

Tackling Challenges of Designing Multicore Networking Software for ATCA Telecom Systems

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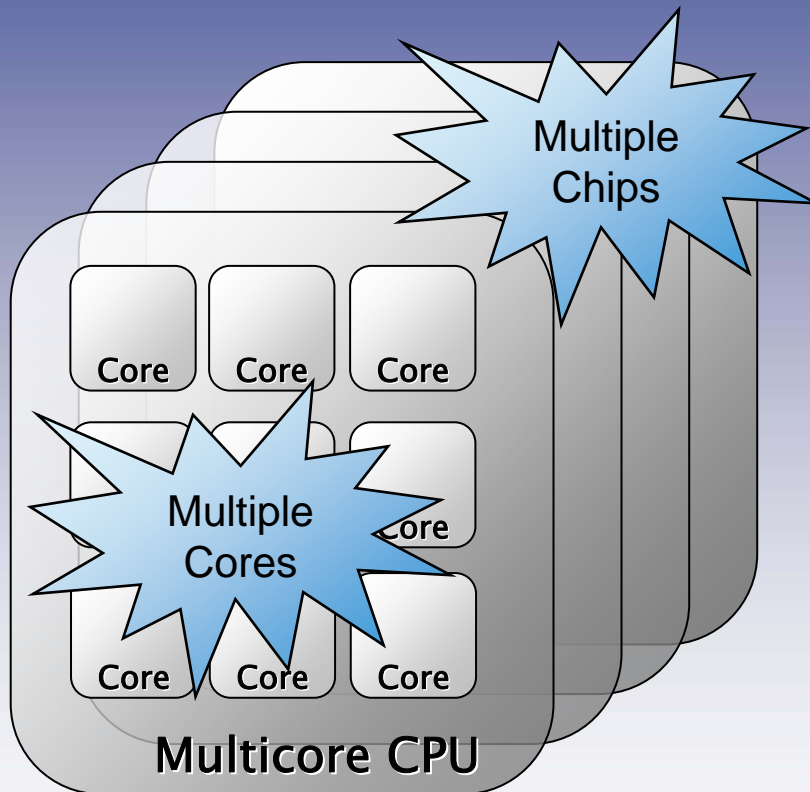
The Multicore Age

- **Market is asking for constant performance increase**
- **Increasing clock speeds no longer yields the processing power needed**
 - ⇒ **Multicore has become the only way to provide more processing capabilities**

BUT

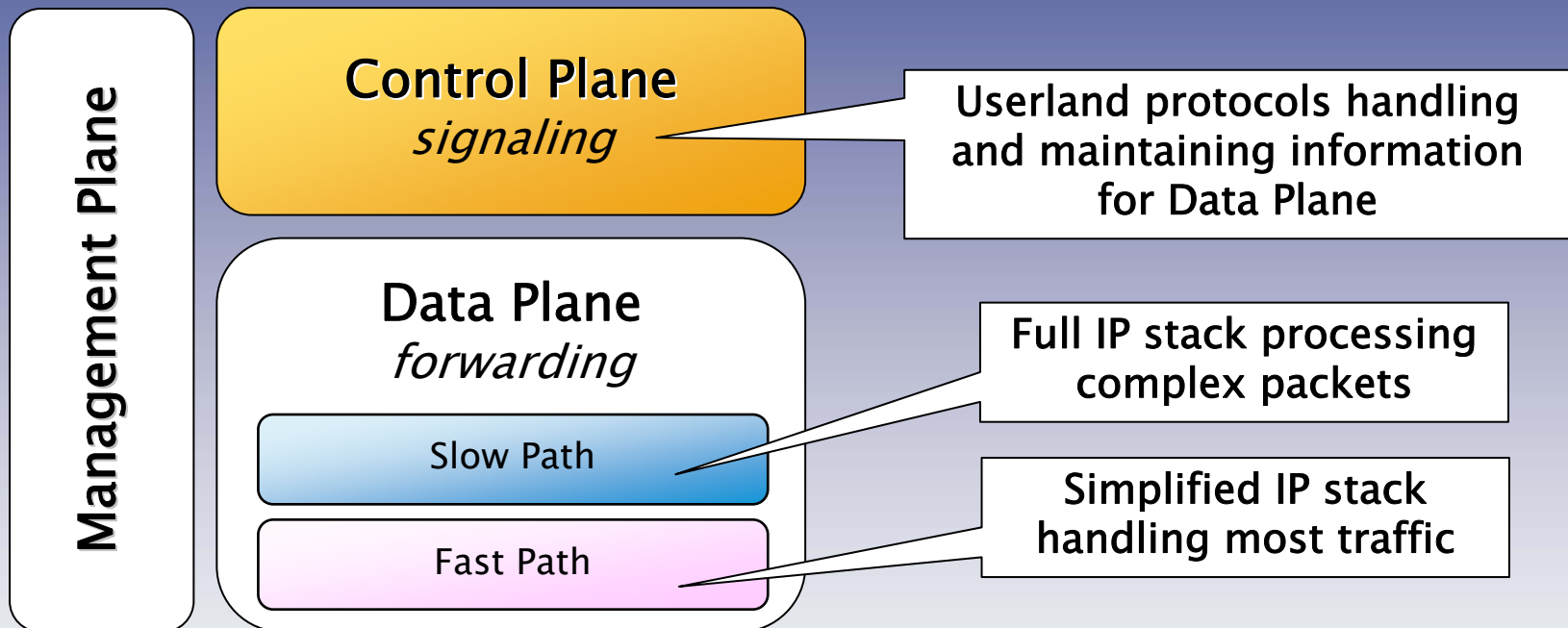
- **It creates a new software development paradigm that requires specific architecture**

Multicore Architecture



- **Duplicated instances of a generic processor into a single integrated circuit for better integration & optimized power consumption**
- **Built-in engines (crypto, pattern matching, HW queue management...)**
- **Efficient inter-core communication (Message ring, Switching Fabric...)**
- **Simplified programming model in specific Multicore Executive Environment (MCEE)**

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**

Multicore Benefits for Networking Equipment

- Flexible architecture allowing
 - Flexible core distribution among Data Plane and Control Plane
 - Coexistence of Linux and MCEE on a single chip

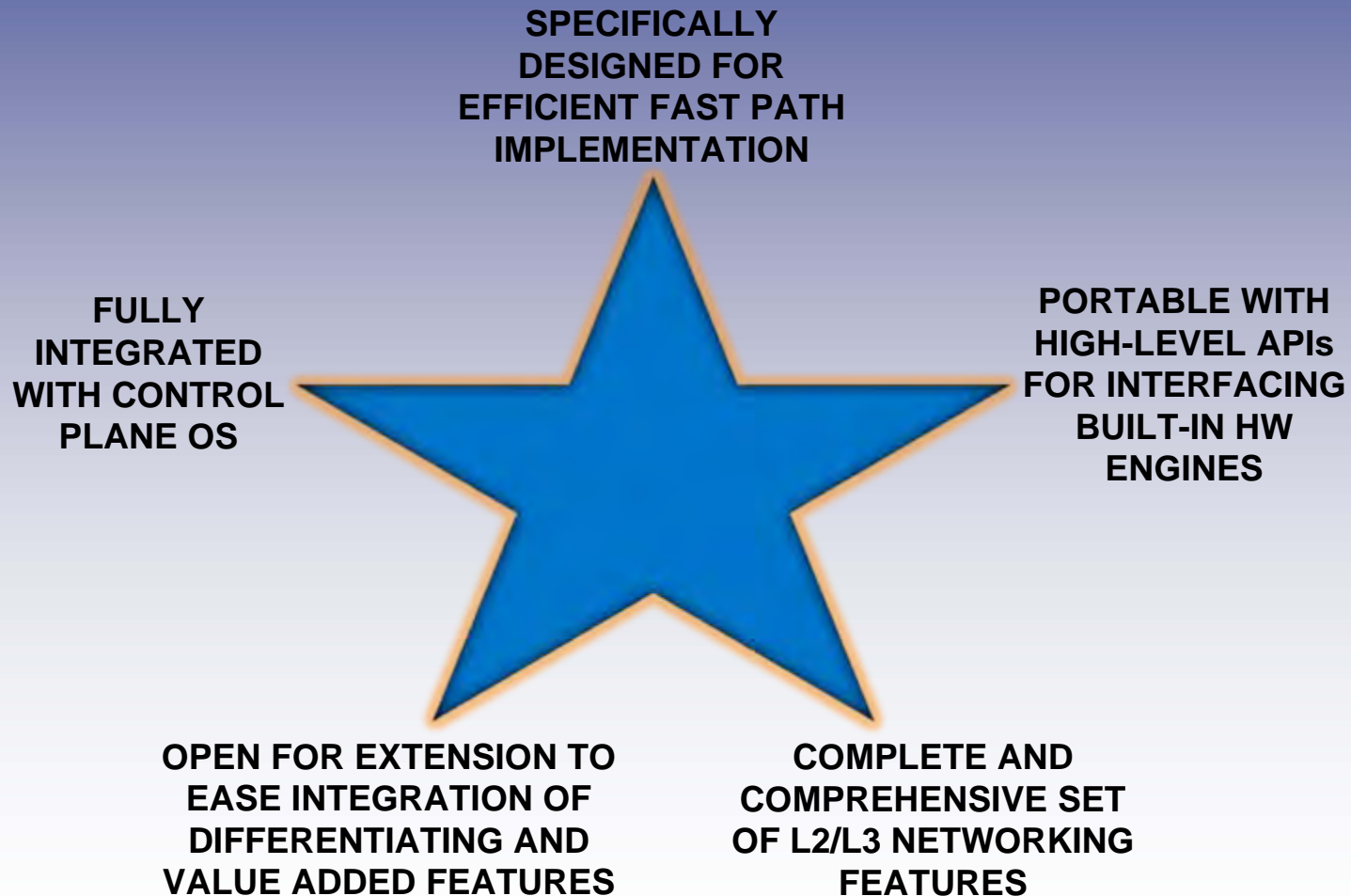
- Scalable architecture over multiple Multicore CPUs
 - High Availability
 - Higher performance

- Efficient implementation of time-consuming functions
 - Encryption
 - QoS
 - Deep Packet Inspection

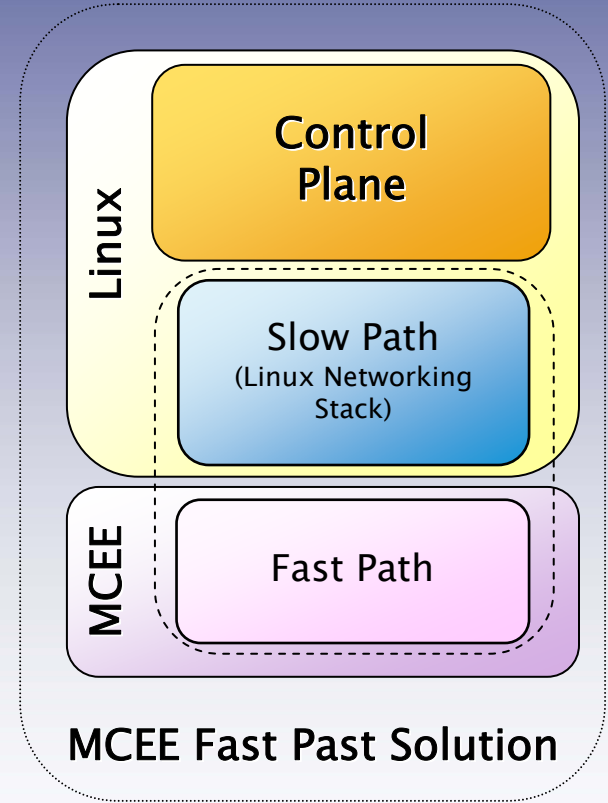
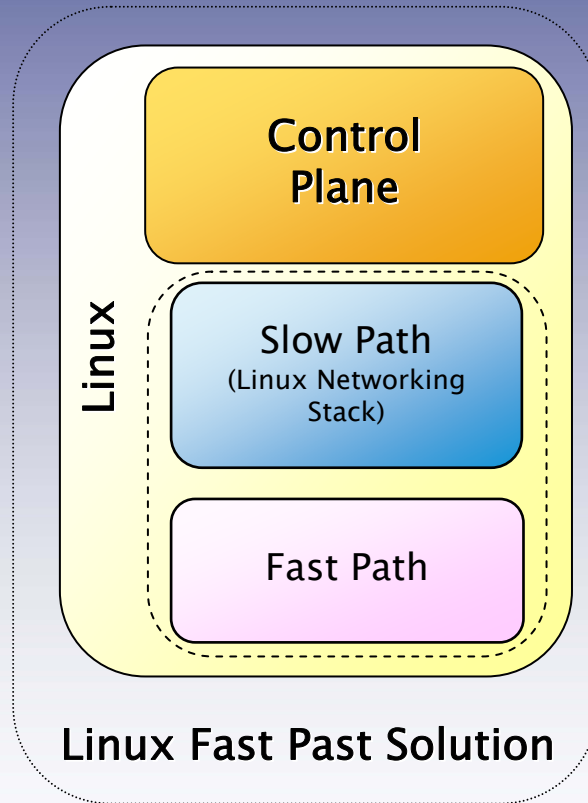
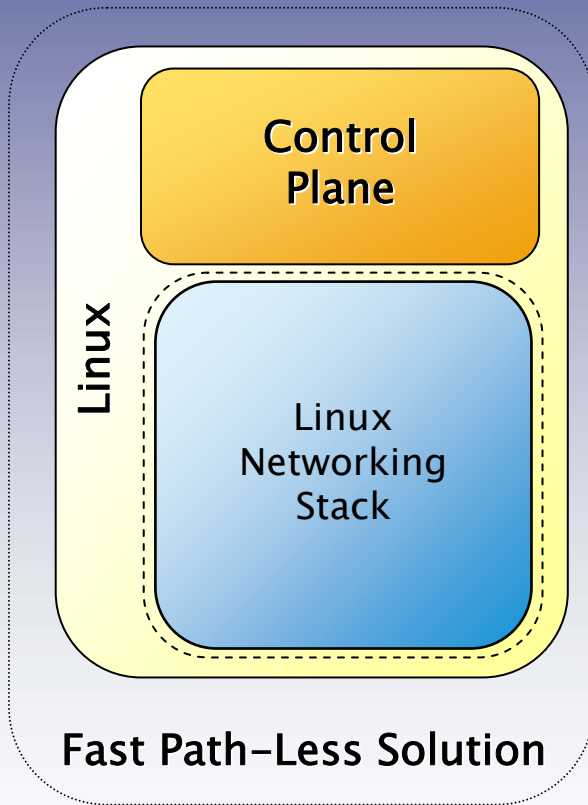
Problems With Designing in Multicore Environment

- Designing applications on top of multicore architectures increases complexities, costs and design times for entire ecosystem – from chipset providers to TEMs
 - Complexities stretch across telecommunications infrastructure, security appliances, enterprise and home gateways
 - Software reuse cannot be maximized, leading to further costs, development time and constraints
- Multicore ushers in new need to integrate the Control Plane, Slow Path and Fast Path to truly benefit from potential performance gains

5 Critical Components Needed In Networking Software for Multicore

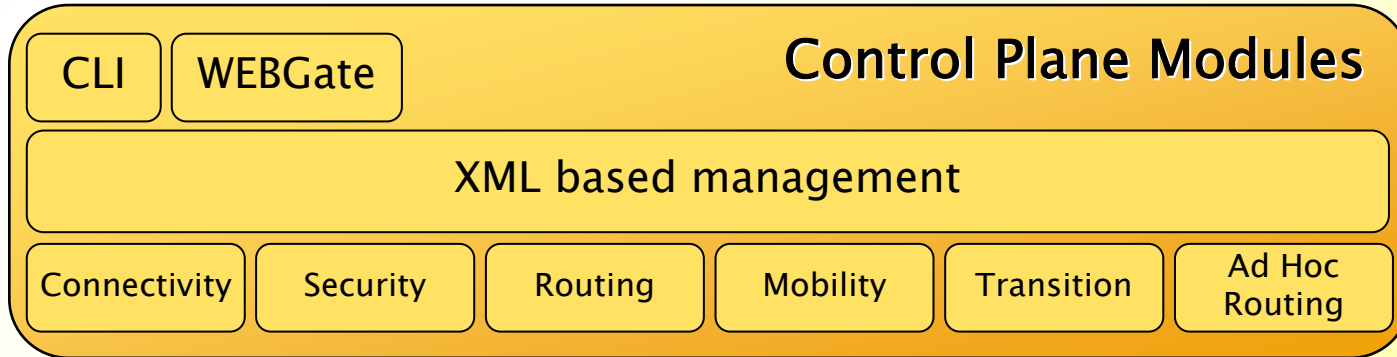


Possible Software Solutions

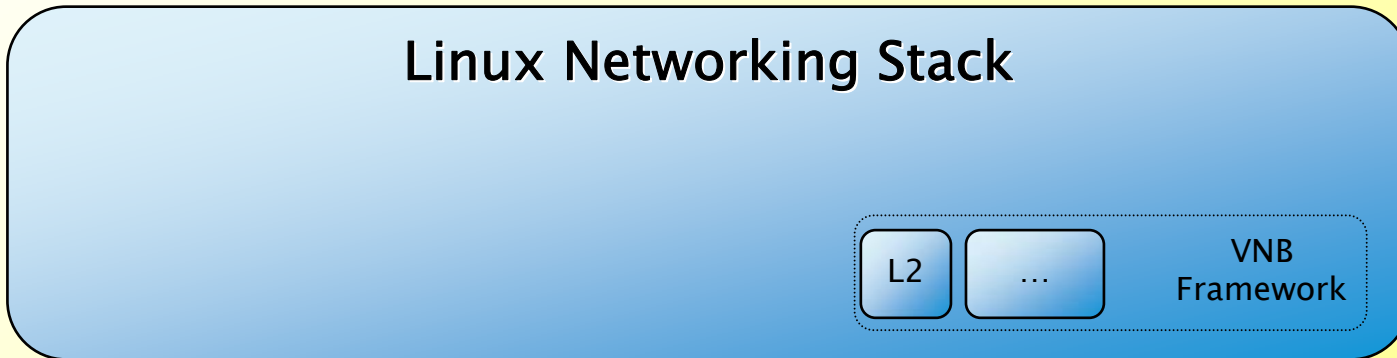


Fast Path-Less Solution

Control Plane
(Userland)



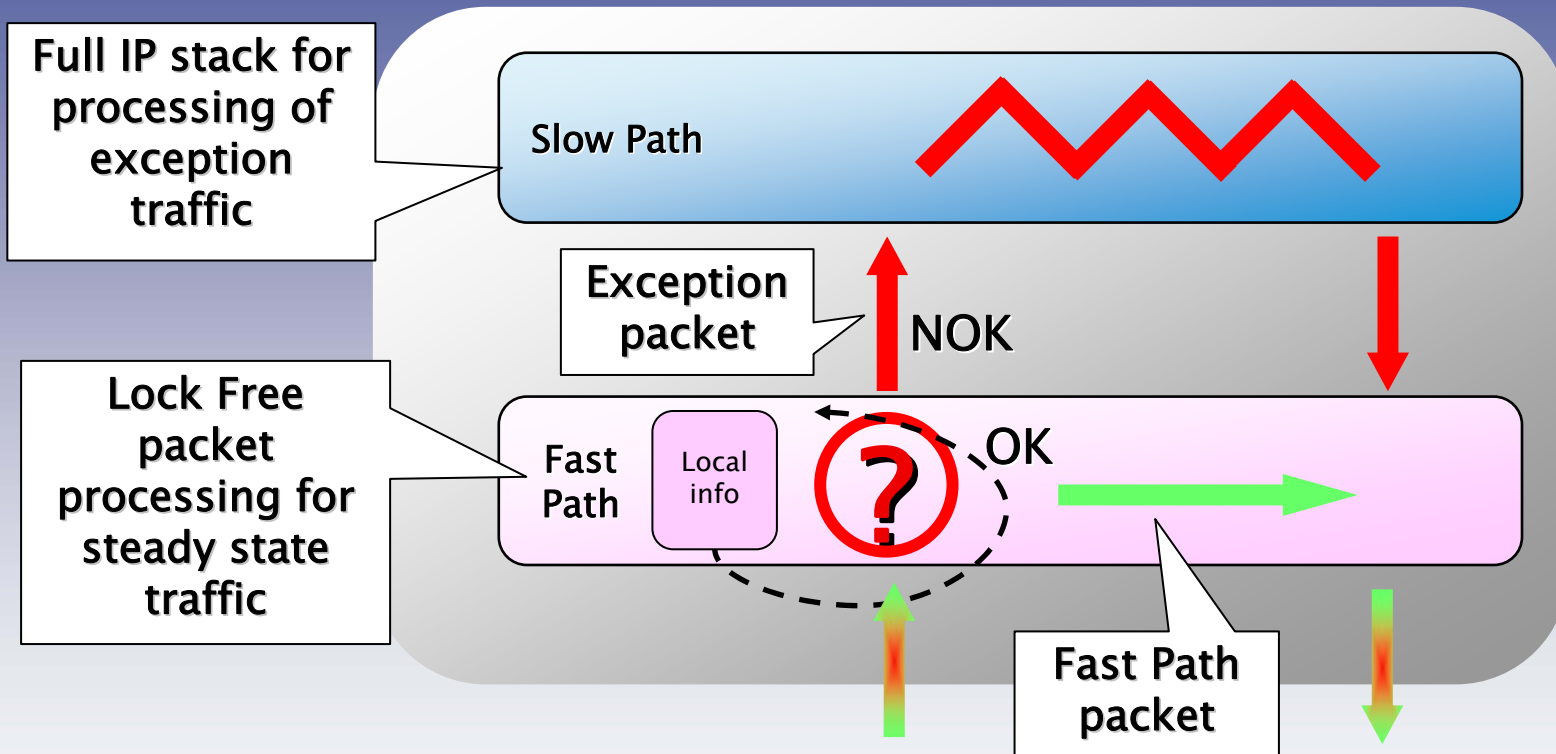
Data Plane
(Kernel)



Linux

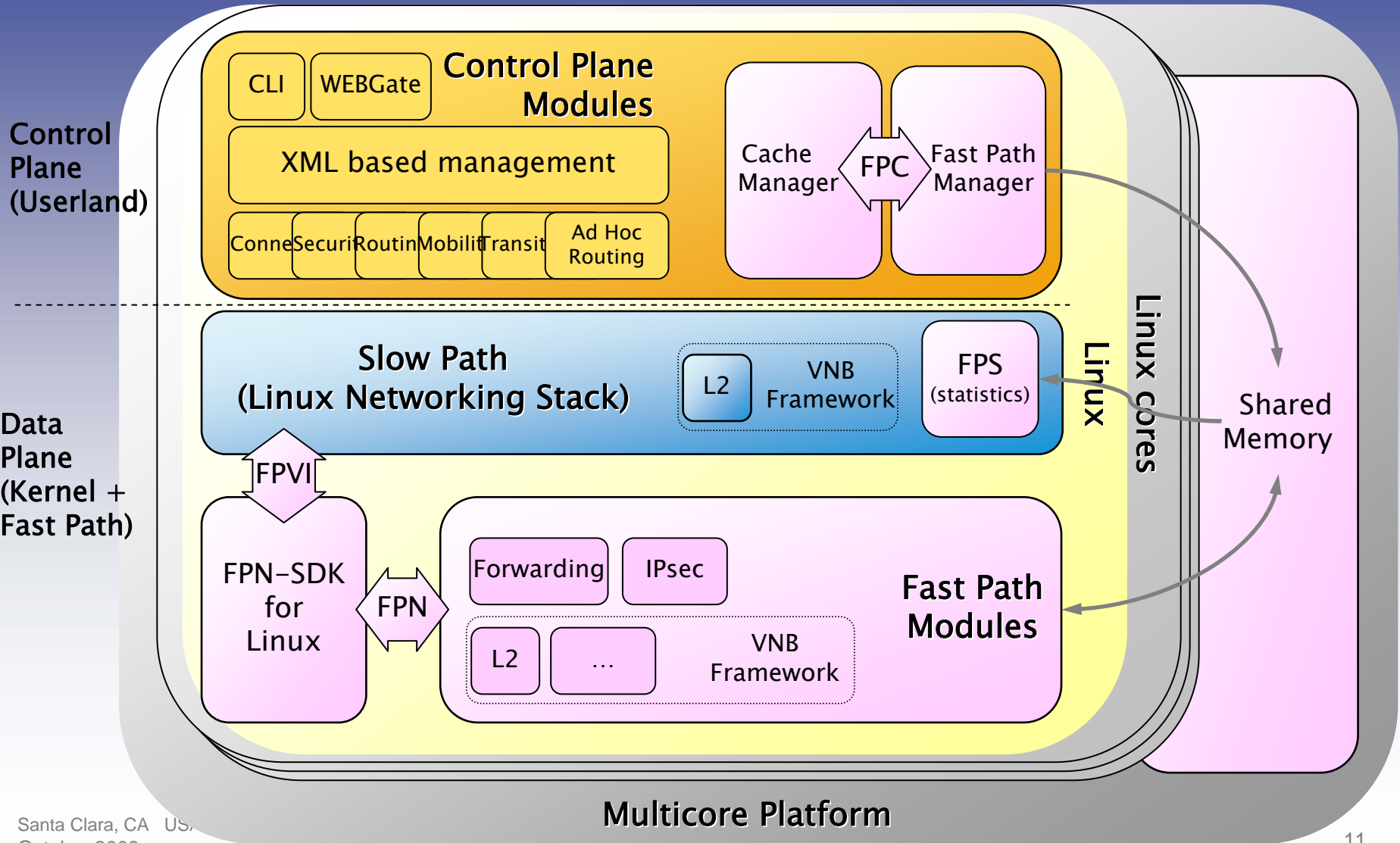
Multicore Platform

Fast Path Architecture

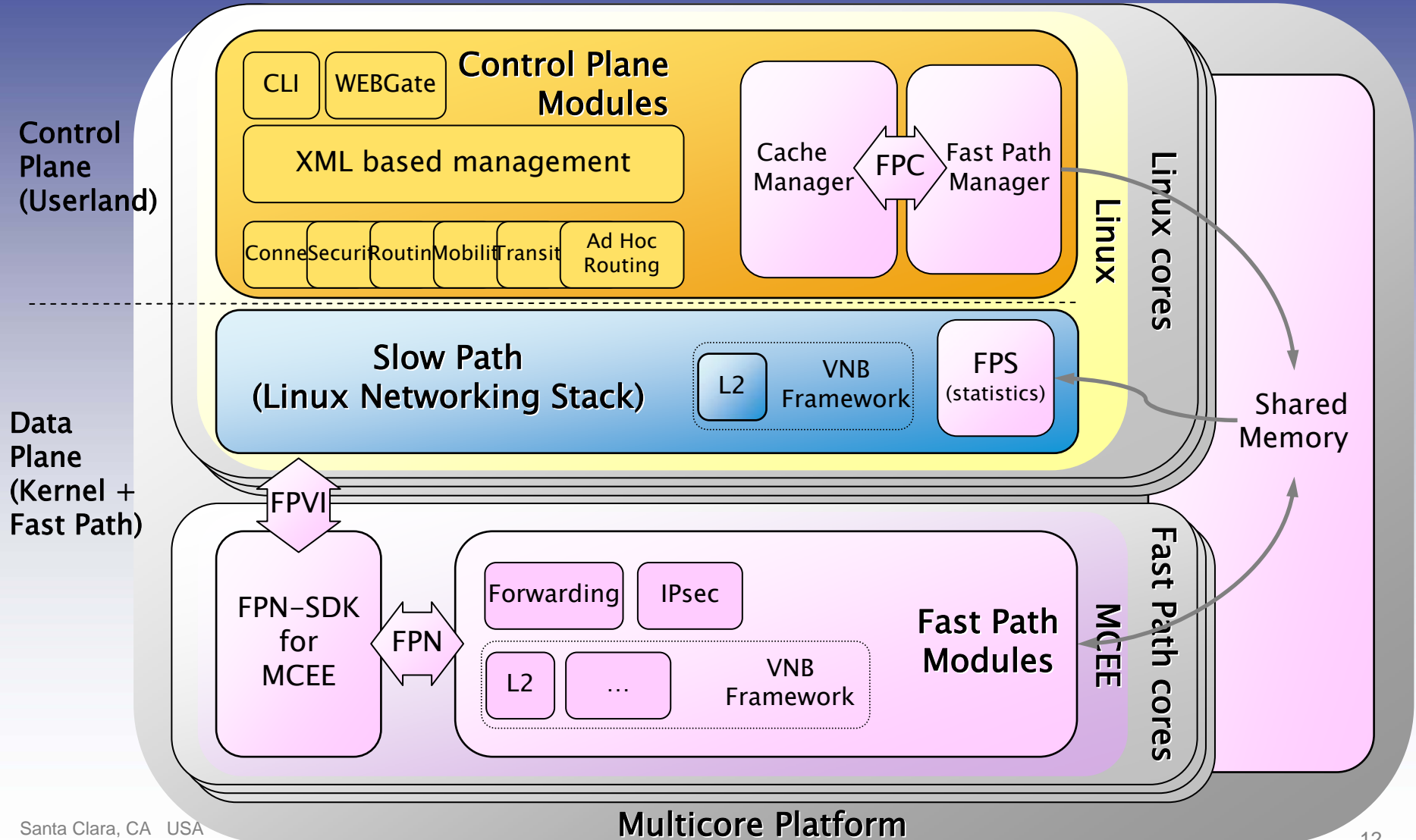


- Progressive approach for implementing Fast Path functions
- Step by step feature migration in Fast Path

Linux Fast Path



MCEE Fast Path



Applications

- Fast Path-based equipment for wireless infrastructure
 - Backhaul GSM
 - BTS: WiMAX, LTE, IP, Femto
 - WiMAX ASN Gateway
 - BSC IP

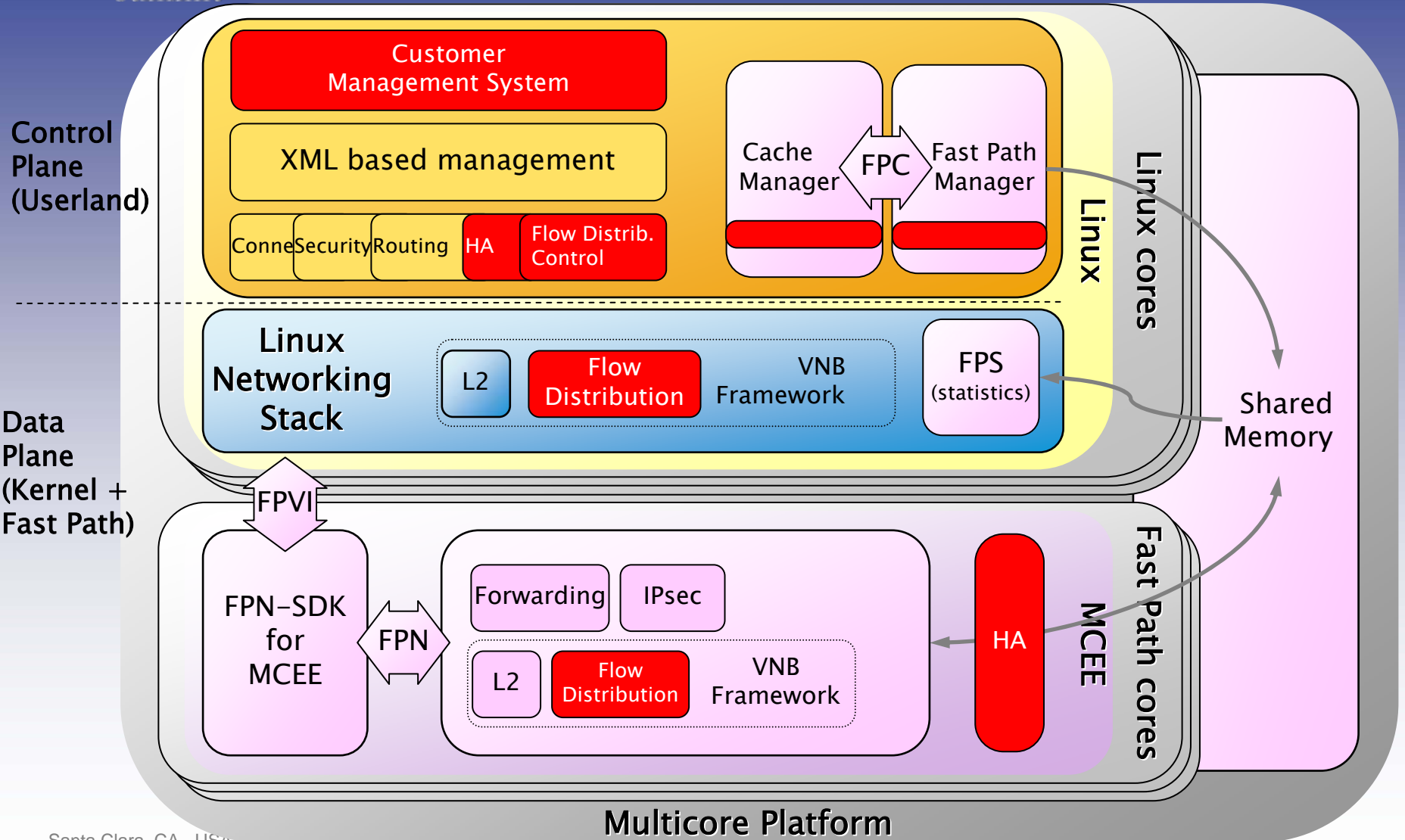
- Security
 - Enterprise UTM appliances
 - IPsec concentrators

- Up-scaling existing applications with high performance front-end
 - Filters & Load Balancers
 - Billing Management Systems

Application Example: Generic Platform for Wireless Core Networks (WiMAX / LTE)

- ATCA Chassis
- Network boards based on dual Cavium Octeon from different providers
- Wind River Linux
- 6WINDGate™ Networking Middleware:
 - MCEE Fast Path: L2, L2/L3 Forwarding, IPsec, QoS, ACLs...
 - Linux Networking Stack
 - Control Plane: Synchronization Modules (Cache Manager, Fast Path Manager), Virtual Routing, IKE, Connectivity Protocols
- Customer software extensions: Flow Distribution, HA, Management integration (XML)

Software Architecture



Multicore Architectures Now Require Specialized Software Solutions

Specialized

To handle unique networking capabilities and application needs of multicore

Flexible

Seamless integration, coexistence of Data Plane, Control Plane, Linux and MCEE

Portable

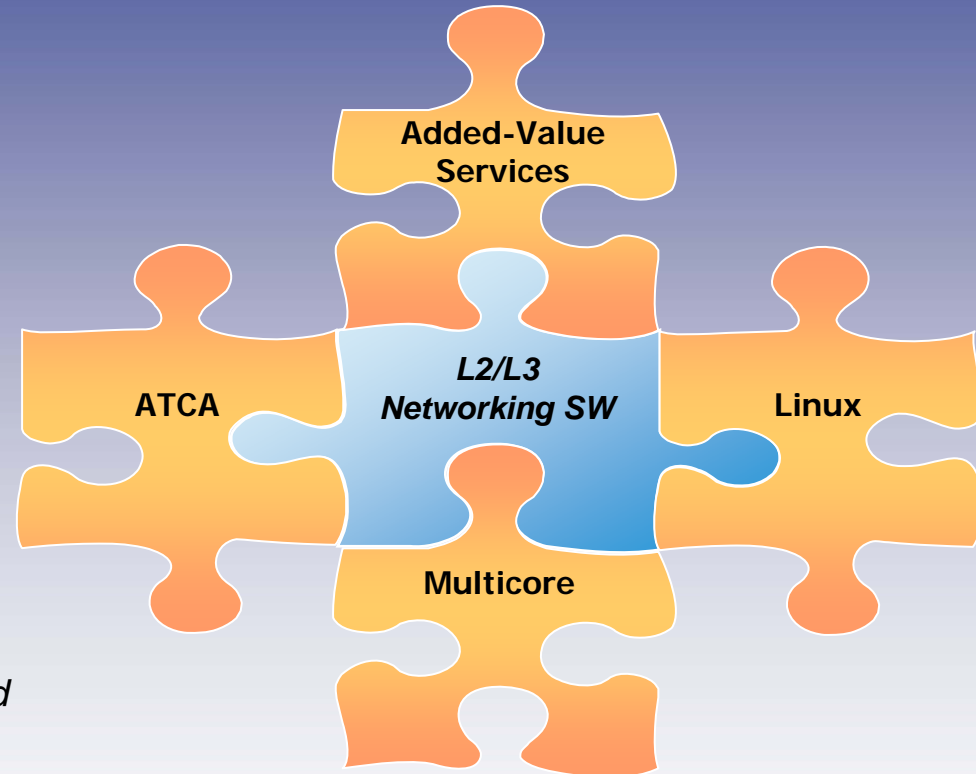
To provide high-level APIs for interfacing needs

Open

To not be locked-in to specific hardware, for extension and to seamlessly integrate any desired features and maximize software reuse

Comprehensive

Complete L2/L3 networking ready to use to remove design cycles, costs and speed time to market



Designed for Multicore

To Hide Multicore Complexity

To Maximize SW Reuse

Any Questions?

*6WINDGate™ Architecture
Overview available for free
downloading*

www.6wind.com

