Data and Control Plane Interconnect solutions for SDN & NFV Networks

Raghu Kondapalli

August 2014

Title & Abstract

Title: Data & Control Plane Interconnect for SDN & NFV networks

Abstract:

Software defined and functionally disaggregated network elements rely heavily on deterministic and secure data & control plane communication within and across the network elements. In these environments scalability, reliability and performance of the whole network relies heavily on the *deterministic behavior of this interconnect*. In this presentation, Raghu Kondapalli will discuss various aspects of this data & control plane interconnect including its functional requirements and solution components suitable for SDN/NFV environments

Agenda

- State of current network solutions and emerging trends
- Challenges with existing interconnect solutions mapped to SDN & NFV networks
- Solution proposals for data and control plane interconnect
- Conclusions

Chief Officer's views

"Why does interconnecting my servers and storage takes more than 30% of my budget?

"I want dynamic cloud scale orchestration for my network elements"

"I want to transition from purpose built network elements to scalable multi-purpose blades"

"I want my network to adapt to my business needs not the other way around"

Increasing Network agility and lowering costs are driving disruptions in the industry

Network Architect's view

Building practices → Base Station

Deployment practices → Router

New service rollout practices → Appliance

Operational practices → Switch

Disaggregate — Network Layers (L1, L2, L3+ etc.) into functions

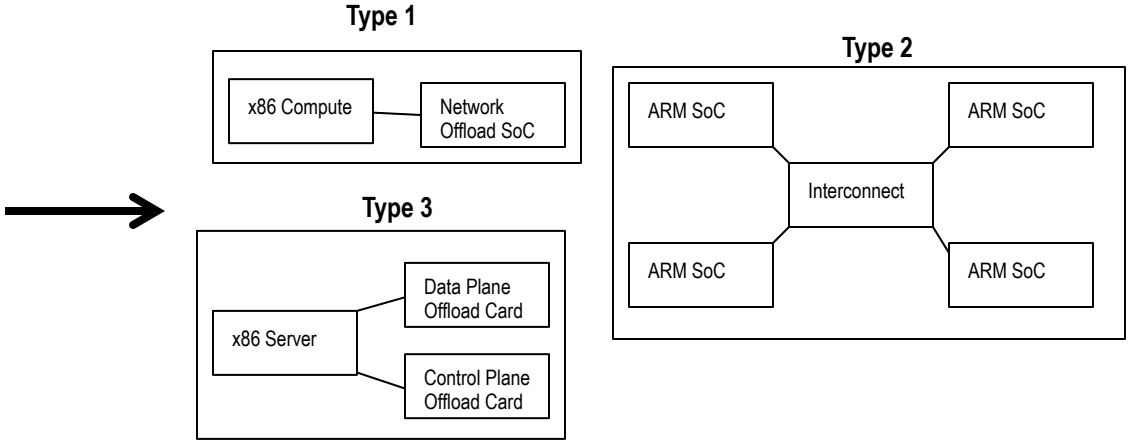
Virtualize — network functions onto multi-purpose elements

Interconnect — functions into complete network elements

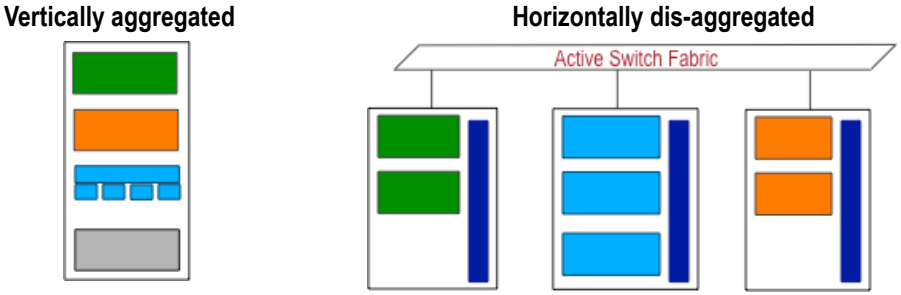
Automate — orchestration & management of network elements

Solution Centric view

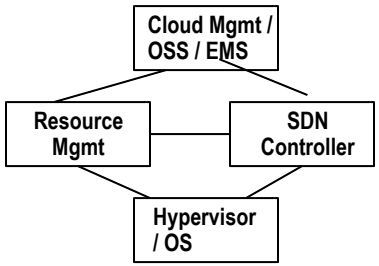
Define Multi - use server



Define build architecture



Define Orchestration & Management



AVAGO TECHNOLOGIES

SDN Deployment Challenges

Before SDN deployment

After SDN deployment

1. Functional pooling increases node-to-node traffic
2. Coordination between multiple controllers & resource orchestration
3. Significant Control Plane Complexities due to latencies & new traffic types
4. Scale poses many challenges in state management and traffic engineering

Functional Coordination and Control Plane Acceleration are key to SDN Deployments

AVAGO TECHNOLOGIES

NFV/SDN Backbone Components view

Resource Orchestration Overlay Network

Across network elements

SF

SF

SF

NFV/SDN Distributor

SF

SF

SF

NFV/SDN Distributor

SF: Software Function
HF: Hardware Function

DETERMINISTIC INTERCONNECT

Within a network element

NFVSDN Coordinator

HF

SF

HF

NFV/SDN Coordinator

SF

HF

NFV/SDN Coordinator

HF

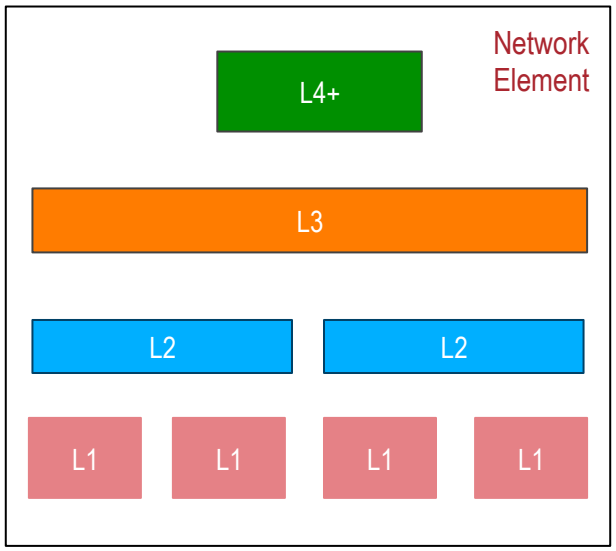
SF

HF

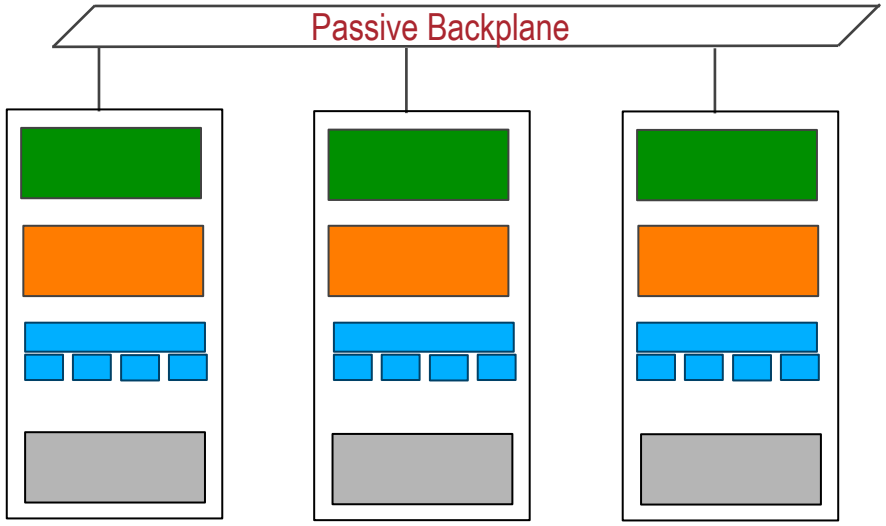
Note: Colors indicate various virtual network functions

AVAGO TECHNOLOGIES

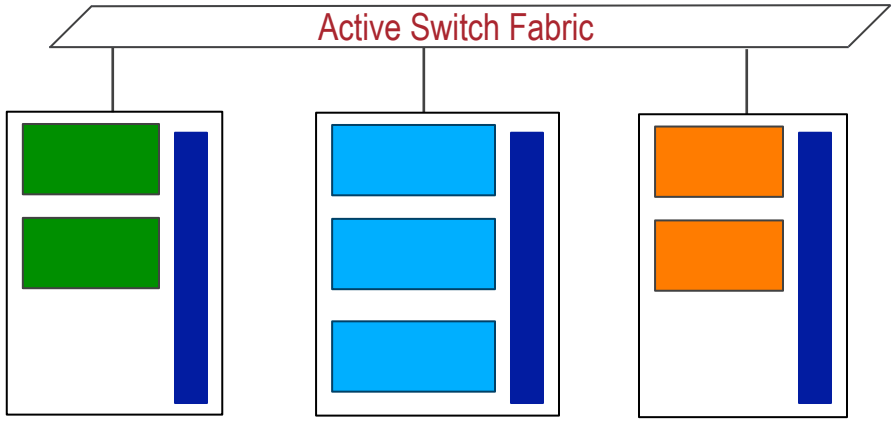
Disaggregated Architectures



Vertical Disaggregation



Horizontal Disaggregation

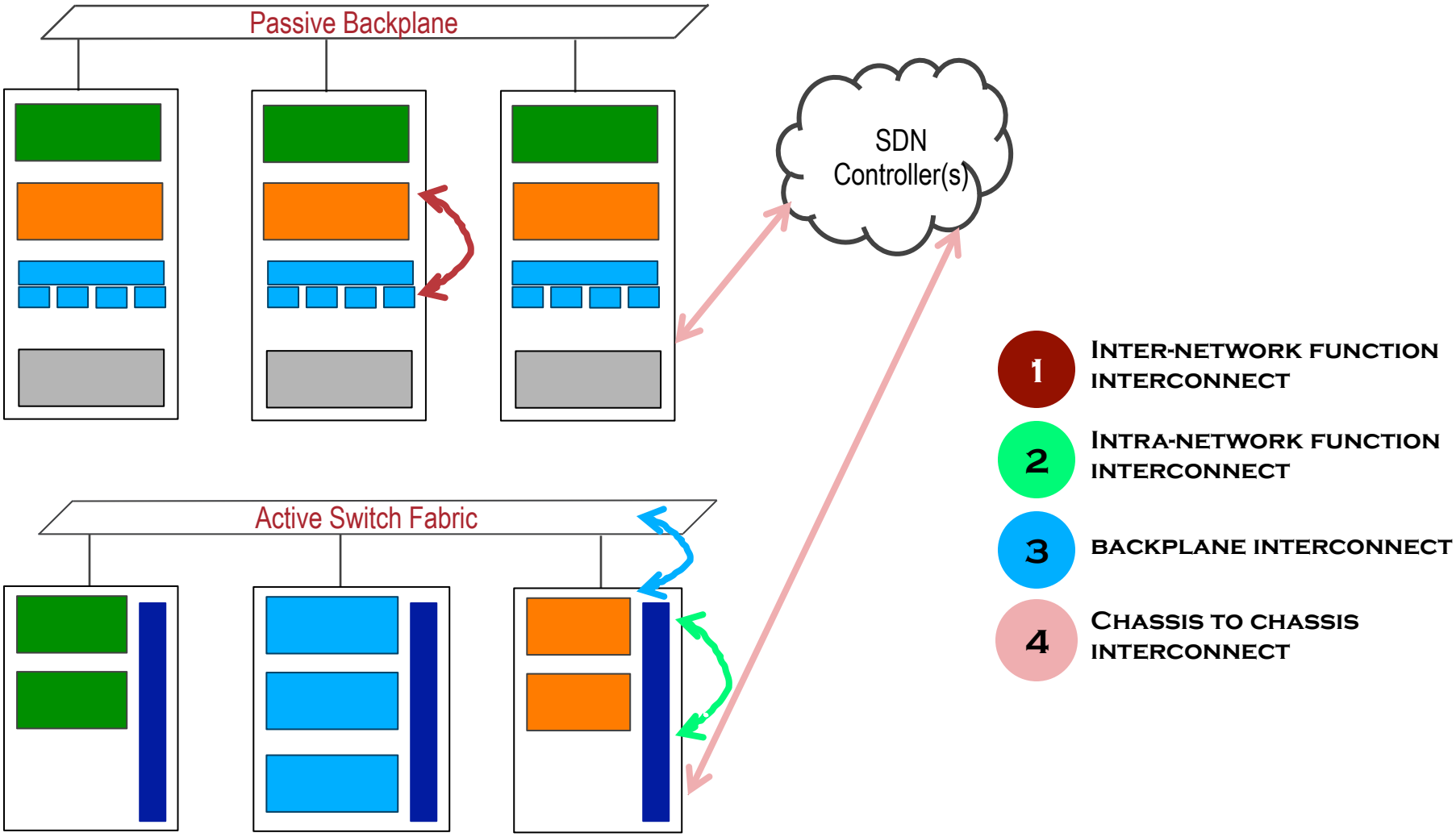


Local Functional Interconnect

- Switch Fabric Interface
- RDMA
- VoQ
- Traffic manager
- Load balancer

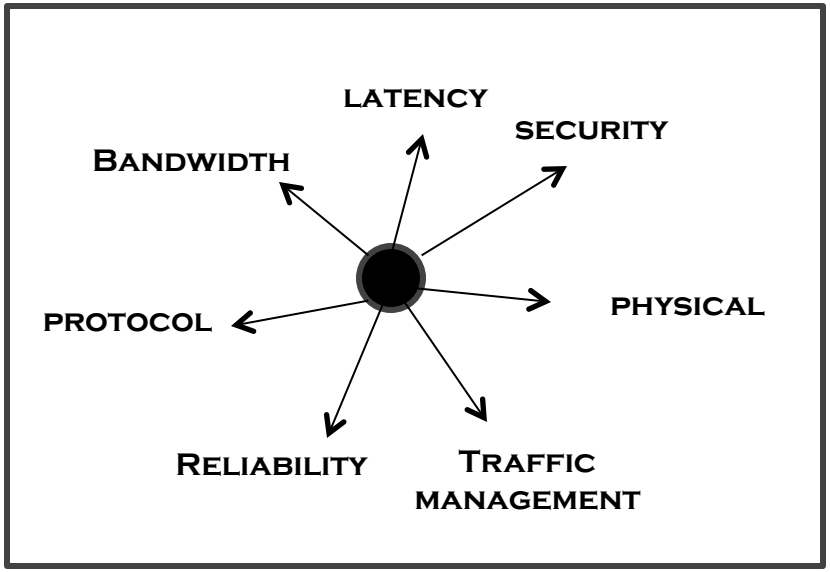
AVAGO TECHNOLOGIES

Interconnect Types



AVAGO TECHNOLOGIES

Interconnect Requirements

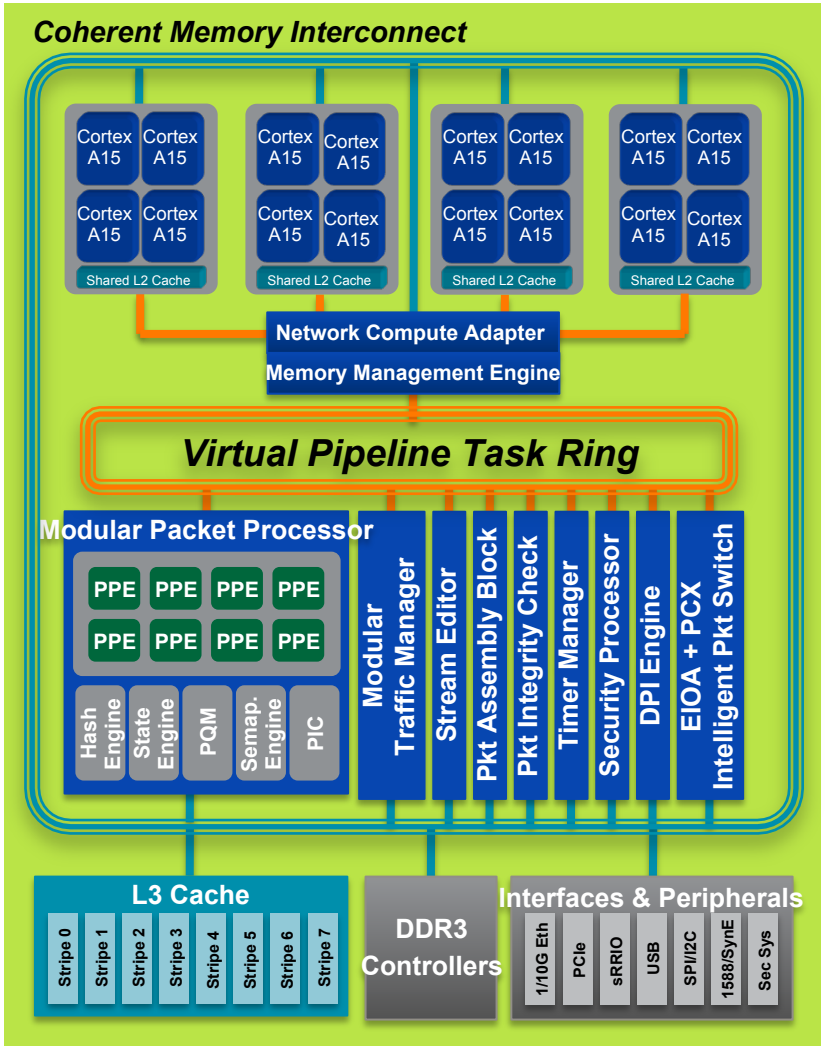


	Data Plane function	Control Plane function
Bandwidth	High	Low to Med
Latency sensitivity	High	Med
Security	Low to Med	High
Traffic Management	Programmable & Hierarchical	Programmable
Reliability	Preferably loss less w re-transmissions	Preferably loss less w re-transmissions
Physical	Ethernet (IEEE802.3)	Ethernet (IEEE802.3)
Protocol	Ethernet	Ethernet

Varying Data and Control Plane Interconnect requires Scalability, Programmability and Functional flexibility

AVAGO TECHNOLOGIES

Axxia 5516: Industry Leading Innovation



First High-End 16 Core ARM Multicore Communication Processor

First Fully Cache Coherent
ARM CCN-504 Network Interconnect

Market Leading Acceleration Engines and Packet Processing

First Integrated Ethernet Switch with 16 10Gb Ethernet links

Samples Delivered on Schedule
with customer Linux bring-up in 2 days

AVAGO TECHNOLOGIES

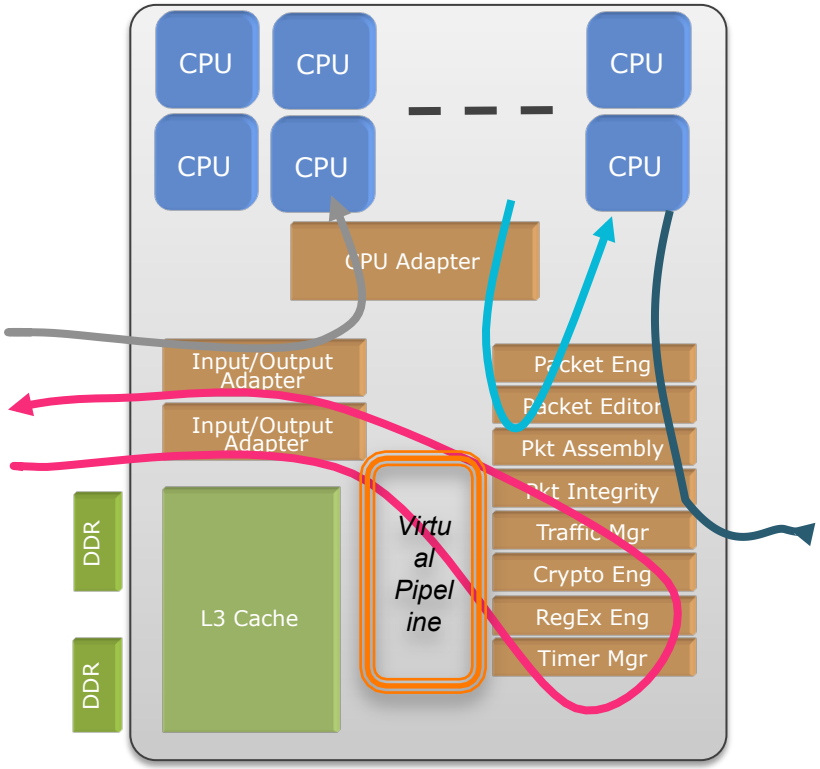
Axxia SoC for SDN/NFV Backbone

Pre-processing

Examples
- Stateful Classification
- Rate shaping
- Crypto (eg, IPsec / Kasumi)
- IP de-fragmentation

Fast Path Processing

Examples
- Ethernet Switching
- Protocol Interworking
- Wireless transport



Intra-processing

Examples
One or more of:
- RegEX Offload
- Crypto Offload
- Scheduler/shaping

Post-processing

Examples
- Traffic Management
- Crypto Offload
- Scheduler/shaping
- Checksum/CRC generation

DETERMINISTIC BANDWIDTH

HIERARCHICAL TRAFFIC MANAGEMENT

AUTONOMOUS PIPELINE PROCESSING

SCALABLE PERFORMANCE

PROGRAMMABLE ACCELERATORS

AVAGO TECHNOLOGIES

Conclusions

- **Software defined and functionally disaggregated network elements rely heavily on *deterministic and secure data & control plane communication* within and across the network elements**

- ***Intelligent and programmable interconnect* plays a crucial role for data and control plane functions to scale**

- ***Axxia multi-core SoC* w various programmable functional accelerators offers a scalable data and control plane solution**


AVAGO
TECHNOLOGIES