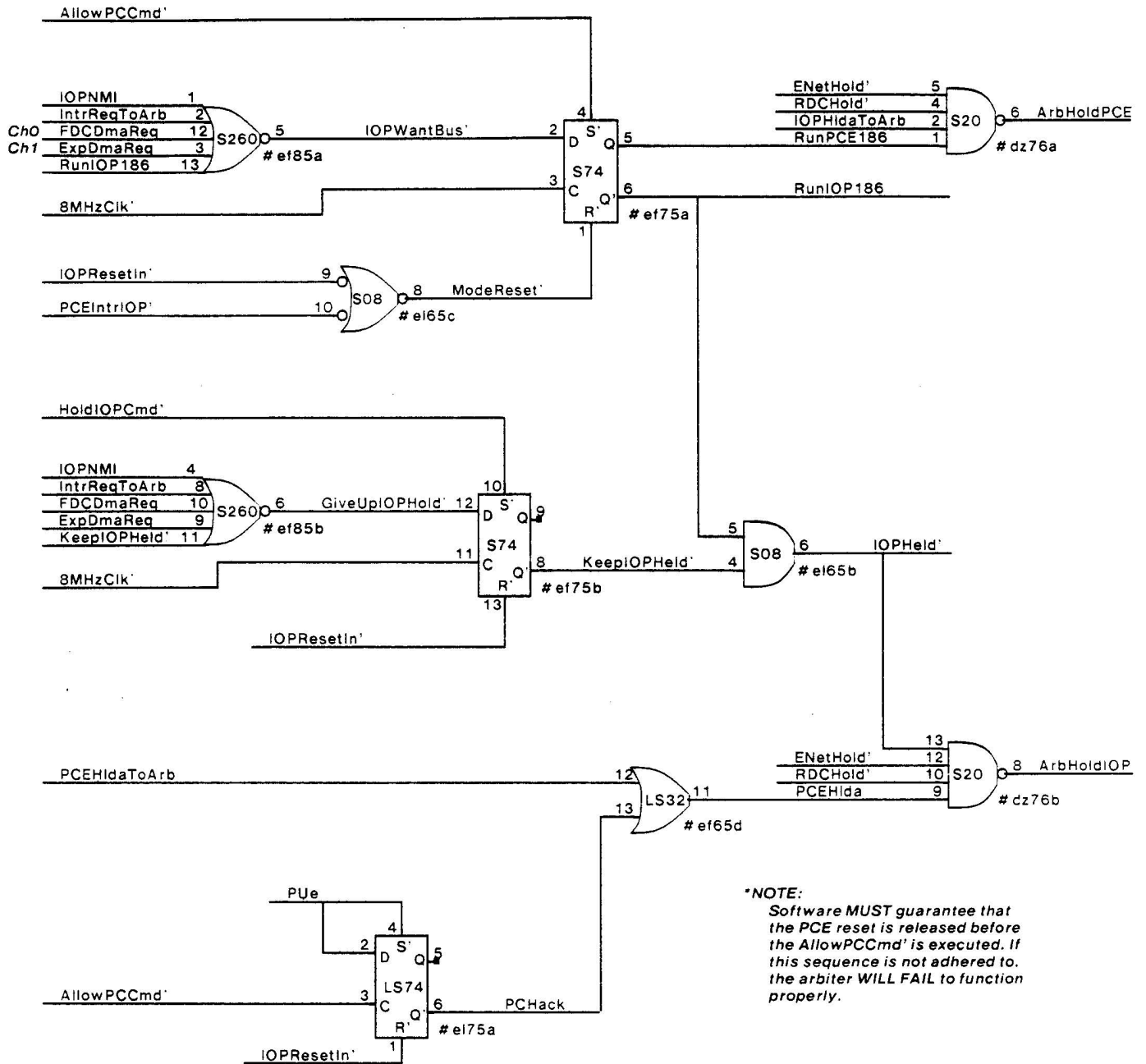   Priority #2 = Ridgid Disk

KEY FEATURES

MODE CONTROL

   o When Commanded By AllowPCCmd', Hold IOP186 Then Grant Bus Mastership to the PCE186

   o Terminate PCE186 Bus Mastership When It Executes an I/O Instruction

   o When Commanded By HoldIOPCmd', Hold the IOP186 Until Arbiter Notification to Release the Hold

ARBITRATION CONTROL

   o Terminate Ridgid Disk Bus Mastership Whenever Ethernet Requests Service

   o When Commanded By AllowRDCCmd', Honor Ridgid Disk Hold Requests

   o When the Following Conditions are True, Notify the Arbitration Control and Mode Control

       * Non Maskable Interrupt
       * Any Pending Interrupt
       * Floppy Disk Requires DMA Service
       * Expansion Slot Requires DMA Service

IOPHldaToArb 12
PCEHlda 13
S08 11 IOP/PCHlda
el65d
8MHzClk'

PUe
10
D 12 S' Q 9
LS74
C 11
R' Q' 8
dz85b
IOP/PCHldaDly'
IOPResetIn' 13

PUe
4
ENetHoldReq 2 D S' Q 5 ENetHold
LS74
8MHzClk' 3 C Q' 6 ENetHold'
R'
1
dz85a
IOPResetIn' RstENetCtlr'
(Note : if ENet is not installed,
keep this signal L to prevent
false ENet bus request).

1
13 LS27 12 ENetHoldAck
2 # ef55a

1 LS32 3 AckENet'
2 # ef65a

PUe
11
RDCHoldAck 14 J S' Q 10 OKToAckENet'
8MHzClk' 12 C LS109
RDCHold 13 K' Q' 9
R'
el55b
IOPResetIn' 15

*NOTE:
Once the RDC State
sees a true state on
the RDCHoldAck line,
it MUST BLOCK samples
until the DMA xfer
begins.

ENetHold 4
ENetHoldAck 5 LS32 6 ReqRDCToStop
ef65b

3
5 LS27 6 RDCHoldAck
4 # ef55b

PUe
5
StopRDC' 2 J S' Q 6 RDCHold
8MHzClk' 4 C LS109
3 K' Q' 7 RDCHold'
R'
1
el55a
RDCHoldReq
(pull down to disable)

9
10 LS32 8 OKToRunRDC'
ef65c

AllowRDCCmd'
IOPNMI 4
IntrReqToArb 8
Ch0 FDCDmaReq 10 S260 6 StopRDCCond'
Ch1 ExpDmaReq 9 # el85b
RunRDC' 11
8MHzClk'

10
12 S' Q 9 StopRDC'
LS74
11 C Q' 8 RunRDC'
R'
el75b
IOPResetIn' 13

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*NOTE:
Software MUST guarantee that
the PCE reset is released before
the AllowPCCmd' is executed. If
this sequence is not adhered to.
the arbiter WILL FAIL to function
properly.

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