DSP Interconnect Issues in Communications Infrastructure
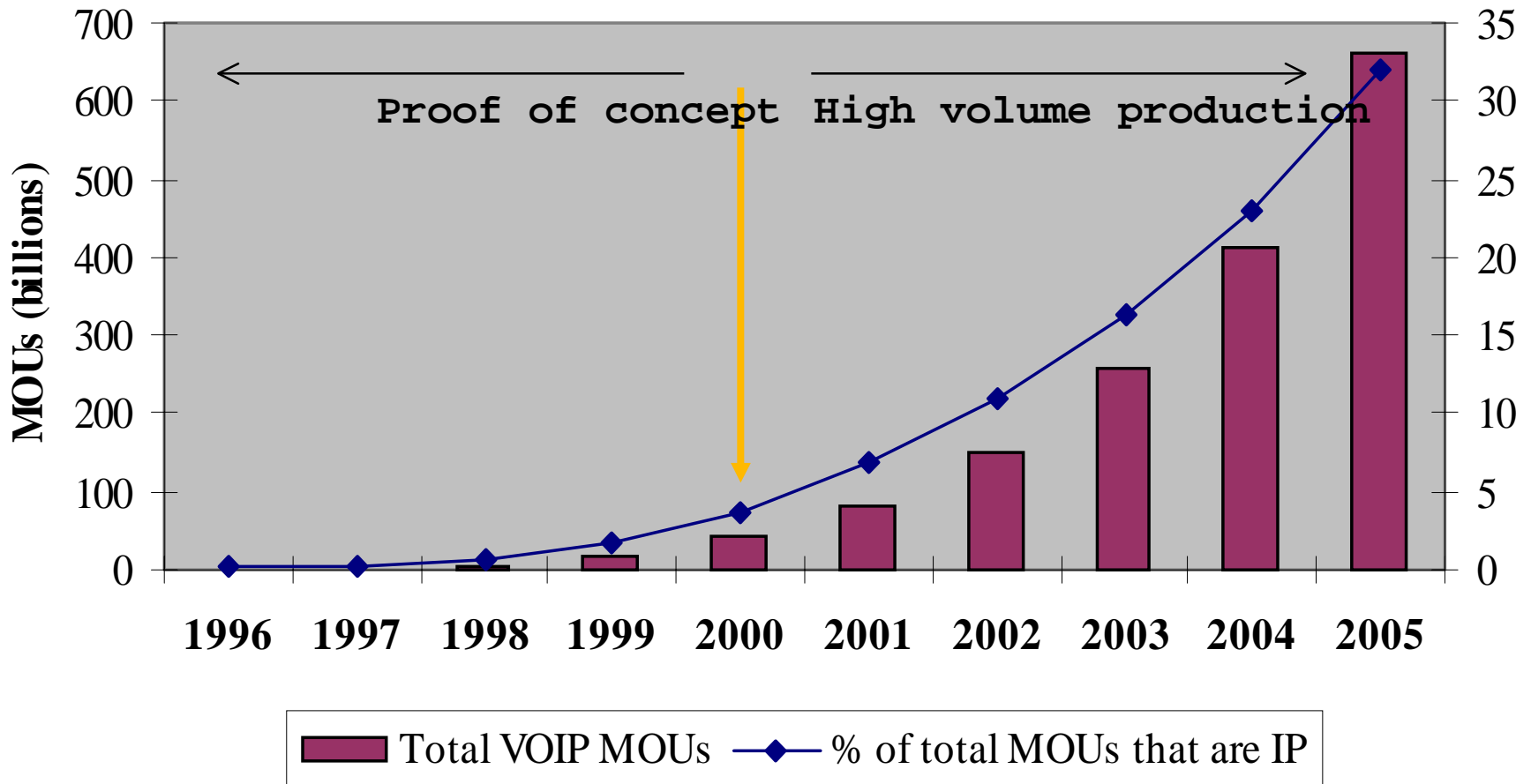
Jonathan Morris
Tundra Semiconductor

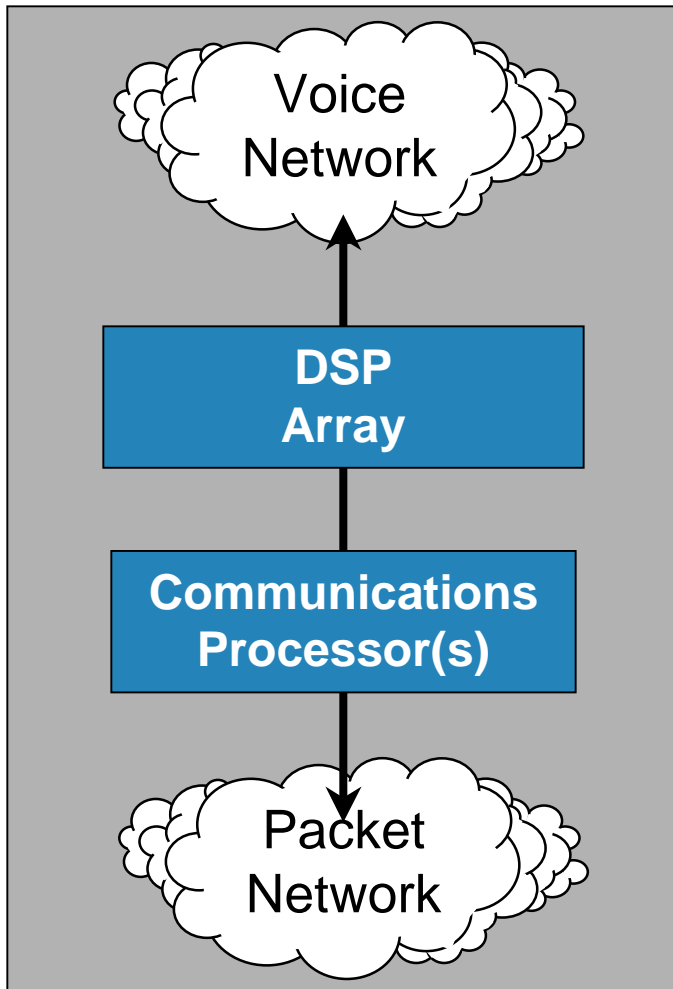# Growth of Voice Over Packet

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Current VoP Systems

- Proof of concept

- Relatively few channels (few 10's)

- High per channel costs
  - Costs were not the priority – technology was
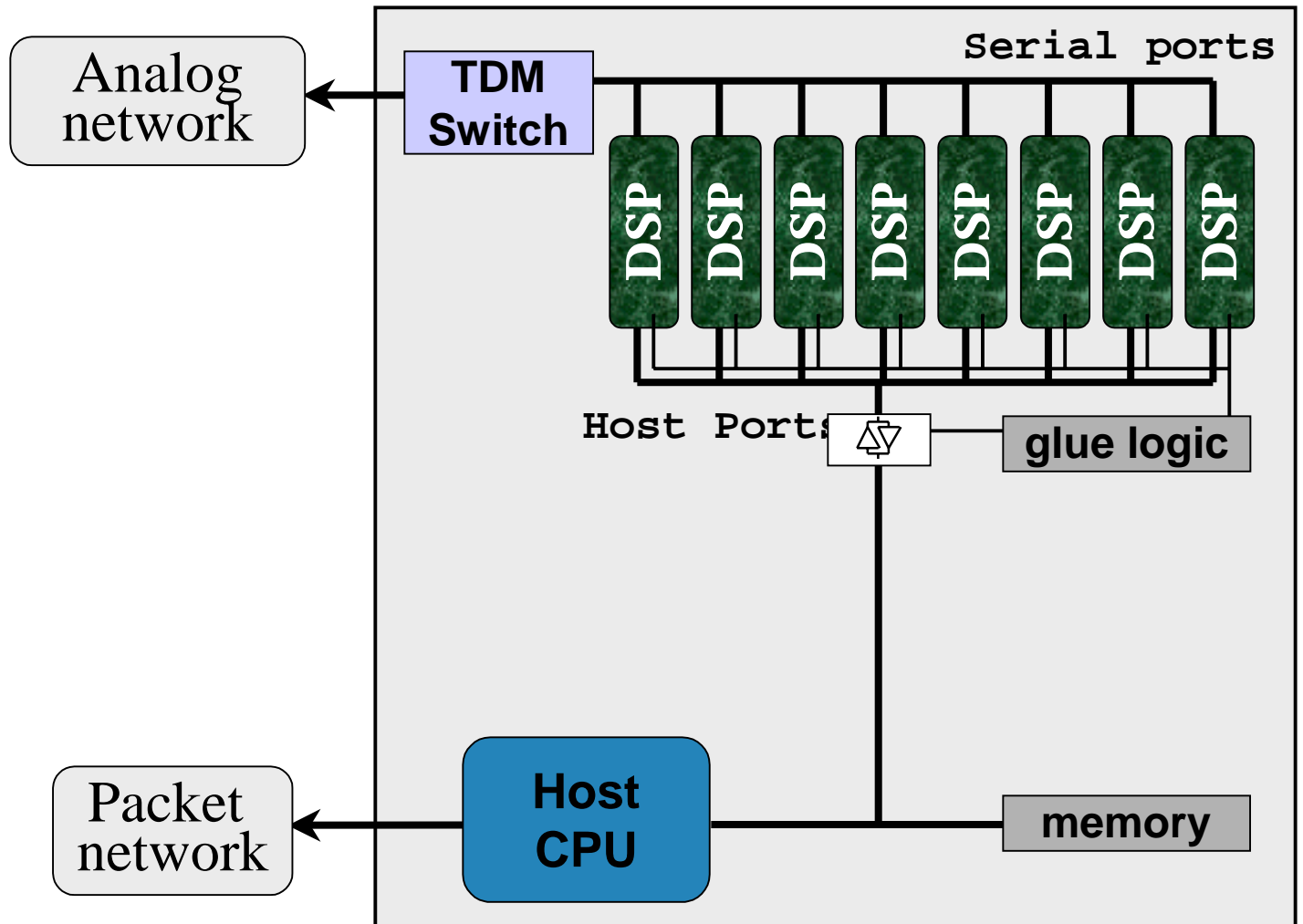
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Basic VoP System

- DSP Array:
  - Vocoding
  - Echo cancellation
  - Compression
  - DTMF

- Comms processor:
  - Routing
  - Protocol termination
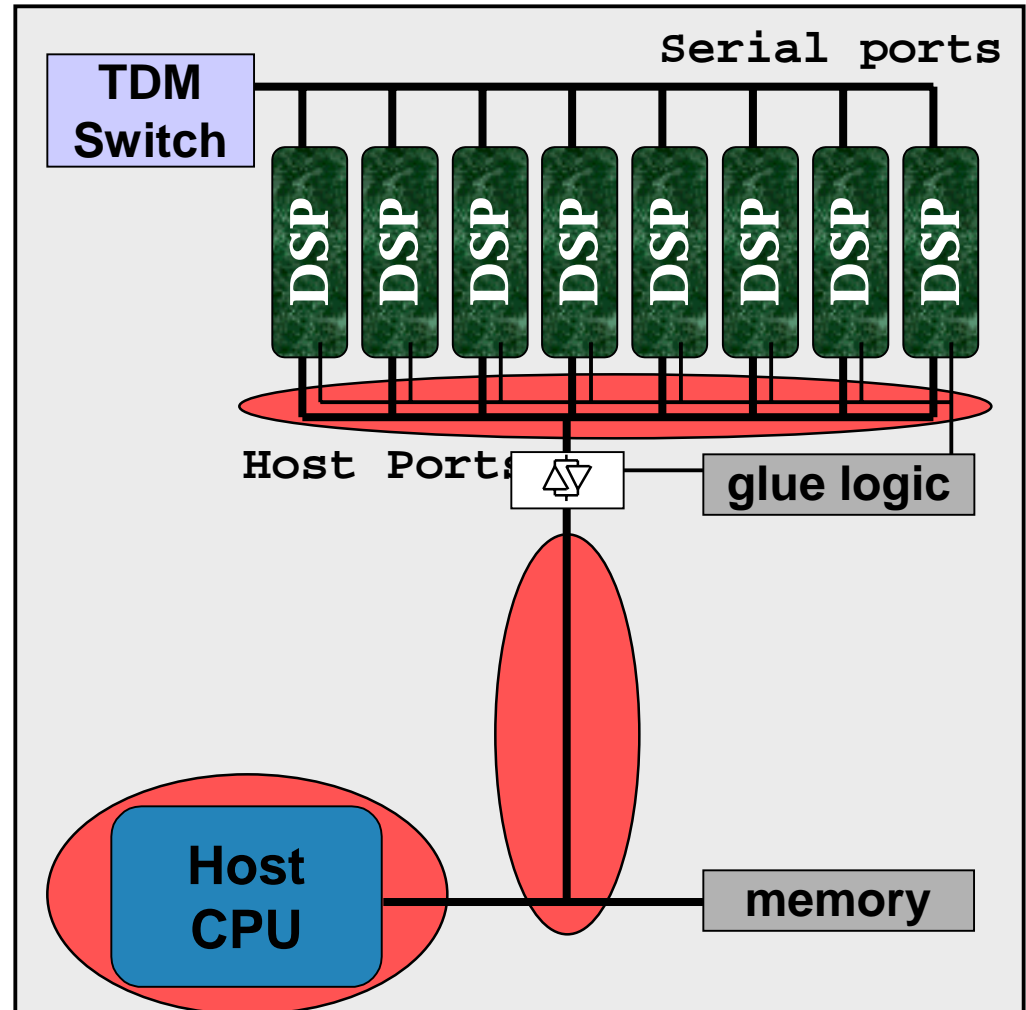 - System management

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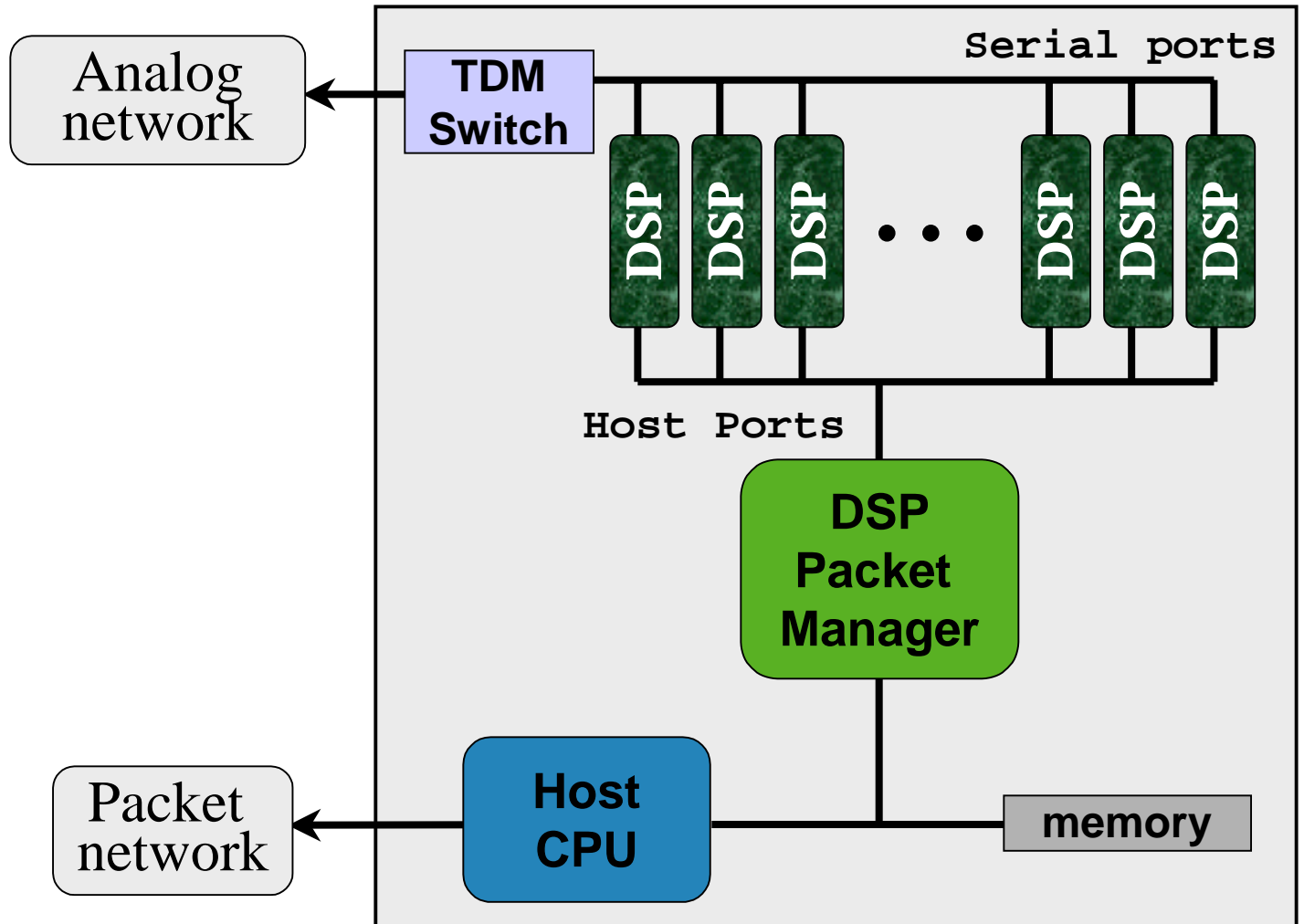# A Closer Look

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A Closer Look – Current System Problems

- Register based Host interface on DSPs
  - Slow, high latency

- Processor management of packet transfers
  - Polling
  - DMAing pkts into and out of DSP memory
  - Encumbered by slow Host interface

- Processor and system (PCI) bus utilization
  - Many long latency reads

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Greater Channel Density

Serial ports

Analog network ← TDM Switch

DSP DSP DSP • • • DSP DSP DSP

Host Ports

DSP Packet Manager

Host CPU

Packet network ←

memory

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Characteristics of a DSP Packet Manager

- Scalably handles any number of DSPs
- Buffers processor and processor bus from DSP port latencies
- Packet oriented
- Masters both DSP and processor interfaces
- Autonomously detects and transfers packets out of DSP internal memory (polling, interrupts, …)
- Manages packet buffers in processor and in DSP memory
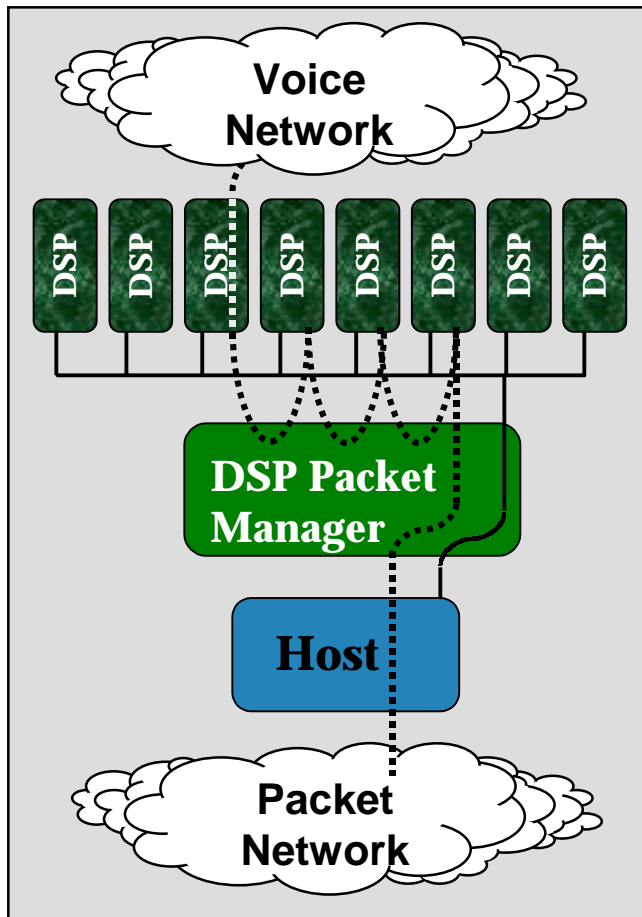
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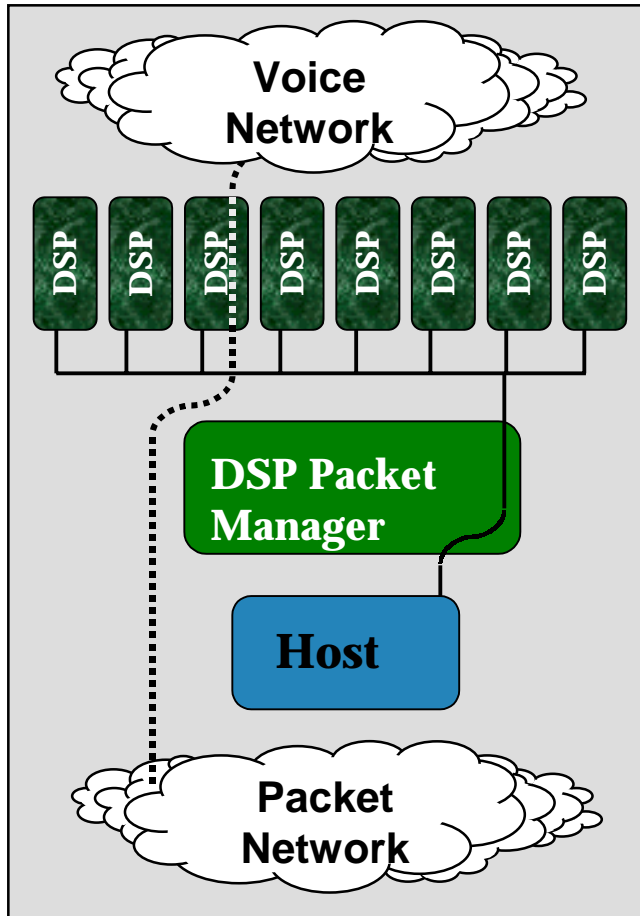# Packet Manager System Architectures (1)
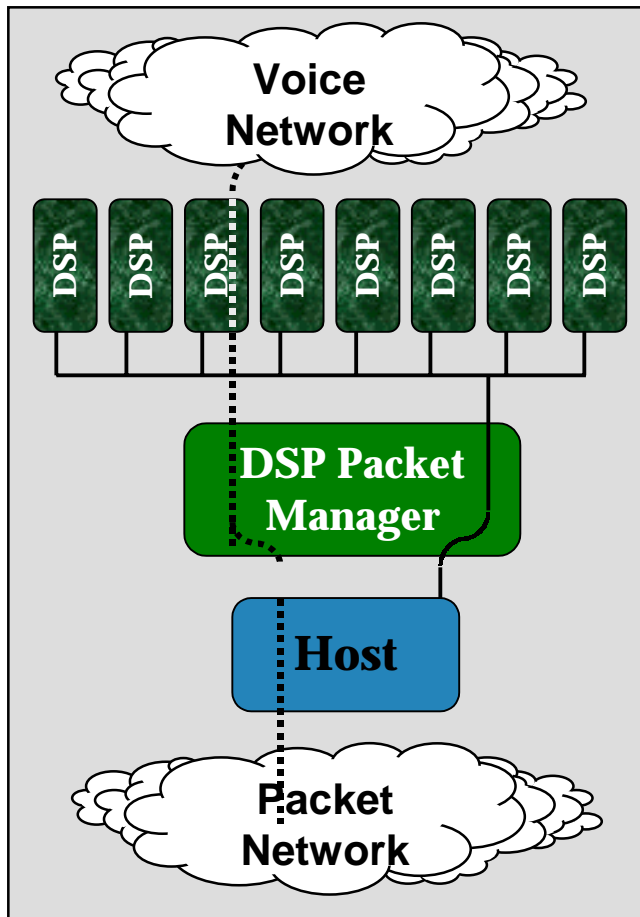
- Channelized Architecture
  - Single DSP handles all voice related processing for a single channel
  - Host handles protocol termination, routing & system functions
  - Packet Manager facilitates movement of both voice packets and control packets between DSPs and Host

Packet Manager System Architectures (2)

- Serialized Architecture
  - Single DSP handles a portion of voice related processing for a single channel <u>then passes to other DSP for more processing</u>
  - Host handles protocol termination, routing and system management
  - Packet Manager facilitates movement of both voice packets between DSPs & voice and control packets between DSPs and Host
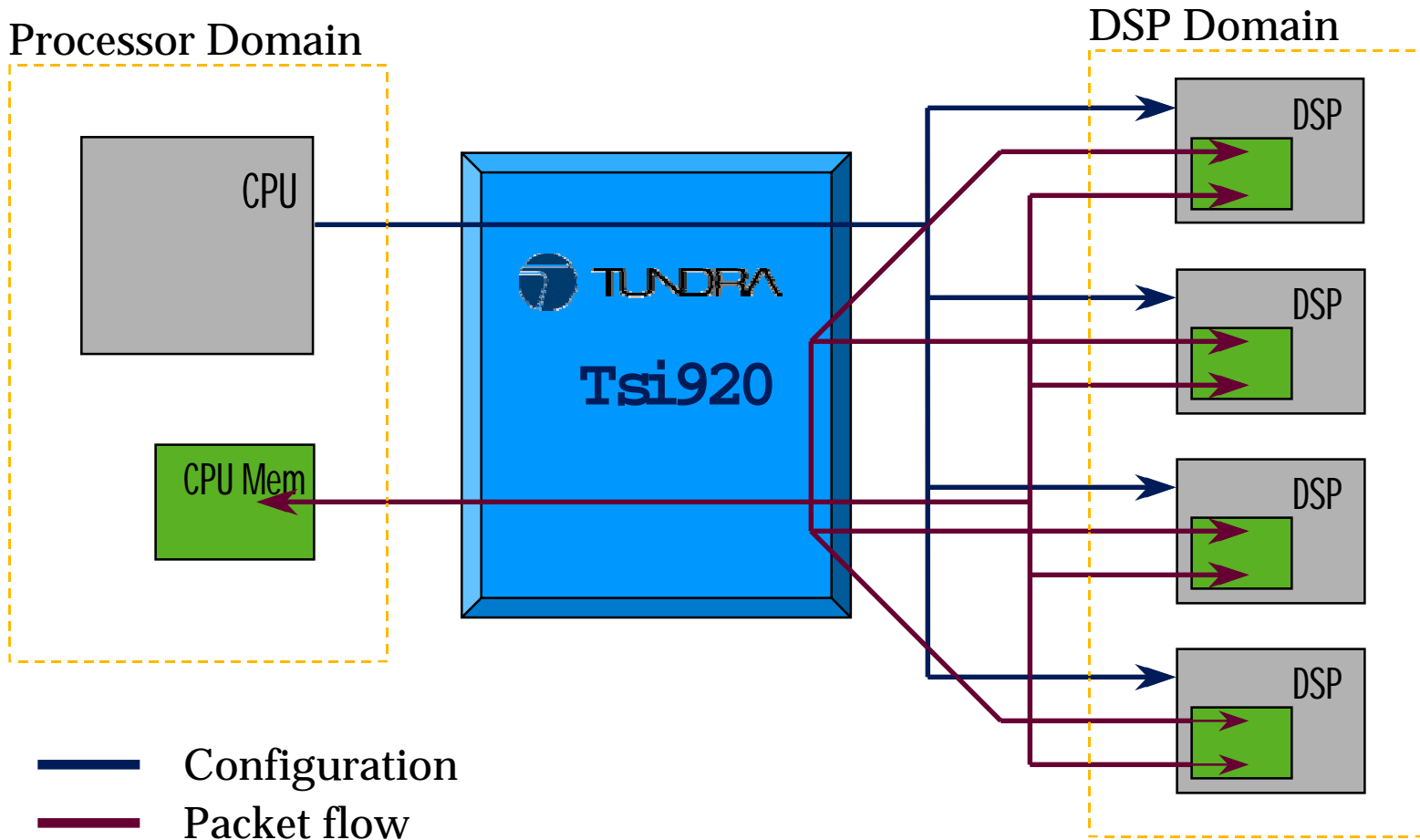
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Packet Manager System Architectures (3)

- **DSP Terminated Architecture**
  - DSP handles voice related processing for a single channel <u>as well as protocol termination</u> for that channel
  - Host handles routing and system management only
  - Packet Manager facilitates movement of control packets between DSPs and Host
  - May be combined with Serialized Architecture

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DSP Packet Manager : Tsi920

Processor Domain

DSP Domain

CPU

CPU Mem

Tsi920

DSP

DSP

DSP

DSP

——— Configuration
——— Packet flow

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Summary

- Voice over Packet systems are still in their infancy

- Drive to reduce costs and increase channel densities will drive new architectures

- Managing inter-processor communications within these architectures will be challenging

- DSP interconnect solutions like the Tsi920 will be the key to those new architectures.

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