



Building DPU Applications

It is all about the software!

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AMD Pensando

- **DPU**s
 - 25G to 200G, in production since 2019
- **Software Stack**
 - Datapath: P4 Software
 - DPU level: GRPC APIs
 - Distributed control plane
- **Segments**
 - Cloud, Enterprise, Appliances, etc.
- **Production Applications**
 - Multi-Tenant Cloud Networking
 - Enterprise Private cloud
 - Storage appliances
 - SDN Disaggregation
- Capturing the IO Processing in all form factors
 - PCIe Card, SmartSwitch, Appliances



Application: DPU Based Distributed Firewall

Stateful firewall and Micro-segmentation

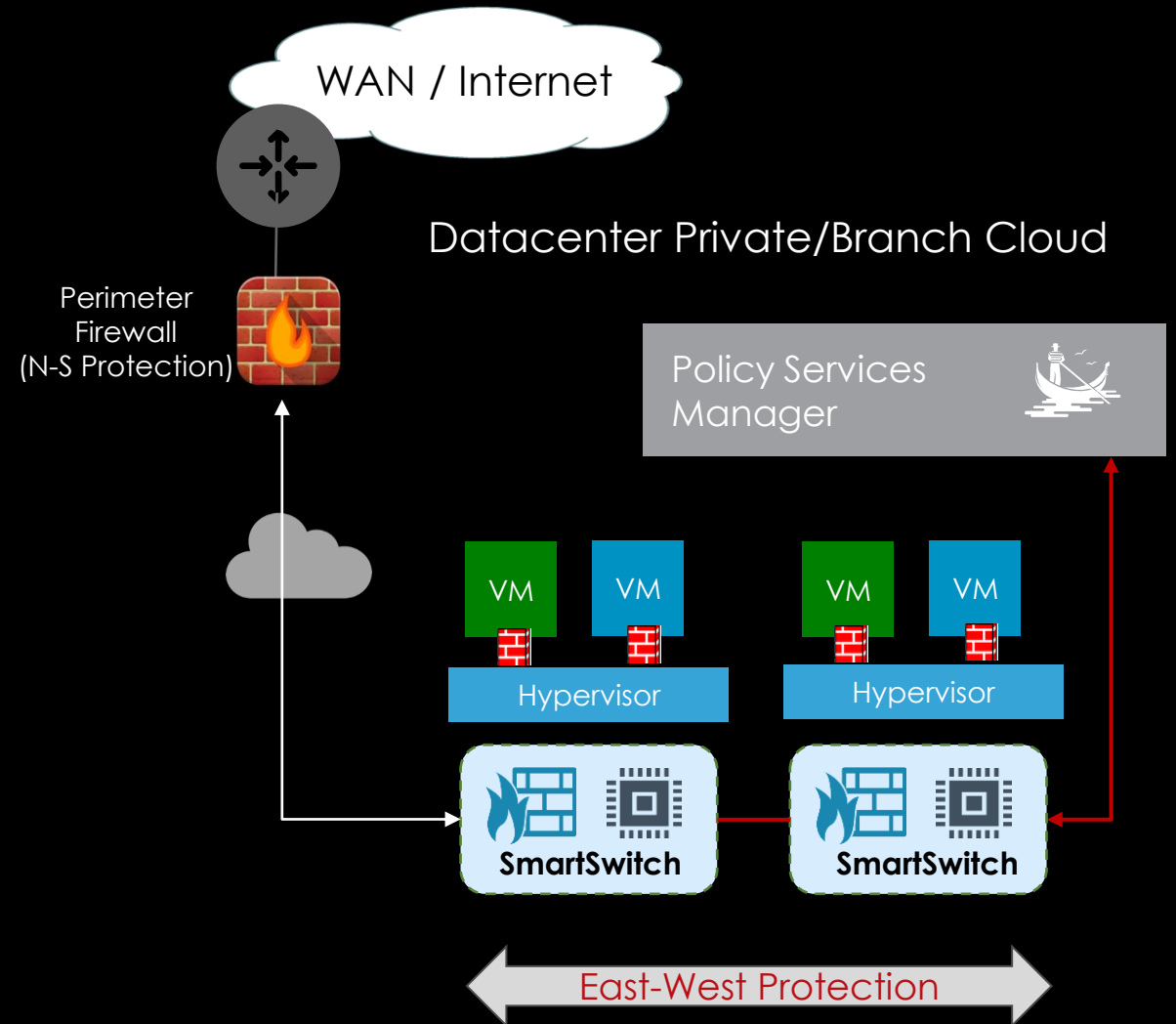
ALG Support - FTP, ICMP, MSRPC, SUNRPC, DNS

Firewall rules/policy defined by

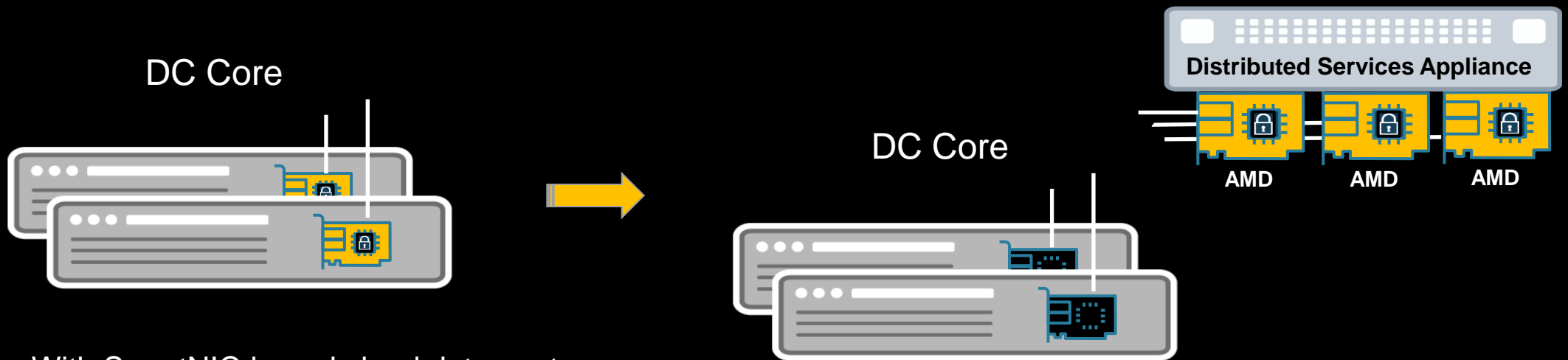
- Traditional: IPs, Port/Protocol, Subnets
- Tags and Labels
- App-ID Detection

Advantages

- Line rate, low latency, firewall for all traffic
- Securely Centrally Managed
- Flow logs export and analysis
- Integration with ecosystem



Application: SDN Disaggregation



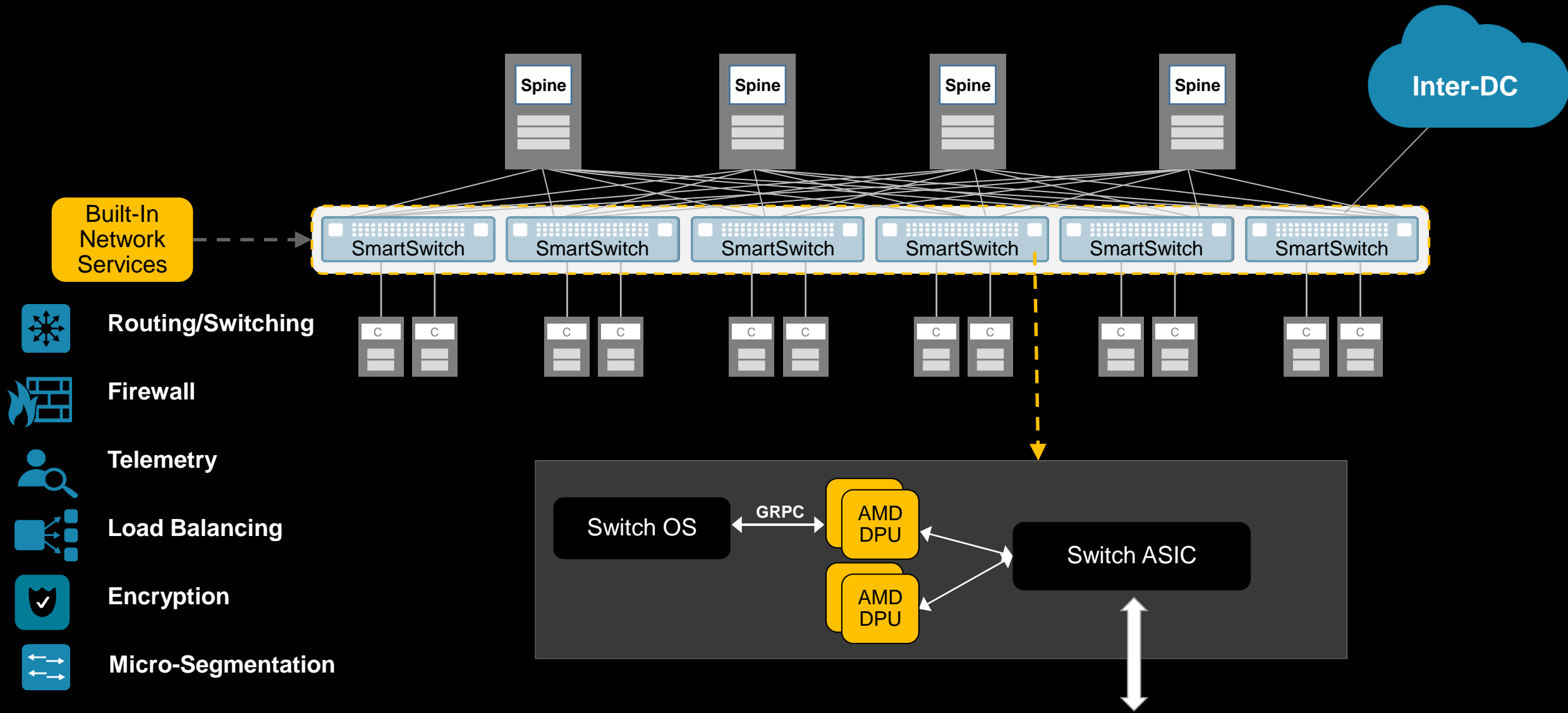
Problem: With SmartNIC based cloud data center

- Provision for peak usage
- Tail IO performance is limited
- Stateful functions can't be implemented on switches or virtual appliances
- <https://www.usenix.org/system/files/nsdi23-bansal.pdf>

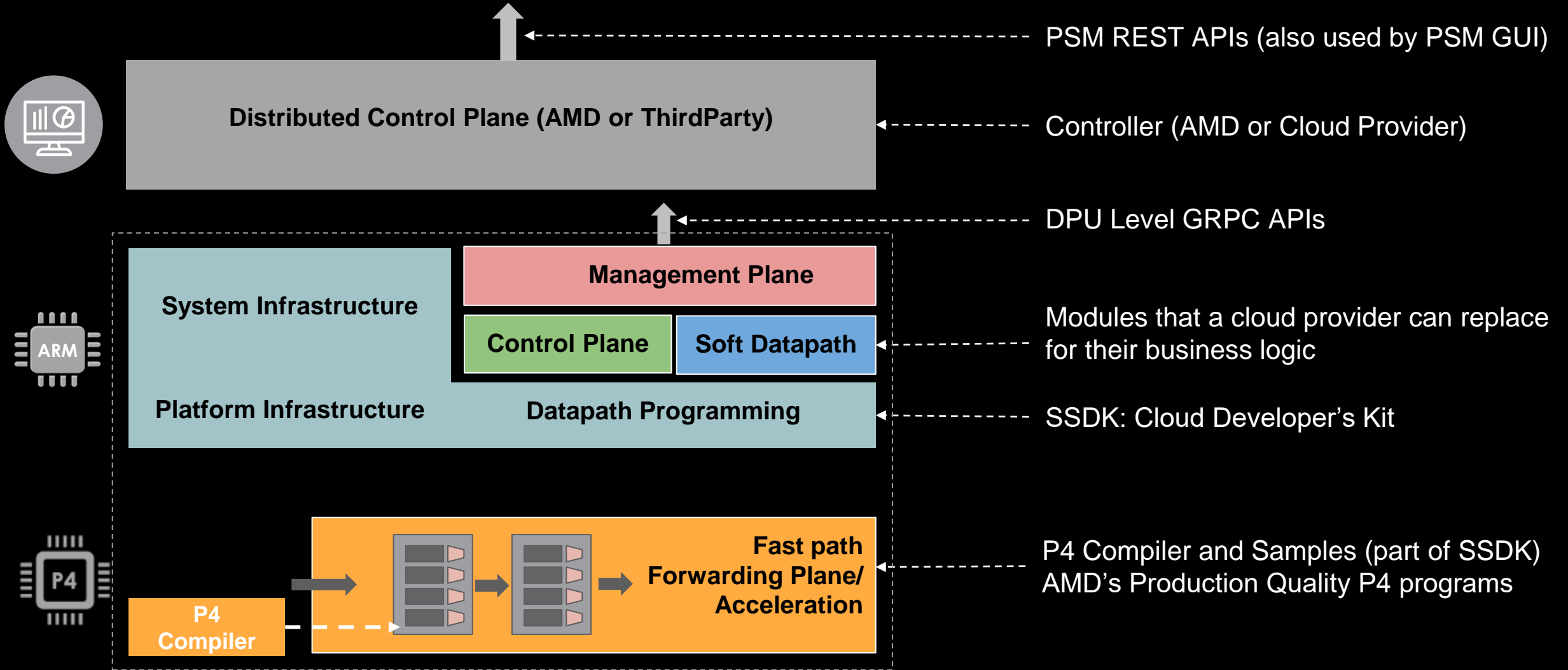
Solution: Create a pool of DPU clusters in an appliance

- Easily handles peak usage
- Reduces cost (pooling)
- Tenant's workloads not limited by cloud infrastructure

Application: SmartSwitch – Stateful Functions on every TOR

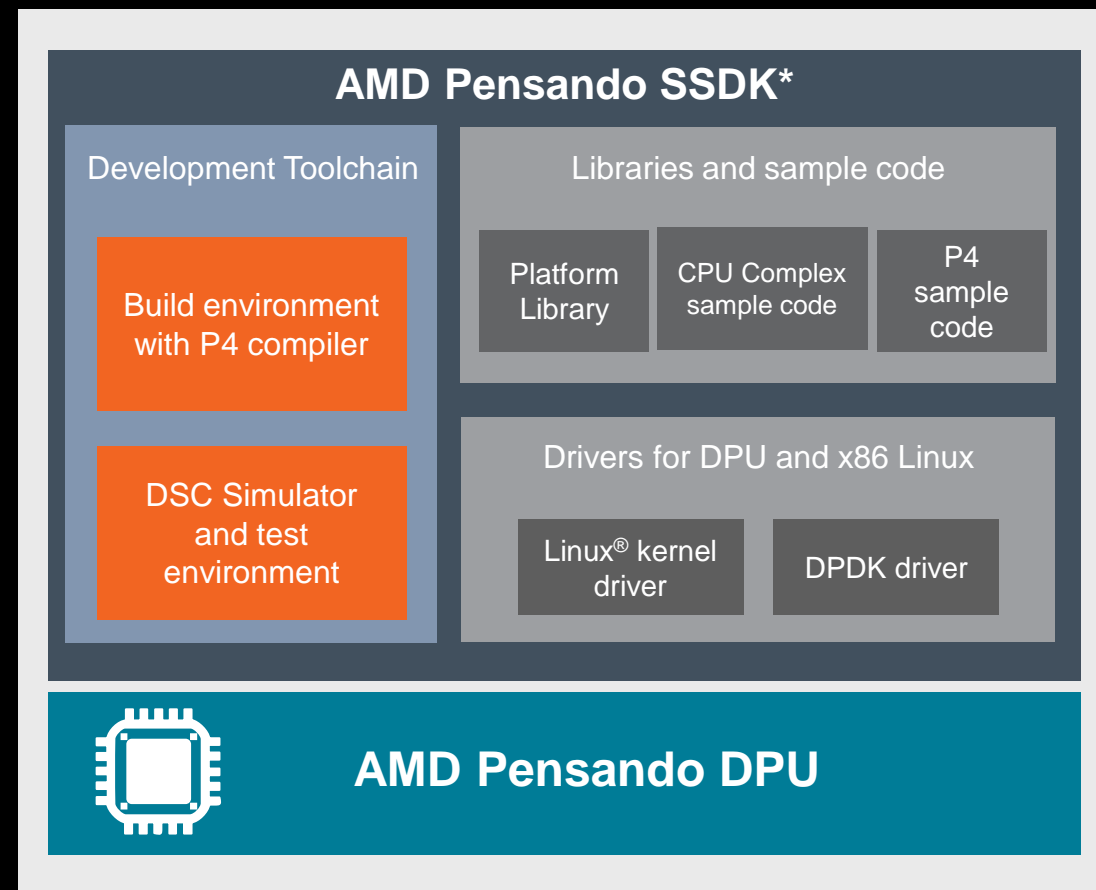


Software Stack Composition – Modular and Extensible



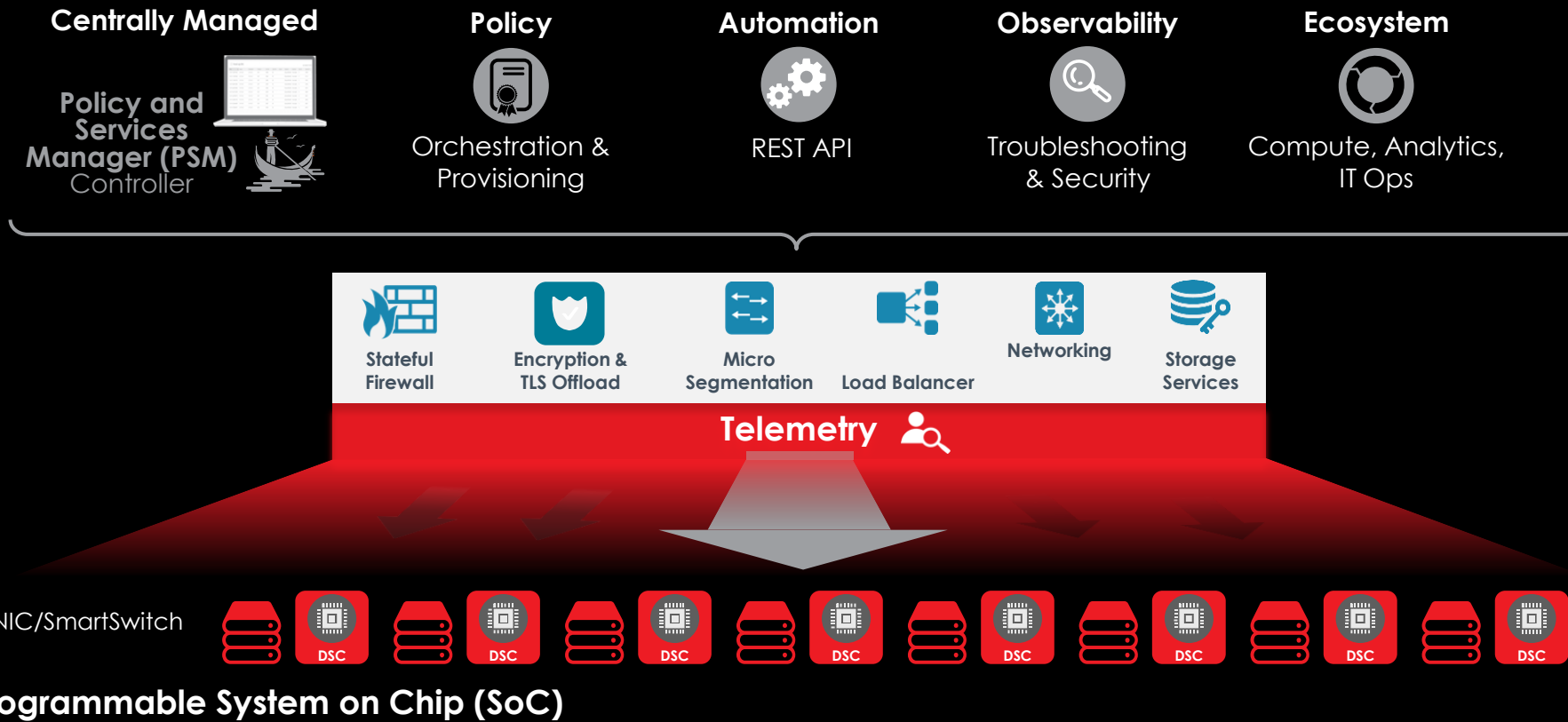
Software Components of a Programmable Datapath

S/W Component	What it provides
Compiler	Express Datapath Logic
Soft Datapath	Exception Path hand off to/from fast datapath
Functional Samples	Quick start for common use cases
Simulator	Make it easy to develop
Control Plane S/W	Integrate with connecting devices
Management Plane	APIs for controller integration
Built in Libs	Platform functions and Sw Infra



*Software in Silicon Development Kit

Conclusion – Powering DPUs with software



Questions?