

Multicore Technology

Building a Software Tool base for Multicore Network Processors

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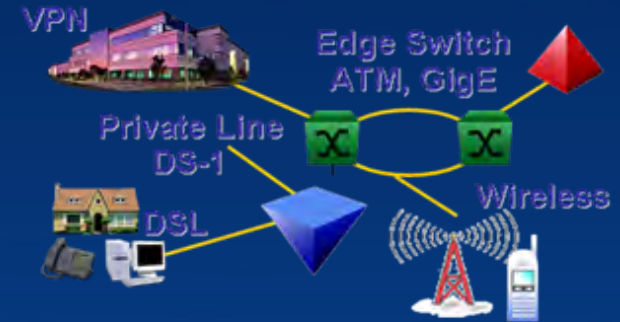
Multicore Processors are the new Network processors.

- How will the multicore software tools ensure that these new processors won't have the same fate as the previous generation?
- How will an ecosystem of software toolkits be created to speed time to market for application?

Key Applications for Multicore Network Processors

Packet processing building blocks finding applications across all elements in the network

- 3G evolution to HSPA and packet based access architecture driving the needs for advanced packet processing
 - Node-B, RNC and Media Gateway solutions
- Security and encryption requirements in the network access and core
 - Network Address Translation
 - Session Border Controller
 - x-CSCF in the IMS architecture
 - Lawful Intercept
 - Wireless Access Gateways (WiMax, LTE, Femto Cells)
- Packet switches and Routers
- Content delivery, management and transcoding solutions
 - Media Servers
 - Content Servers in IPTV
 - Mobile TV application servers
 - Billing



Evolution in Network Processor Silicon

Legacy

- ASIC's and FPGA
 - Solutions favored by current leaders in IP-Networking
- Network processor Silicon especially suited for ATM based packet networks
 - Intel IXP, Cport, Agere, Winpath, etc.

Emerging

- Multi-core processor solutions with hardware acceleration assists
 - Cavium Octeon, RMI XLR
- New generation of general purpose multi-core processor solutions
 - Sun Niagara, Intel Dual Core IA, AMD Opteron

Key Network Processing Modules

- TCP/IP off load
- IPv4 & IPv6 stacks
 - Unicast and multicast forwarding
 - IPv4 to IPv6 tunneling and translation
 - DiffServ for QOS
 - NAT and PAT support
- Unicast and multi-cast routing acceleration
- IPSEC acceleration
 - DES, 3DES and AES encryption
 - HW encryption API
 - IKE and other IPSEC utilities
- Stateful Firewall
- SRTP Offload
- Transport Protocols
 - L2 802.1Q VLAN
 - PPP/MLPPP/PPPoE
 - L2TP (LNS)
 - GRE
- Mobile-IP – IPv4/IPv6 stack with IPsec Support
- Management Tools and API's for configuration, status, statistics and error reporting
- Policy Management and Routing
- Compression/De-compression off-load

Software Evolution

- NPU's had a reputation for being difficult to program
 - Software Tools Ecosystem for Intel IXP tried to simplify software
- Part of the challenge is addressed by using a MIPS processor core architecture
 - Supports well known operating systems such as Linux and VxWorks
 - Allows software tool vendors to port applications across multiple vendors
 - Real Time OS (RTOS) allows wire rate processing

Linux vs RTOS

- RTOS supports wire rate packet processing
 - Pattern Matching
 - Routing
 - Compression / Decompression
 - Encryption / Decryption
 - Etc.
- Linux supports management & exception processing
 - User / Device Authentication
 - Security Associations
 - Accounting

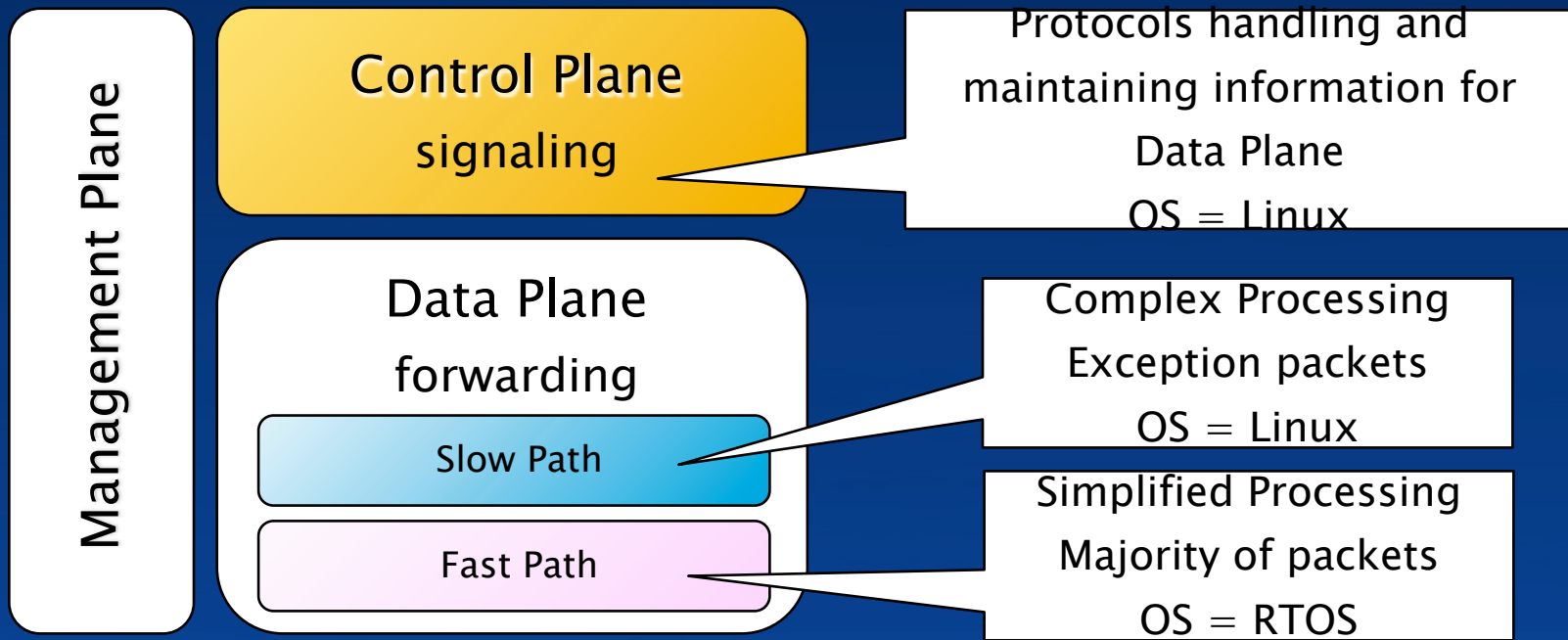
Which Linux?

- Wind River PNE
- Monte Vista CGE
- Red Hat
- Linux.org
- Etc.

Hardware Accelerators

- New Multicore Processors frequently include hardware accelerators:
 - IPsec
 - Compression / Decompression
 - Pattern Matching / Regex

Network Equipment Architecture



⇒ **Control Plane and Data Plane can be co-localized or distributed over multiple processors**

⇒ **High performance is achieved by running Fast Path on dedicated hardware**
⇒ **Data Plane easily Parallelized**

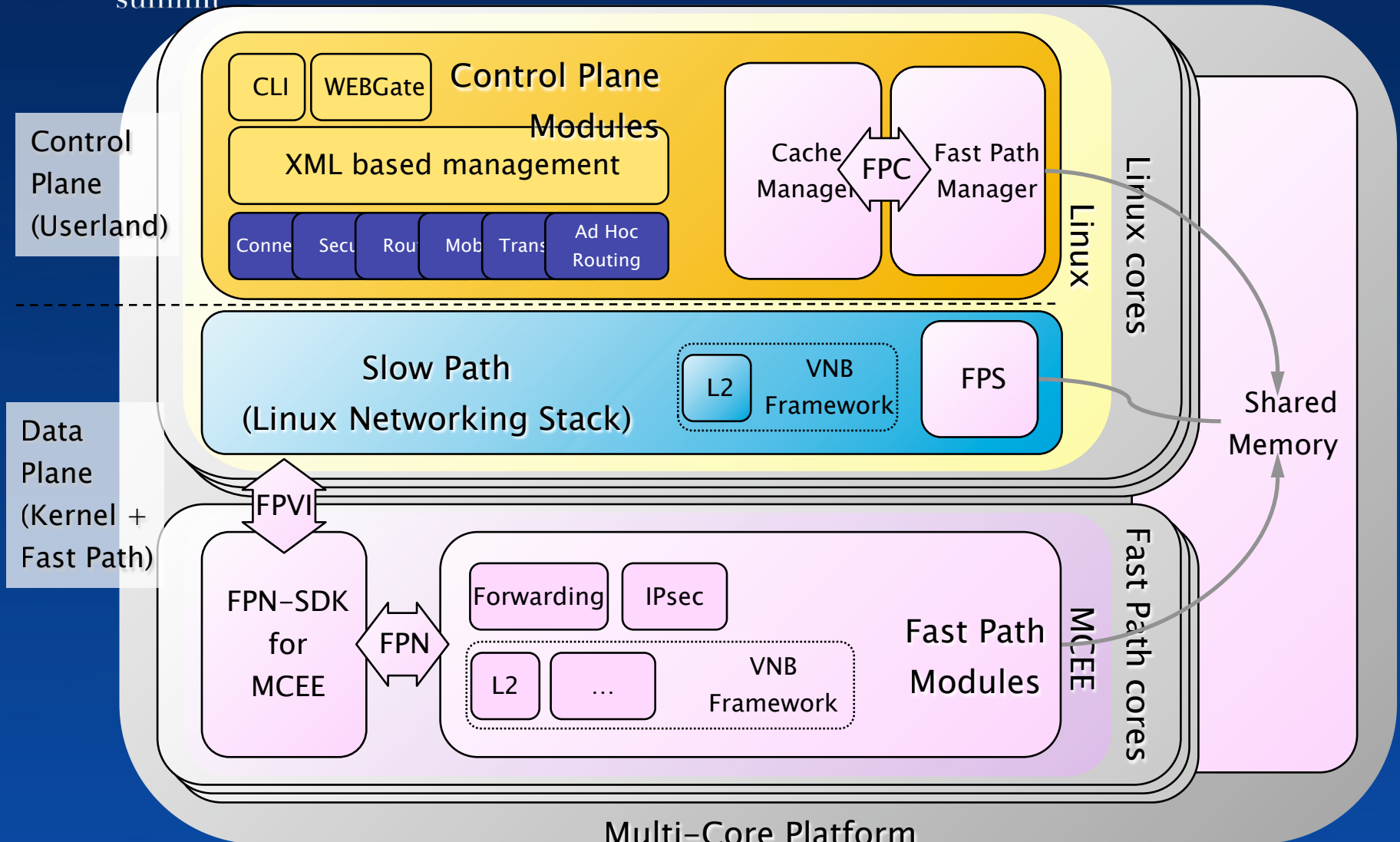
Multicore & Virtualization

- Virtualization improves the reliability of multi-OS embedded systems by enabling the complete isolation of real-time tasks from general-purpose operating-system (GPOS) tasks
- Task isolation brings significant advantages to communications applications.
 - real-time call-critical processing can continue without interruption even when the GPOS becomes overloaded, fails, or needs to be rebooted
- Combining multiple homogeneous CPUs on a single silicon chip provides performance advantages that enable the efficient parallel operation of multiple operating environments across multiple CPUs
 - Eliminates the bottleneck of running time-dependent tasks on a general-purpose operating system.

Software Toolkits for Network Processors

- Toolkits are now emerging and can exploit the power of a multicore processor as well as use the real time operating systems provided with the different processors.
 - 6WIND 6WindGate™
 - SafeNet Quicksec™
 - Interphase Protocol Accelerators
 - SIP / RTP
 - GTP-u
 - SIGTRAN
 - Qosmos ixDPI

6WINDGate™ SDS



Multi-Core Platform

Will Multicore Architectures converge?

Freescala, Intel, AMD, Sun
Vs
Cavium, RMI

Current Key Differentiators

Speed

Real Time Support

Hardware Accelerators

Control Plane vs. Data Plane

- Multicore NPU's are ideal for Data Plane
 - Optimized for Packet Handling
 - Reduced instruction set
 - Real Time or Linux OS
 - Cavium, RMI, ...
- Multicore General Purpose Processors are ideal for control plane
 - Support for a wide variety of applications
 - Multiple OS support
 - Freescale, Intel, AMD, ...

Thank You!

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