Implementation of Offloading the iSCSI and TCP/IP Protocol onto Host Bus Adapter

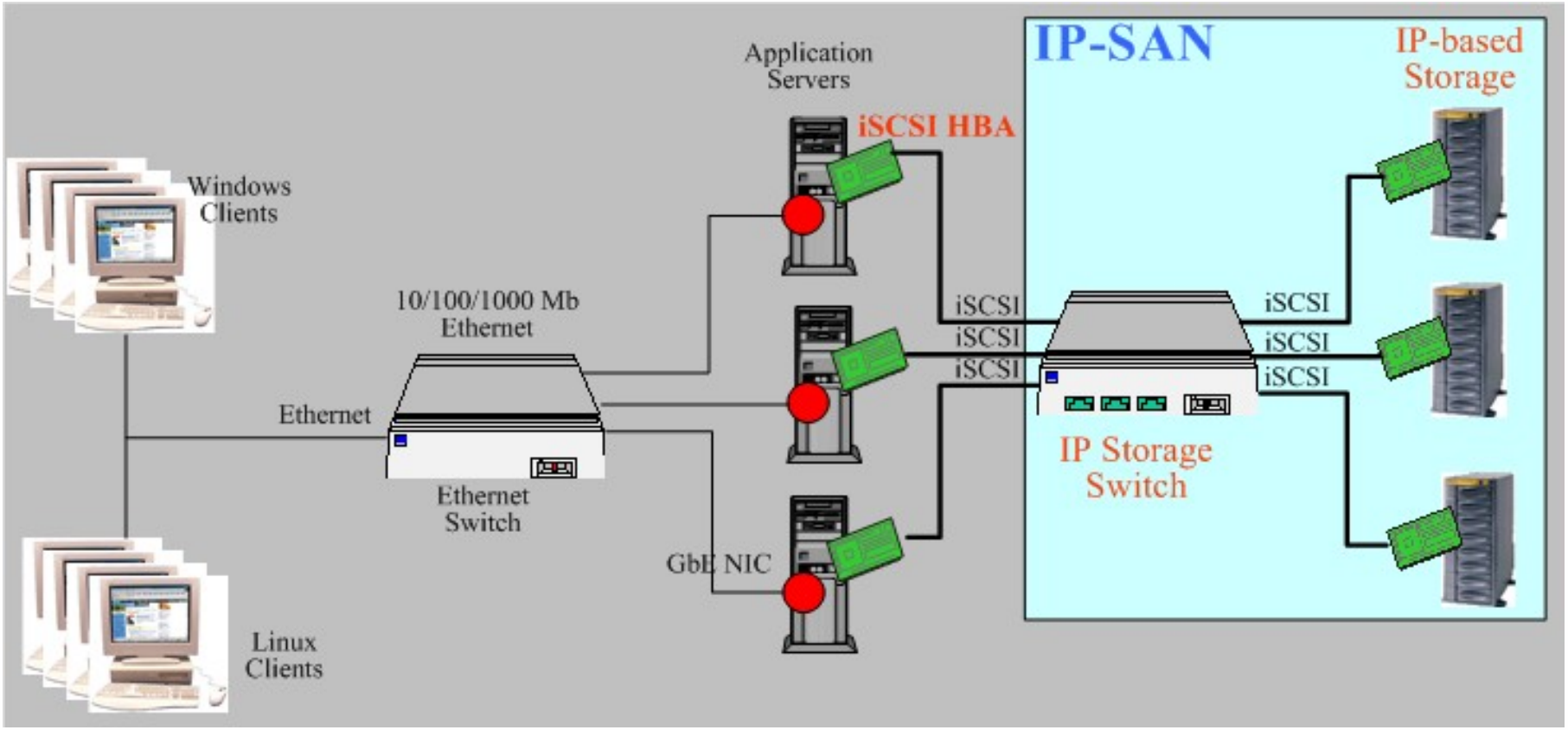
ITRI South Network Storage Dept.

Zheng-Ji Wu
Zhong-Zhen Wu
Speaker: Han-Chiang Chen

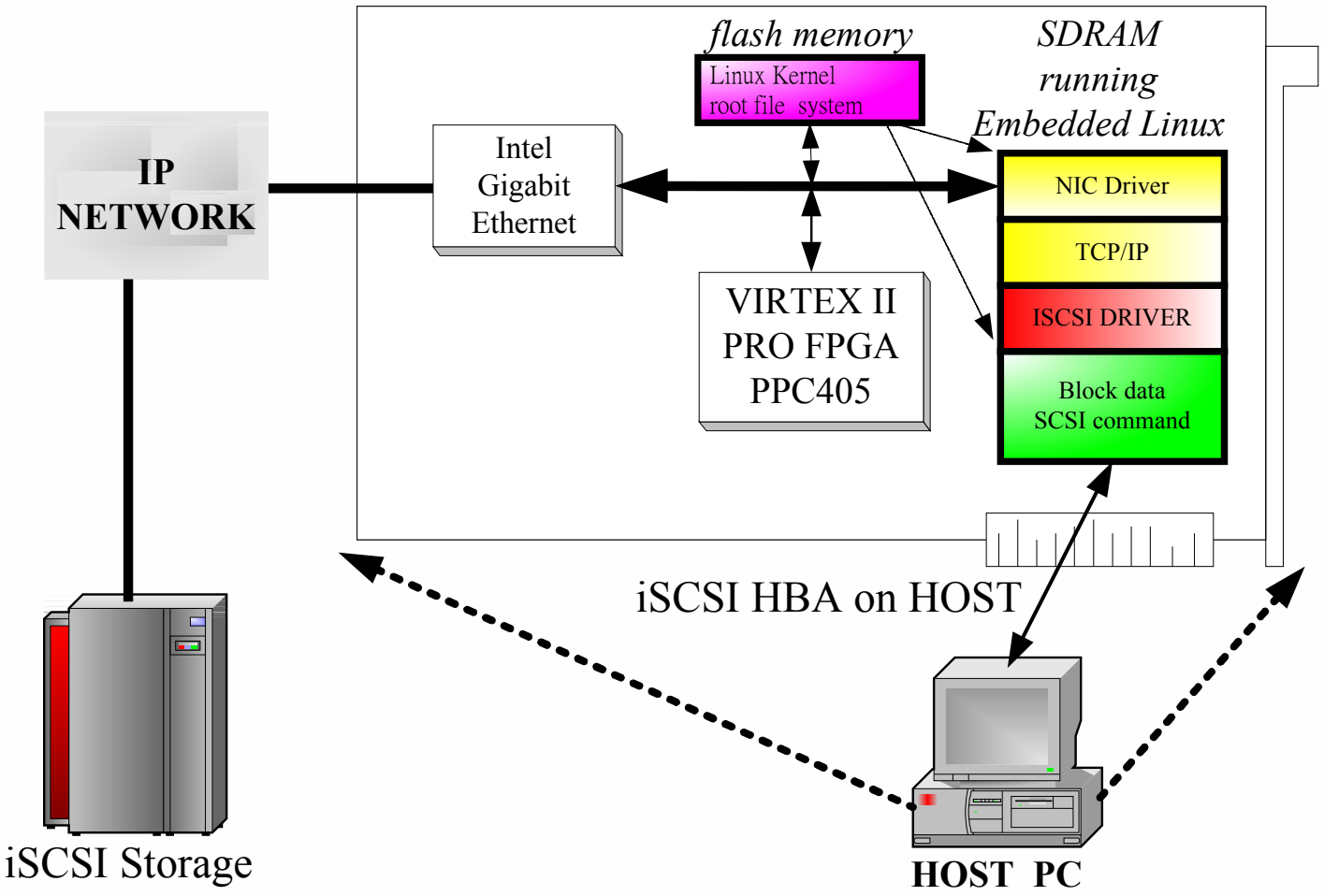
Agenda

- **IP SAN with iSCSI HBA Introduction**
- **iSCSI HBA Design**
  - Embedded system for processing iSCSI and TCP/IP
  - Architecture design of iSCSI adapter
  - The iSCSI HBA Driver interface
- **Implementation Results**
  - Throughput and CPU utilization measured by Linux TIObench
  - Device utilization summary
  - iSCSI HBA Prototype
- **Conclusions**

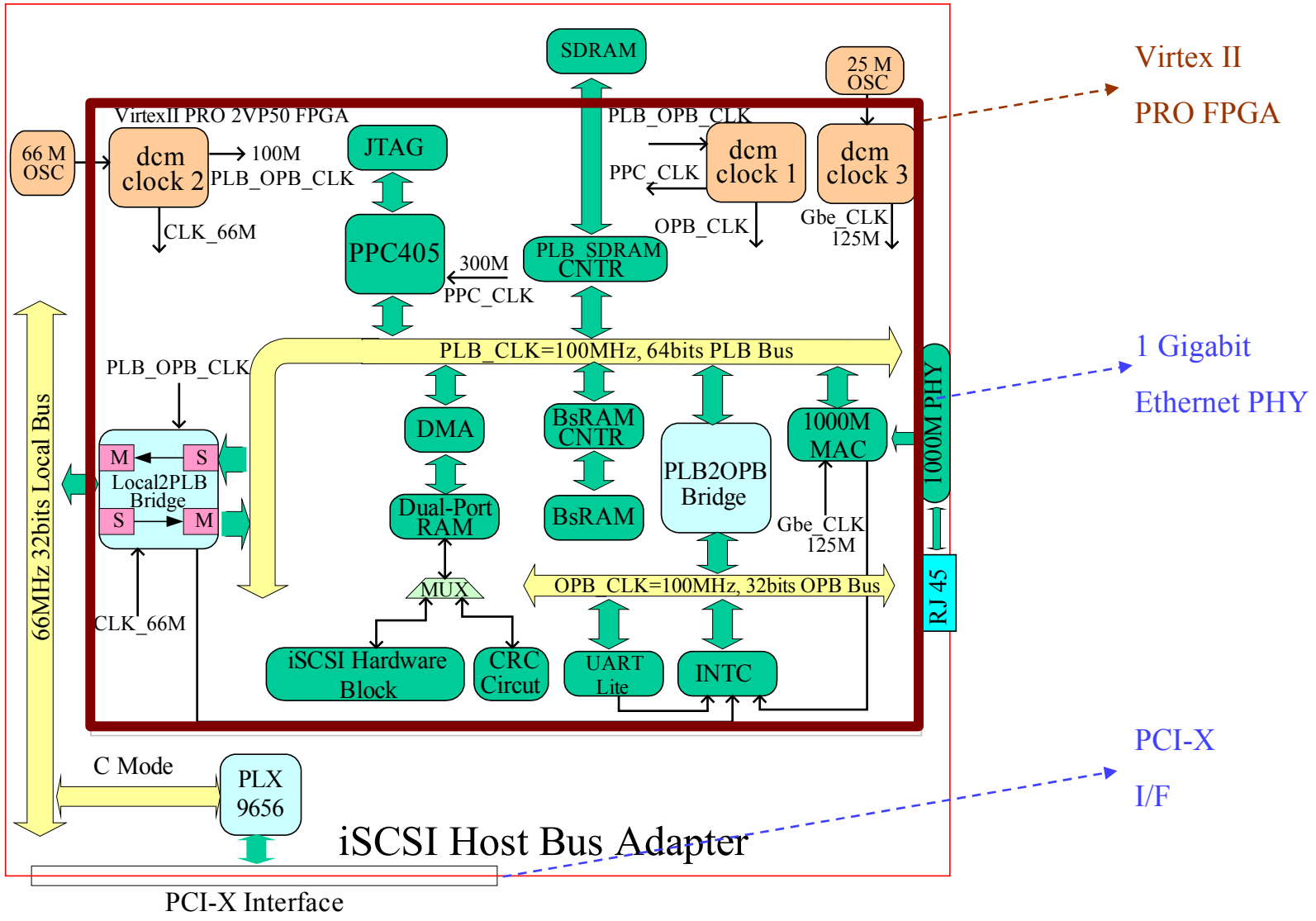
IP SAN with iSCSI HBA



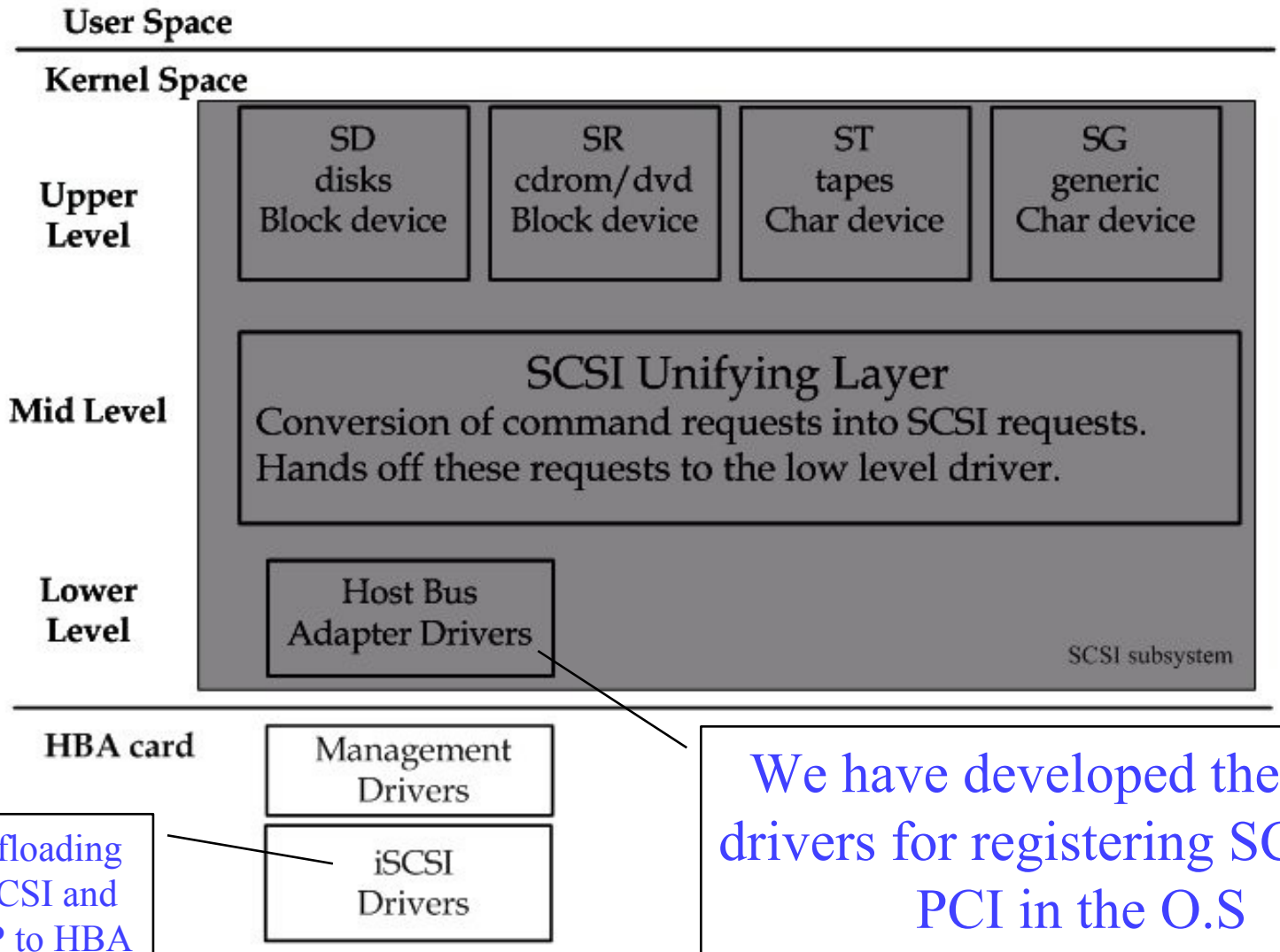
Embedded system for processing iSCSI and TCP/IP



Architecture design of iSCSI adapter



The iSCSI HBA Driver interface



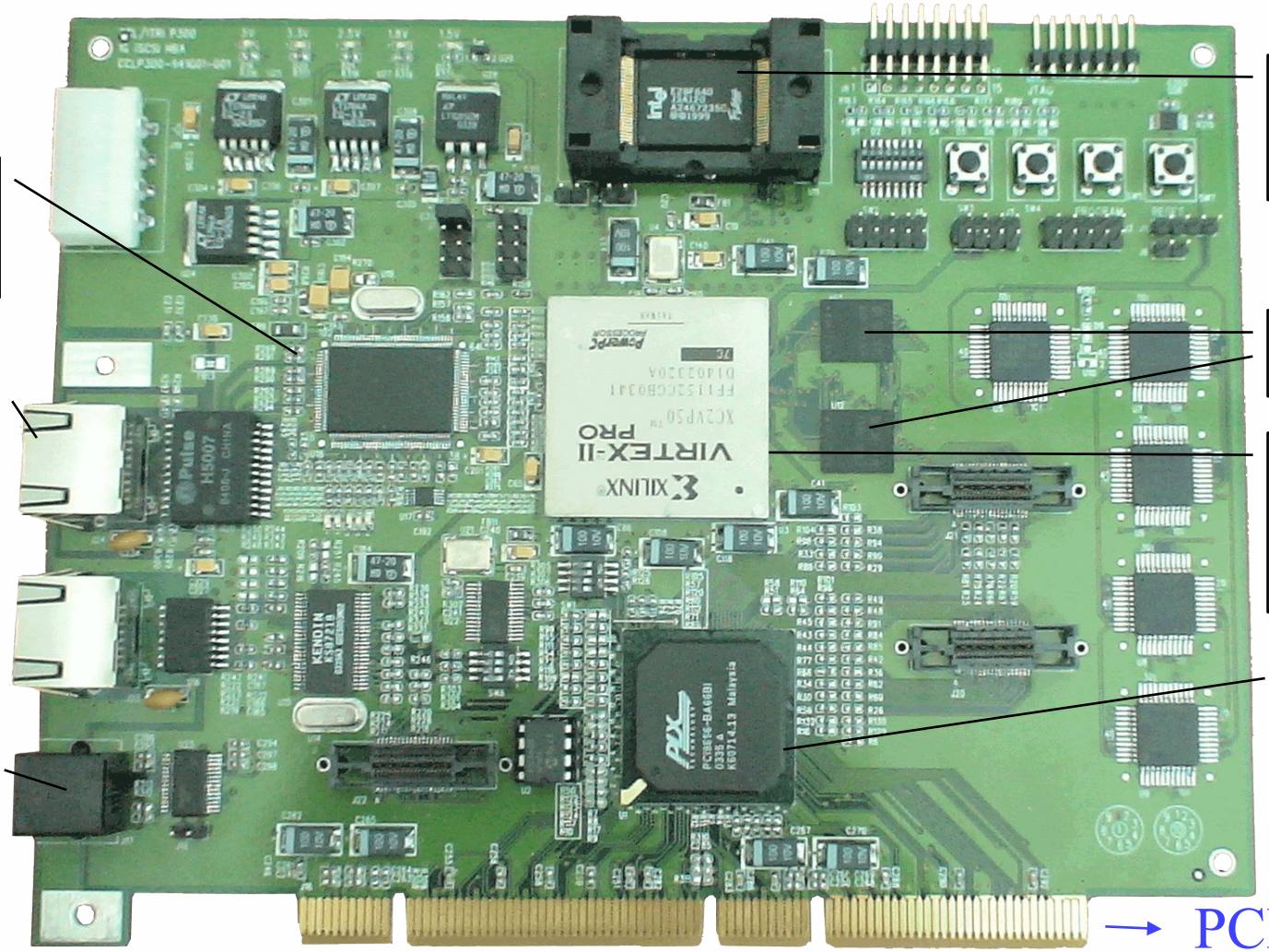
Throughput and CPU utilization measured by Linux TIObench

		Pure Software	Qlogic QLA-4010C	1G CCL iSCSI HBA
Without CRC	Write (MB/s)	15.85	11.35	10.85
	Read (MB/s)	10.55	18.75	10.19
	Write CPU (%)	20.9	3.5	1.2
	Read CPU (%)	9.3	3.8	2.1
With CRC	Write (MB/s)	11.38	3.78	3.75
	Read (MB/s)	6.55	3.98	3.46
	Write CPU (%)	29.6	1.2	1.1
	Read CPU (%)	18.4	2.7	0.9

Device utilization summary

XILINX VIRTEX II PRO FPGA XC2VP50	Used	Total	Utilization
External IOBs	215	692	31%
LOCed IOBs	206	215	95%
PPC405s	1	2	50%
RAMB16s	79	232	34%
SLICEs	5444	23616	23%
BUFGMUXs	7	16	43%
DCMs	4	8	50%

iSCSI HBA Prototype



Conclusions

- The iSCSI HBA can significantly reduce the HOST CPU utilization for application server and IP-based storage server.
- The hardware accelerating for iSCSI Digest is required.
- To enable high-speed data throughput, we should implement TCP/IP Offload Engine to further improve the processing of TCP/IP for iSCSI.