Network Processor Technical Report

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Why Need Network Processor

- Flexibility and line speed requirement
  - ASIC vs NP, GPP vs NP
  - Line speed increasing (OC-768)
- Time to market and Time in market
  - New products develop time
  - Networking evolving

NP Architecture

- The characteristic of network workload
  - Naturally parallelism, inherent from data stream
- Parallel processing
  - Packet level parallelism (several PEs)
    - IXP2850 16 PEs, PowerNP 16 PEs
  - ILP
    - Pipeline, multi-issue
  - TLP
    - CMP and SMT performance better than SS
    - PEs are multi-threading

NP Architecture

- On-Chip Communication
  - Crossbar, high cost and low scalability
  - High bandwidth bus, Motorola C-5, Agere PayloadPlus
- Memory Architecture
  - Multi-threading hide the memory latency
  - Memory Co-processor (table-lookup…)
  - Caching

NPs

- Many companies make NPs
  - Intel IXA
  - IBM PowerNP
  - Agere PayloadPlus
  - Motorola C-5
  - Cisco Toaster2

Future Trends

- With increasing line speed and new applications, are the current architectures still available?
- High speed of on-chip communication
- Memory access latency
- More Co-processors, less flexibility