Network Processor: Architecture and Applications

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Outline

- Overview of Network Processors
- Network Processor Architectures
- Applications
- Case Studies
  - Wireless Mesh Network
  - a Content-Aware Switch
- Conclusion

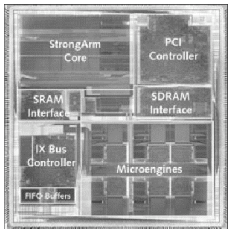
Packet Processing in the Future Internet

Future Internet

More packets
&
Complex packet processing

ASIC

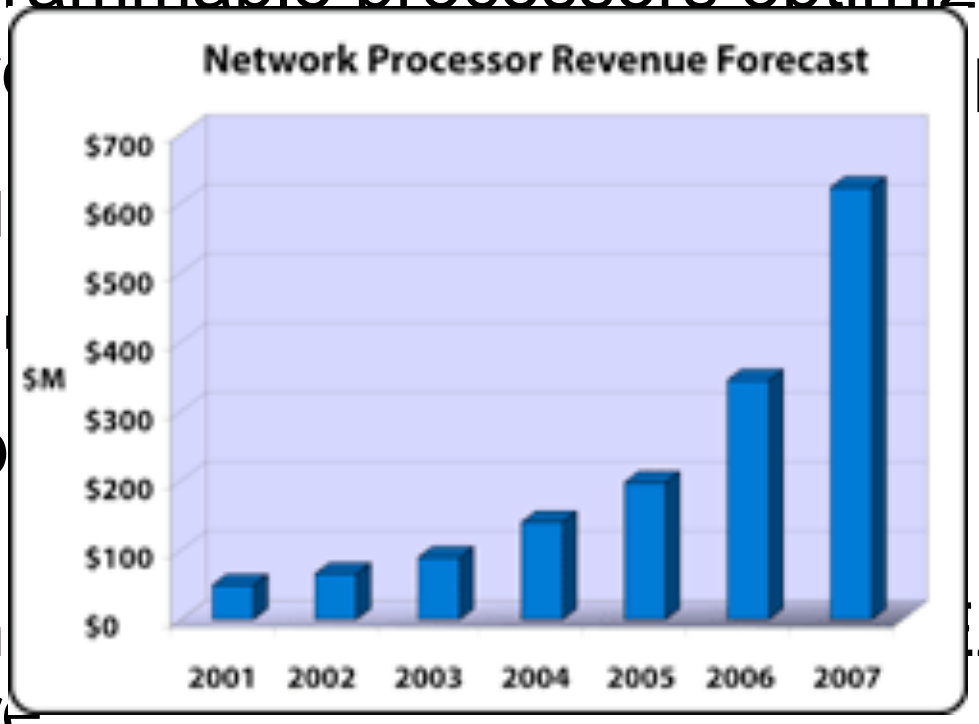
General-Purpose Processors



- High processing power
- Support wire speed
- Programmable
- Scalable
- Optimized for network applications
- …

What is Network Processor ?

- Programmable processors optimized for netw processing
  - H
  - P
  - O
- Main zchip, Agere

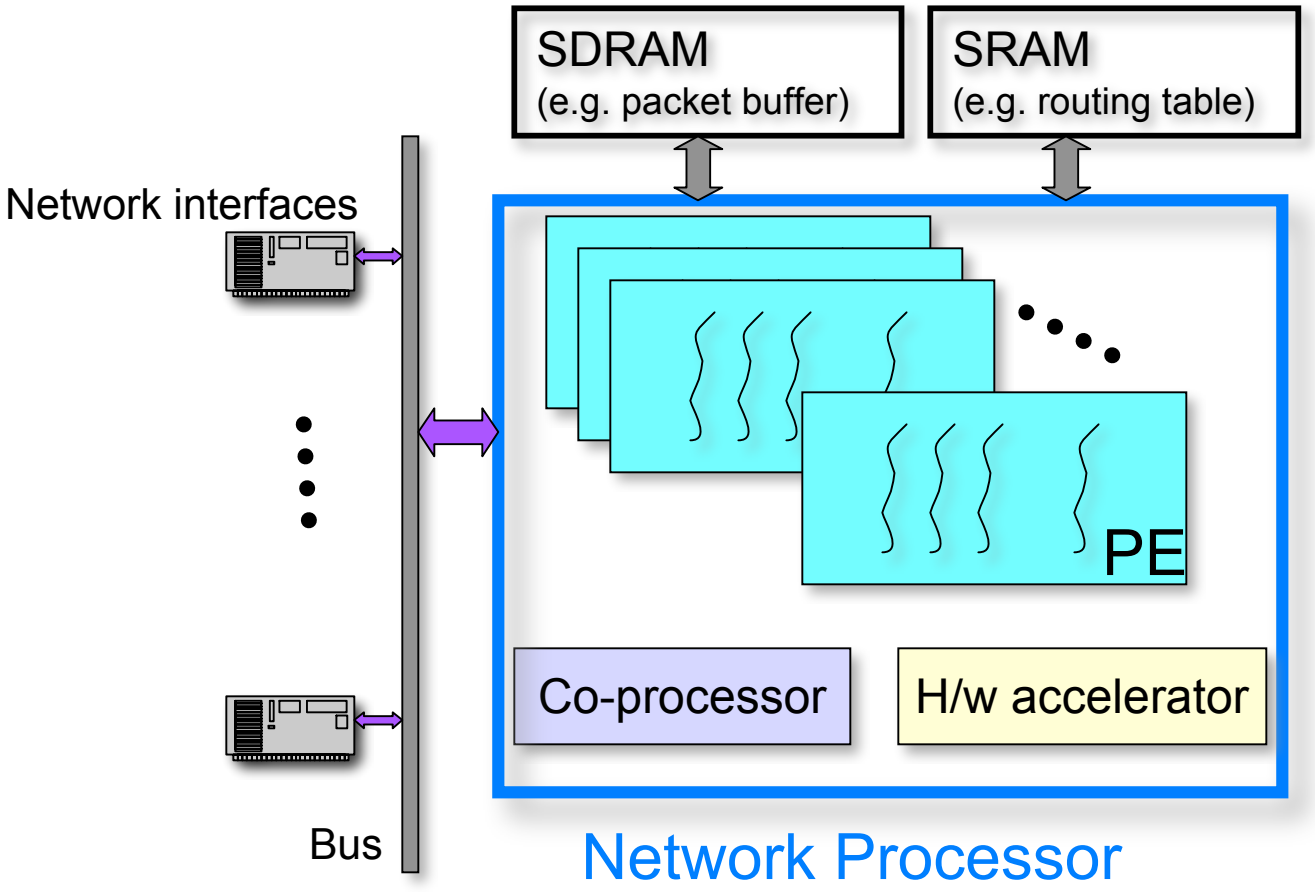


Semico Research Corp. Oct. 14, 2003

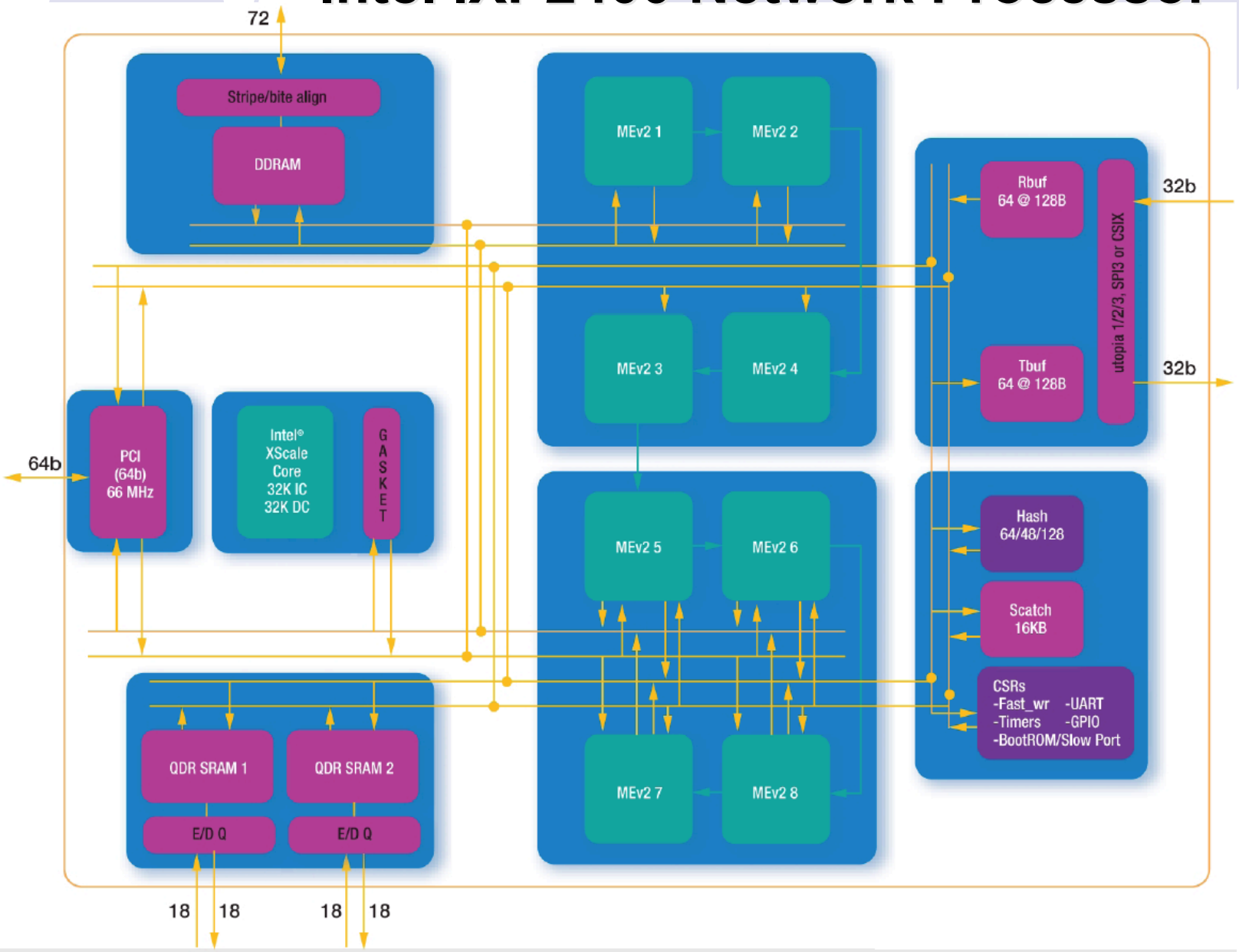
Commercial Network Processors

Vendor	Product	Line speed	Features
AMCC	nP7510	OC-192/ 10 Gbps	Multi-core, customized ISA, multi-tasking
Intel	IXP2850	OC-192/ 10 Gbps	Multi-core, h/w multi-threaded, coprocessor, h/w accelerators
Hifn	5NP4G	OC-48/ 2.5 Gbps	Multi-threaded multiprocessor complex, h/w accelerators
EZchip	NP-2	OC-192/ 10 Gbps	Classification engines, traffic managers
Agere	PayloadPlus	OC-192/ 10 Gbps	Multi-threaded, on-chip traffic management

Typical Network Processor Architecture



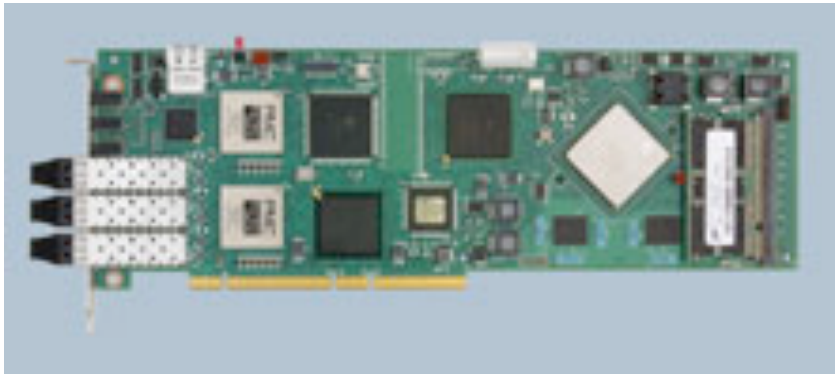
Intel IXP2400 Network Processor



Snapshots of IXP2xxx Based Systems

ADI Roadrunner Platform

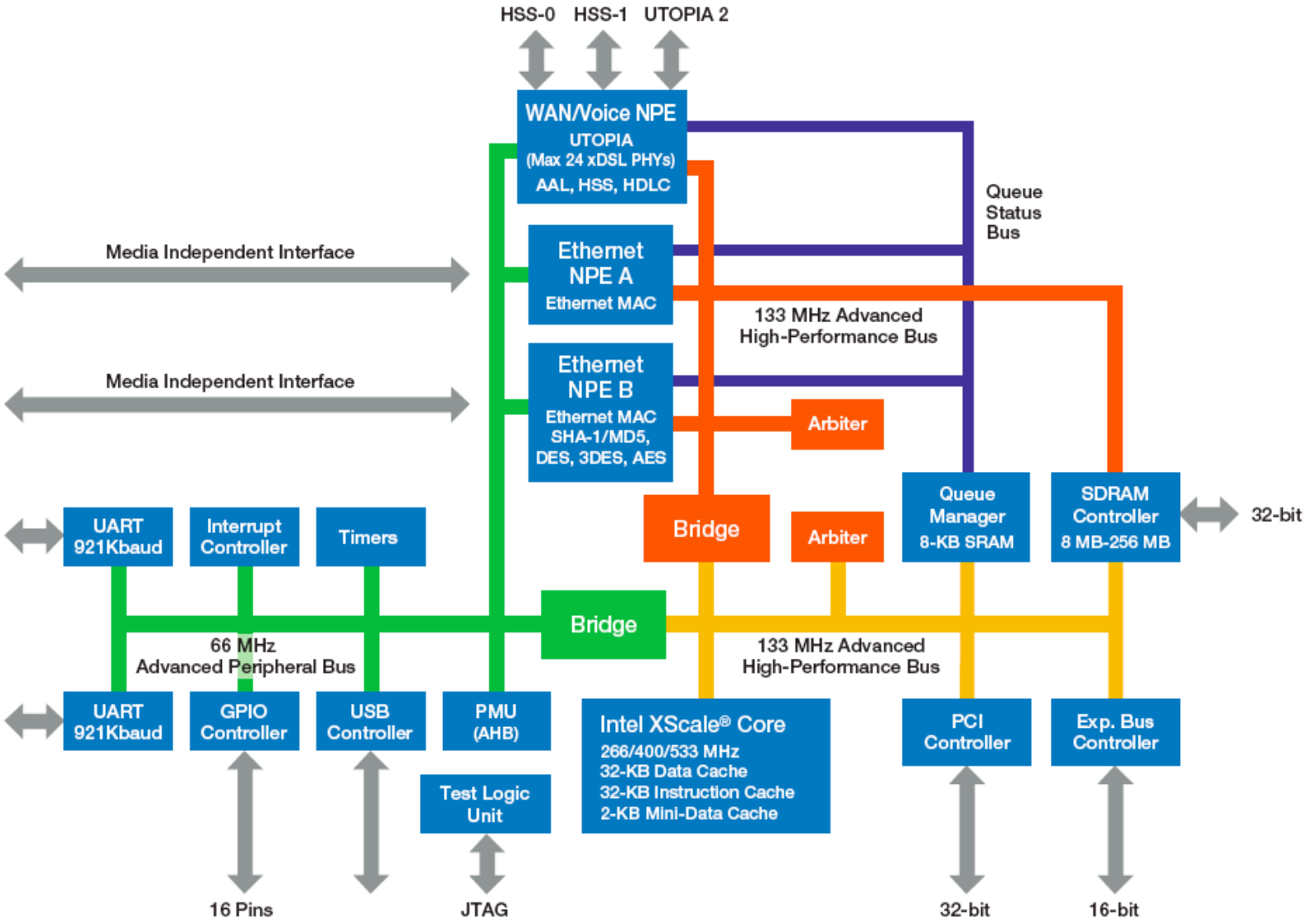
- IPv4 Forwarding/NAT
- Forwarding w/ QoS / DiffServ
- ATM RAN
- IP RAN
- IPv6/v4 dual stack forwarding



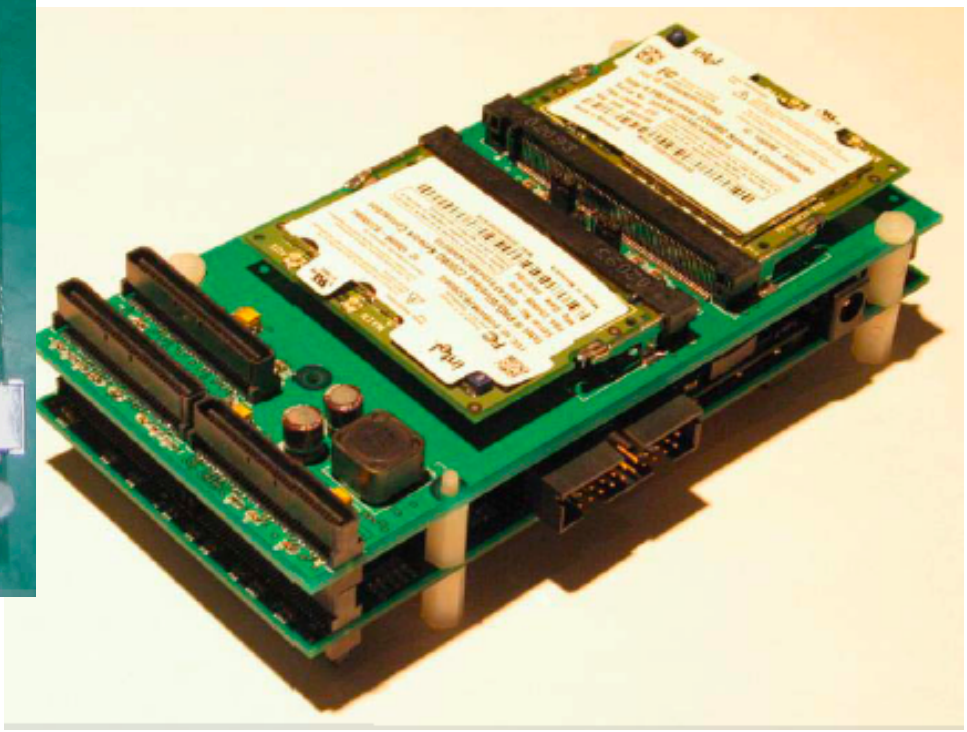
Radisys ENP2611 PCI Packet Processing Engine

- multiservice switches,
- routers, broadband access devices,
- intrusion detection and prevention (IDS/IPS)
- Voice over IP (VoIP) gateway
- Virtual Private Network gateway
- Content-aware switch

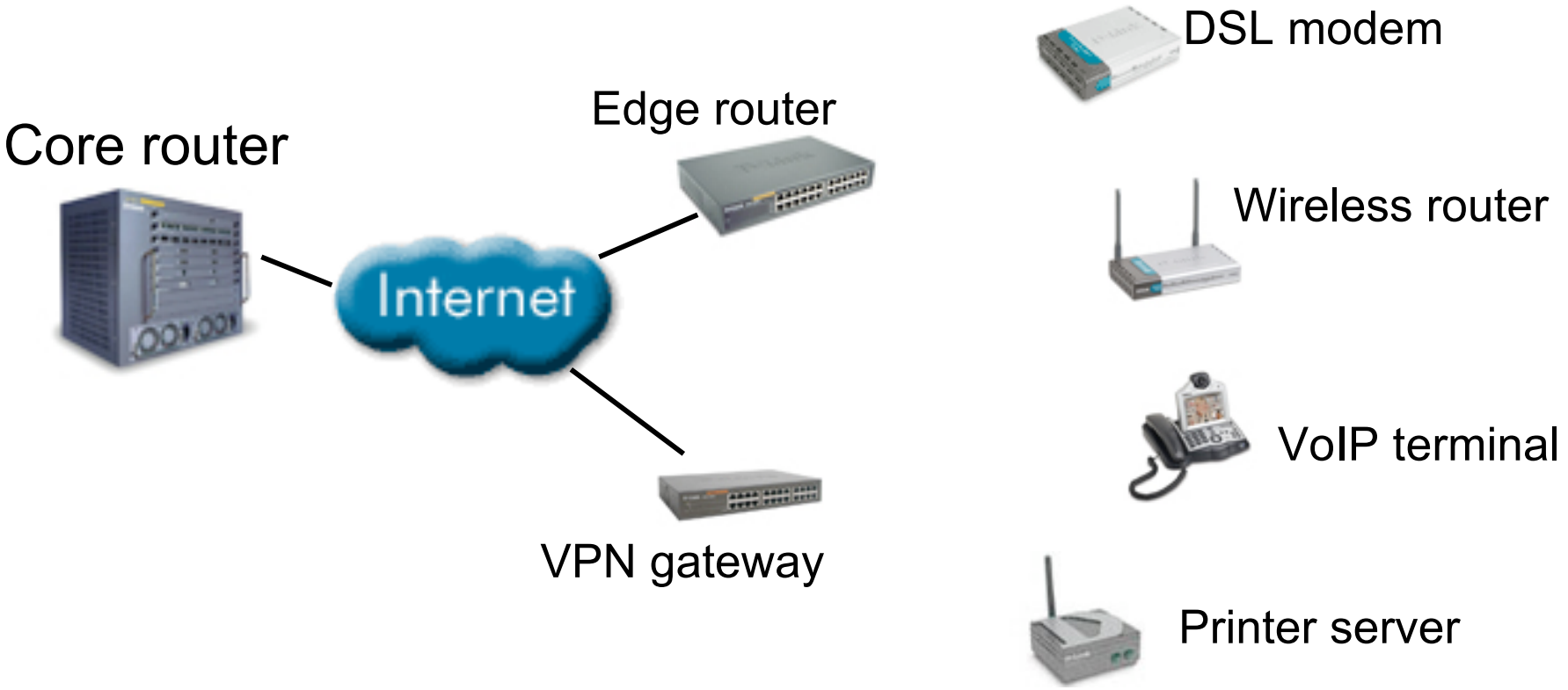
Intel IXP425 Network Processor



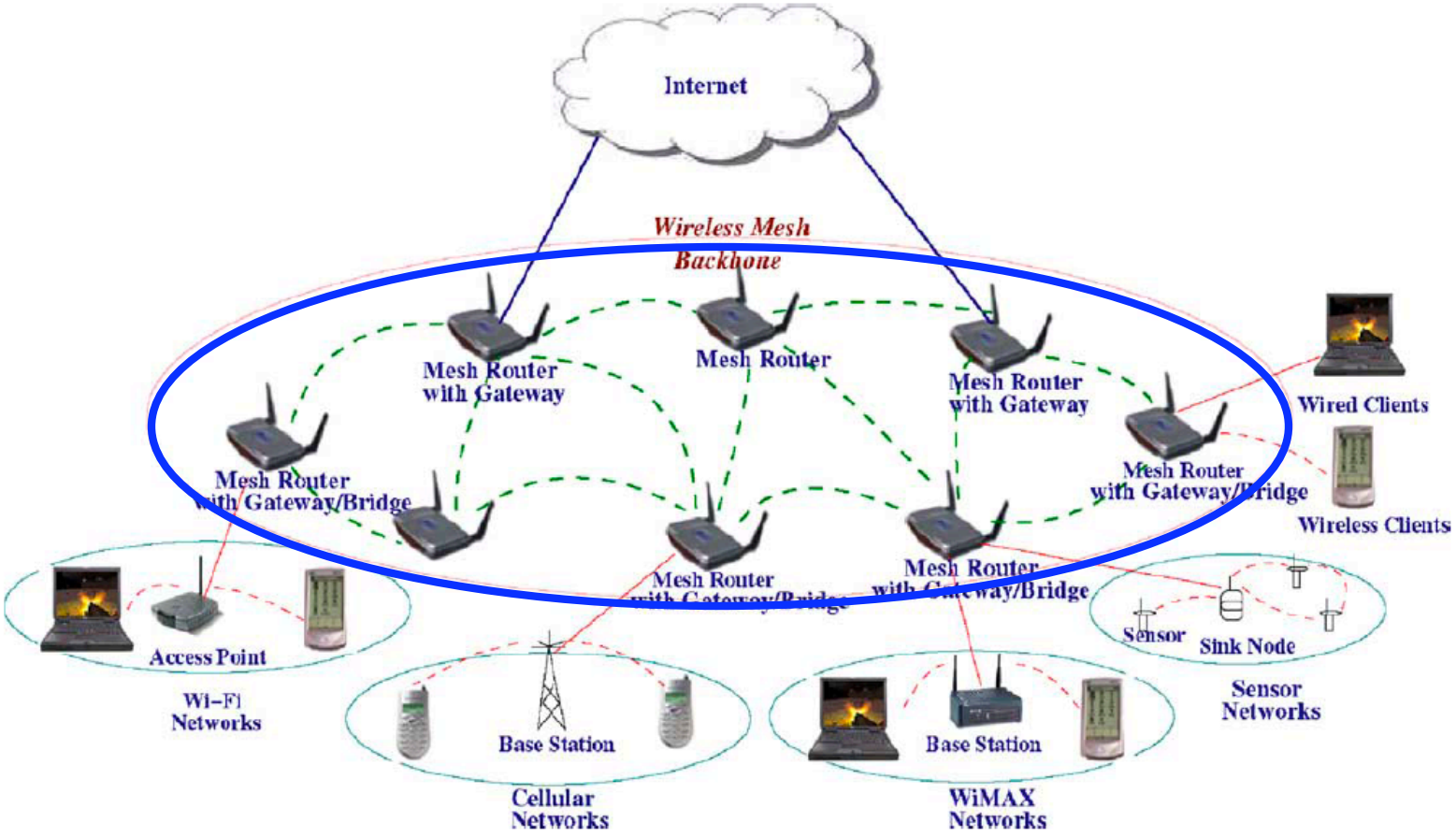
StarEast: IXP425 Based Multi-radio Platform



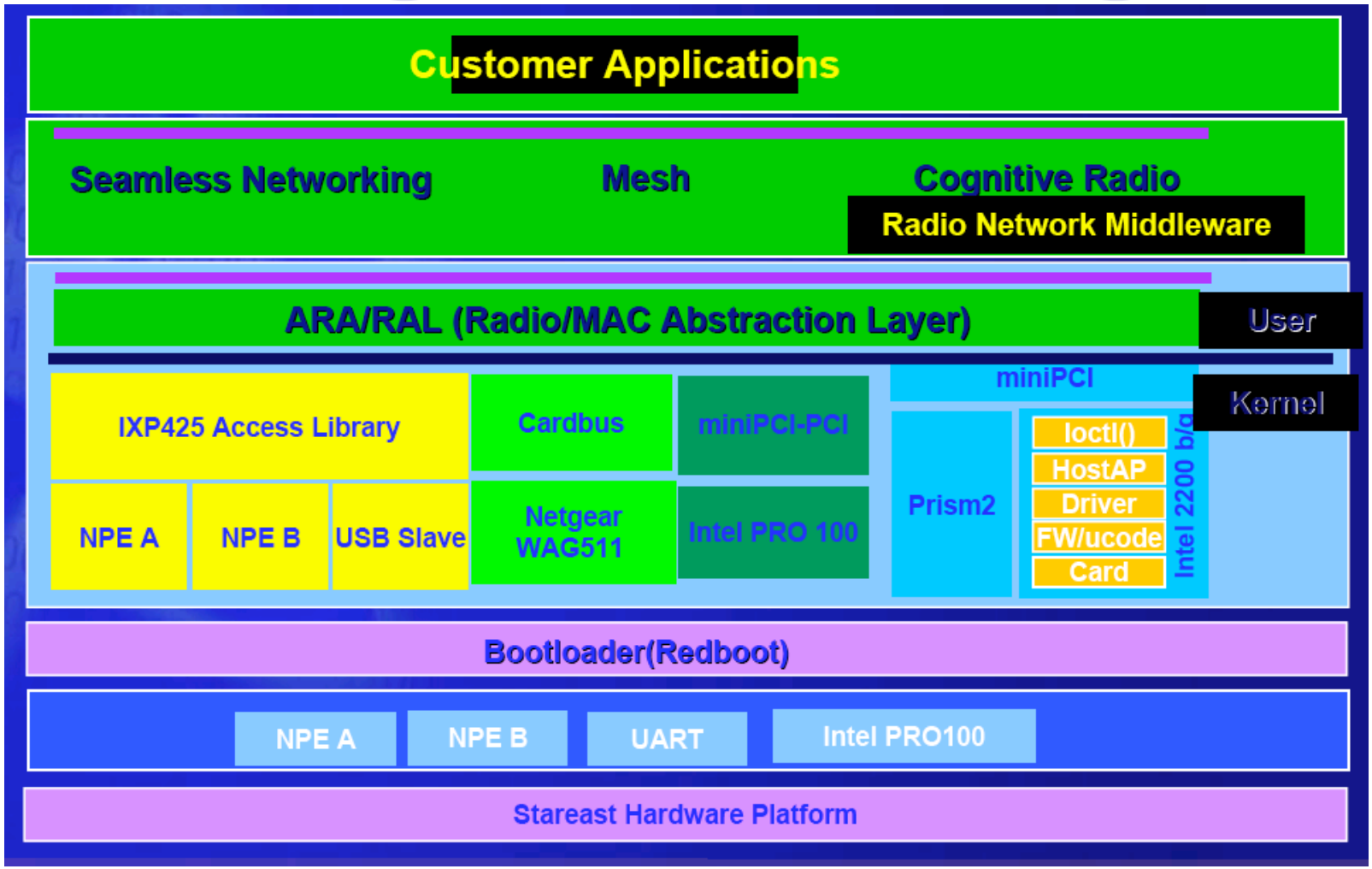
Applications of Network Processors



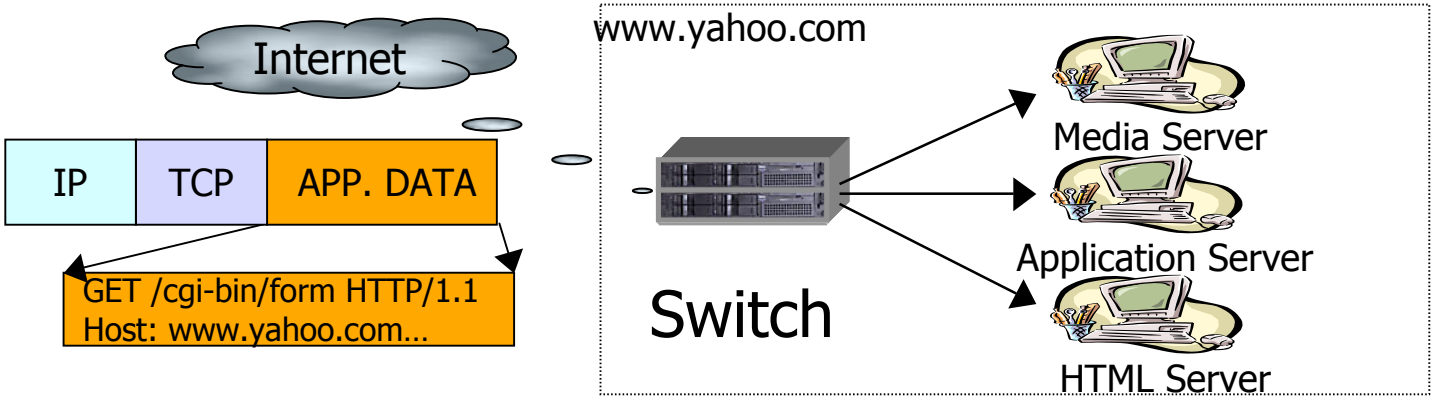
Case Study 1: Wireless Mesh Network



Software Stack on StarEast



Case Study 2: Content-aware Switch



- Front-end of a Web cluster, only one Virtual IP
- Route packets based on Layer 5 information
  - Examine application data in addition to IP& TCP
- Advantages over layer 4 switches
  - Better load balancing: distributed based on content type
  - Faster response: exploit cache affinity
  - Better resource utilization: partition database