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NETWORK DIFFERENT™

Simple Scalable, Secure and Seamless Routing-Centric Network Transformation

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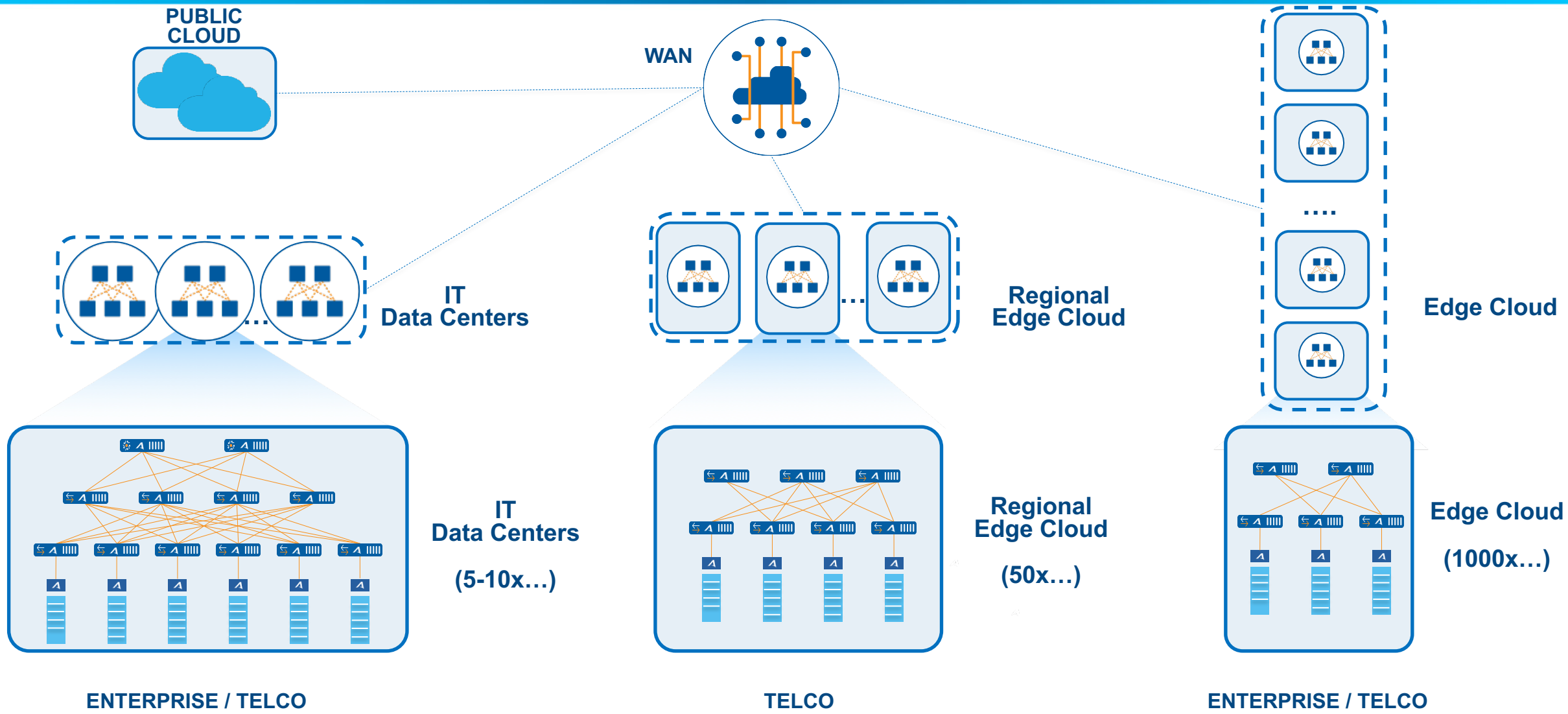
Network Transformation

What is a Software Powered Network Transformation?

LEGACY NETWORKING	NETWORK TRANSFORMATION
Switch-Centric	Routing-Centric
Doesn't Scale	Massively Scalable
Siloed, Rigid, & Brittle	Intelligent, Agile, & Elastic
Outage Issues/SW Bloat	Resilient/Optimized
Expensive	10x+ more Cost Effective
Minimal API Usage	Programmatic APIs
Manual Management	Automated
Proprietary Lock-In	Open Integration, Standards

Single Software: ToR to Super Spine, Switching to Routing, DC to Edge



Foundational Elements of Network Transformation

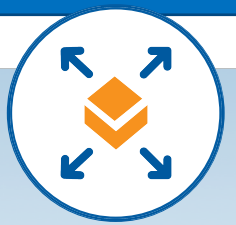
SIMPLE

- Simplified Protocols (e.g. Common BGP control plane)
- Standards based Automation (e.g. OpenConfig/YANG)
- Easy Manageability and Debuggability

SCALABLE

- Architectural Scale (e.g. Internet-scale routing w/ fast convergence)
- Network Scale (e.g. 100G/400G high-perf, low latency platforms)
- Operational Scale (e.g. Resilient, per-process restartability)

SECURE



- Real-time Network Telemetry & Analytics
- Routing Security (ROV)
- DDoS Mitigation

SEAMLESS

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Massively Scale-up & Scale-out Solution

New Routing Capabilities with Jericho2

24 ports 100GbE + 6 ports 400GbE

40 ports 100GbE

80 ports 100GbE

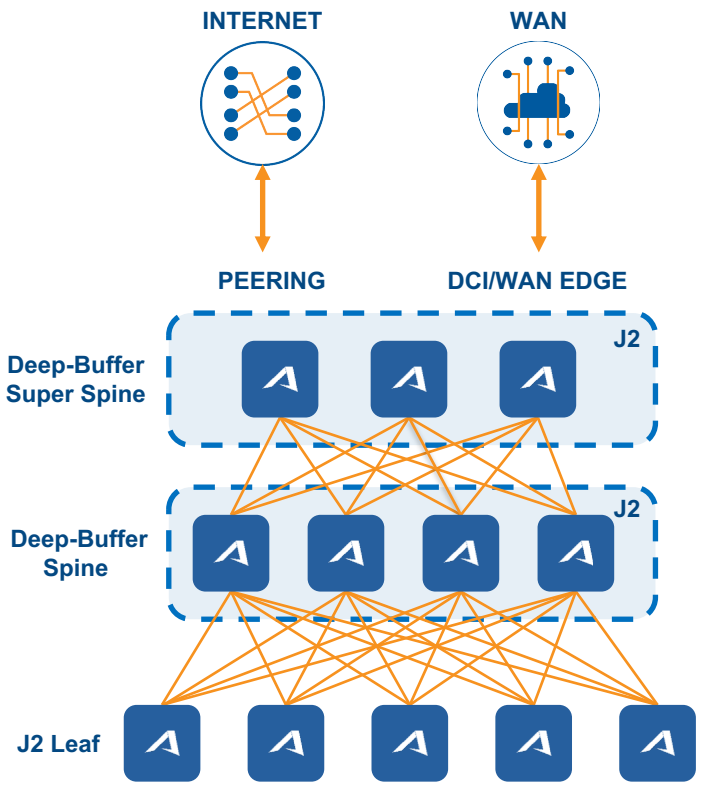
96 ports 100GbE

- 10Tbps (5X higher bandwidth) with over 2M IPv4 routes (1M IPv6) on chip, over 12M with external memory device
- 70% lower power per gigabit (vs. Jericho+)
- Multiple interfaces like 10GE, 25GE, 40GE, 50GE, 100GE, 200GE, 400GE
- Efficient traffic management with scalable packet buffer memory
- Optimized Hyperscale Cloud, Edge, and 5G Networks
- Superior cost/performance
- Multi-vendor hardware options

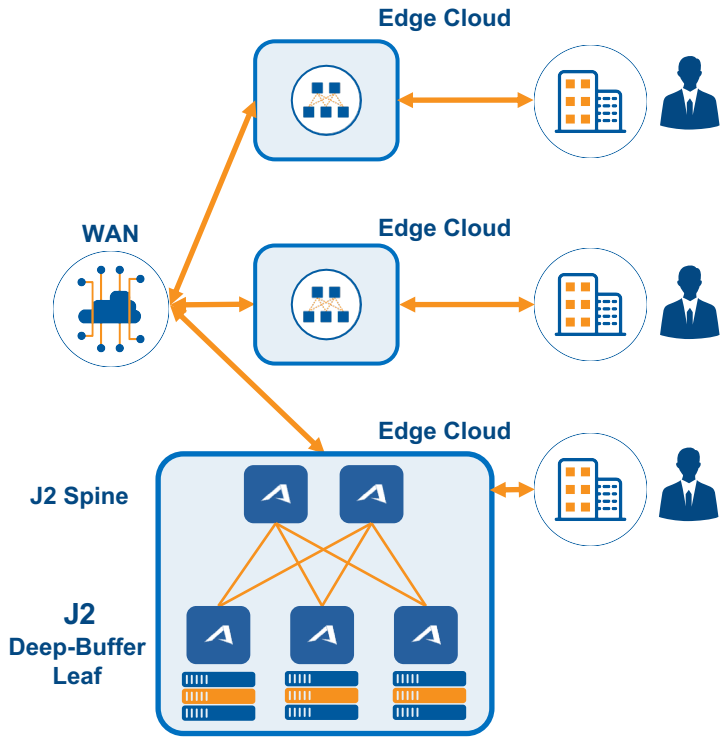
Key Customer Value Propositions with Jericho2

NEW CAPABILITY	CUSTOMER VALUE
Up to 10Tbps, 2M+/1M+ IPv4/IPv6	Faster, Scalable Router Platforms
Line-Rate Flow Monitoring	Real-Time Visibility at Scale
Selectable Scale Profiles	Enables Flexible Deployments
Scalable Packet Buffer Memory	Better Latency and Congestion Control
BGP Flowspec, ROV, DDoS Mitigation	Secures Control Plane and Data Plane
Ansible, 3rd Party Controller Integrations	Scale through Automation

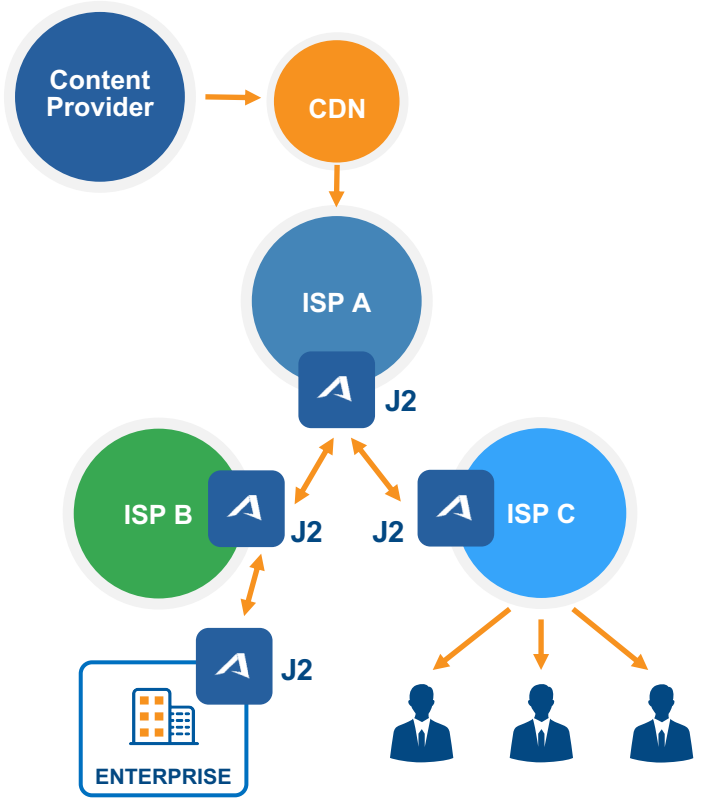
Enabling Cloud DC, Edge, & Internet Peering Use Cases



Deep-Buffer Spine/Leaf in a Data Center



Deep-Buffer Spine/Leaf in Edge Cloud



Internet Peering

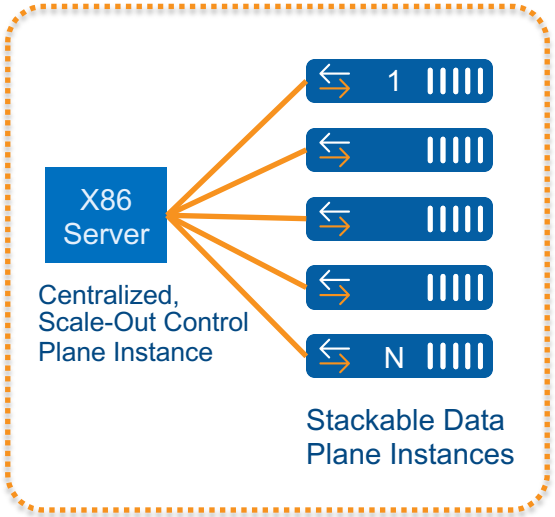
Architected for the Complete Routing Spectrum

SINGLE HARDWARE ARCHITECTURE

Fixed

High-Density Fixed

Modular*



Open Aggregated Router*

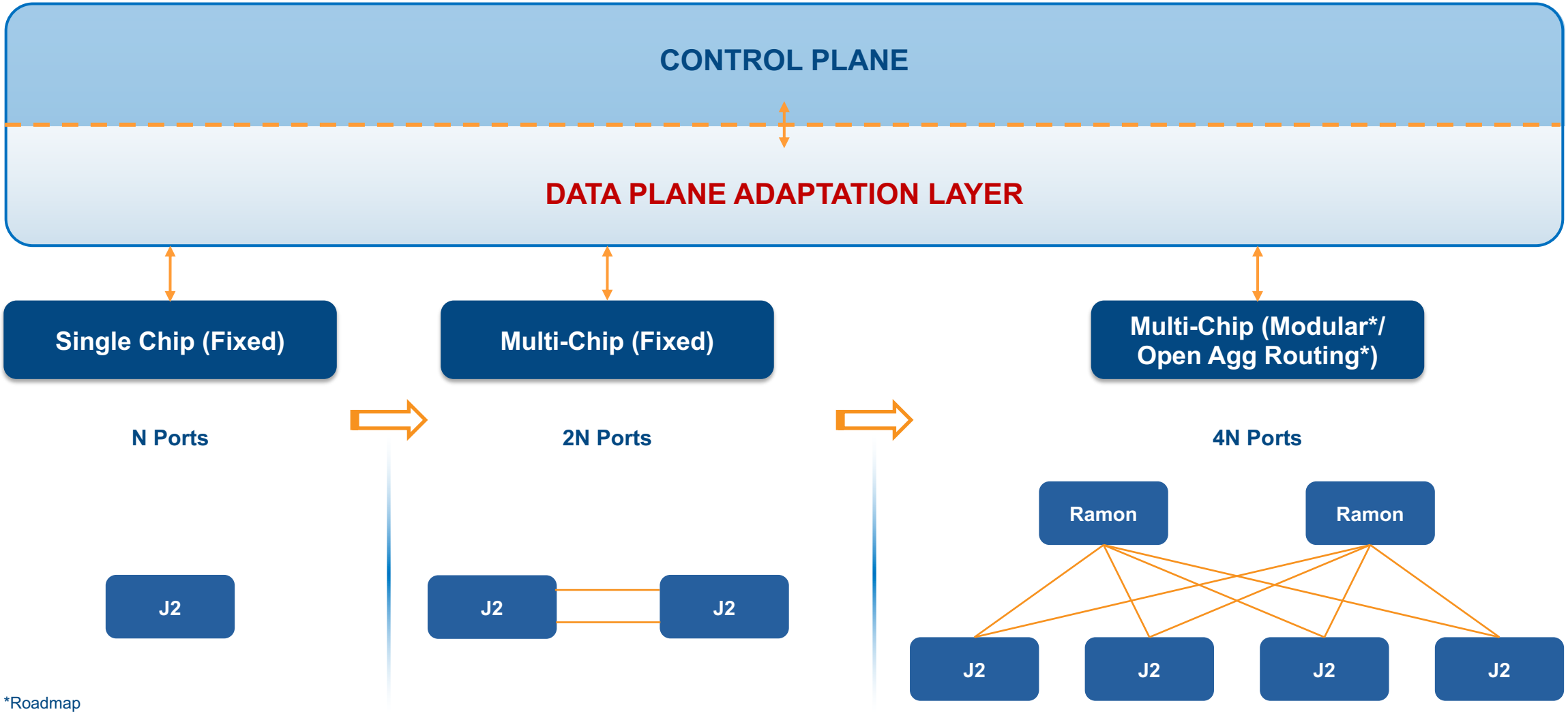
SUPERIOR PERFORMANCE. FLEXIBLE DEPLOYMENT. LOWEST TCO

*Roadmap

Modern Networking Software Requirements

- **Networking Silicon and Hardware SDKs are getting scalable, faster….**
  - Scalable, high performance control plane is required
    - Eliminates Control Plane (Software) bottlenecks
    - Micro-services model, multi-threading, etc…
- **Single Hardware Architecture can Achieve Multiple Hardware Deployments**
  - Single software should support multiple hardware deployments
  - Flexible control plane deployment (in-bound/out-bound)

Multi-Chip/Open Aggregated Routing Support Expands Density, Forwarding Capacity



*Roadmap

Control Plane for high scalable hardware deployment

- **High performance/scalable software architecture.**
  - micro-service design, multi-threading design…
  - minimum resource locking…
  - independency from data plane…
  - scale-out…
  - Ability to run on VM, Docker/container…

Data Plane Adaptation Layer for High Scalable HW Deployment

- **High Performance & Scalable Software Architecture**
  - Micro-service design, multi-threading design…
  - Minimum resource locking…
  - Independency from control plane and hardware…
  - Support distributed model…
  - Capability to run on VM, Docker/container…
  - Support multiple data plane like Broadcom, Linux, VPP, etc with the single architecture…

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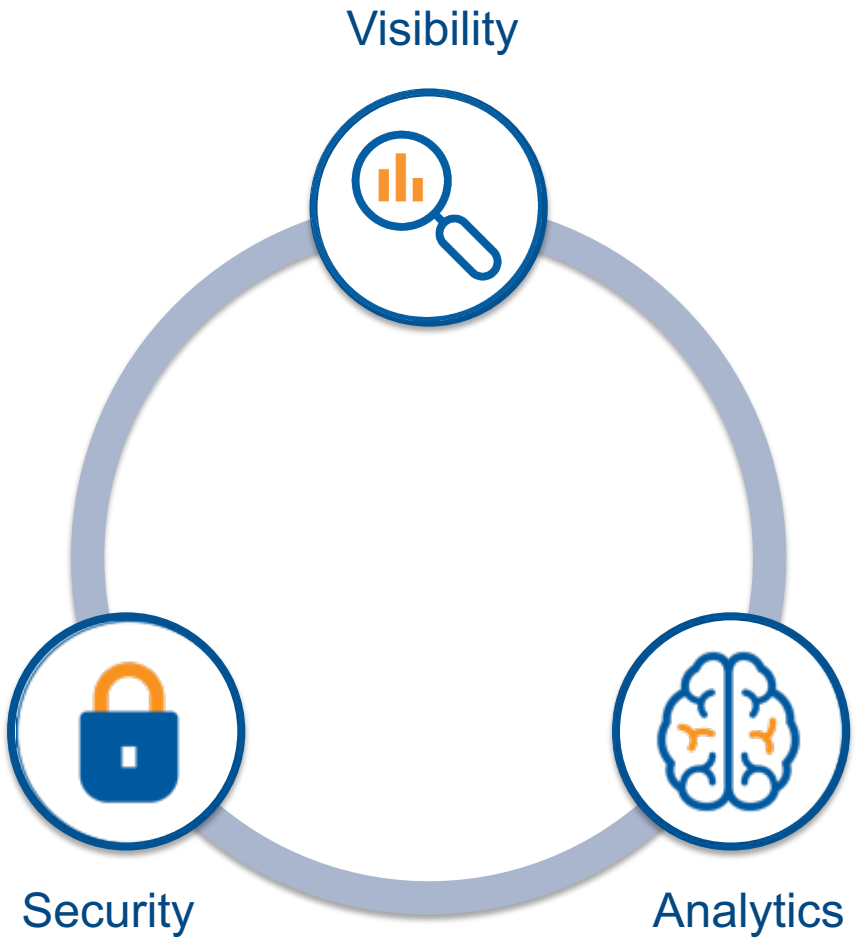
Modern Approach to Networking Operations

Why is a new approach for Network Operations Required?

- **High Scalable Chipset like Jericho2**
  - Increasing the number of interfaces
- **Open Aggregated Router Solution**
  - Elastically scale beyond confines of a physical chassis
    - Scale number of devices managed, hardware components
    - Increasing the interfaces, routes etc

Need to have a scalable, flexible, programmable network operation scheme…

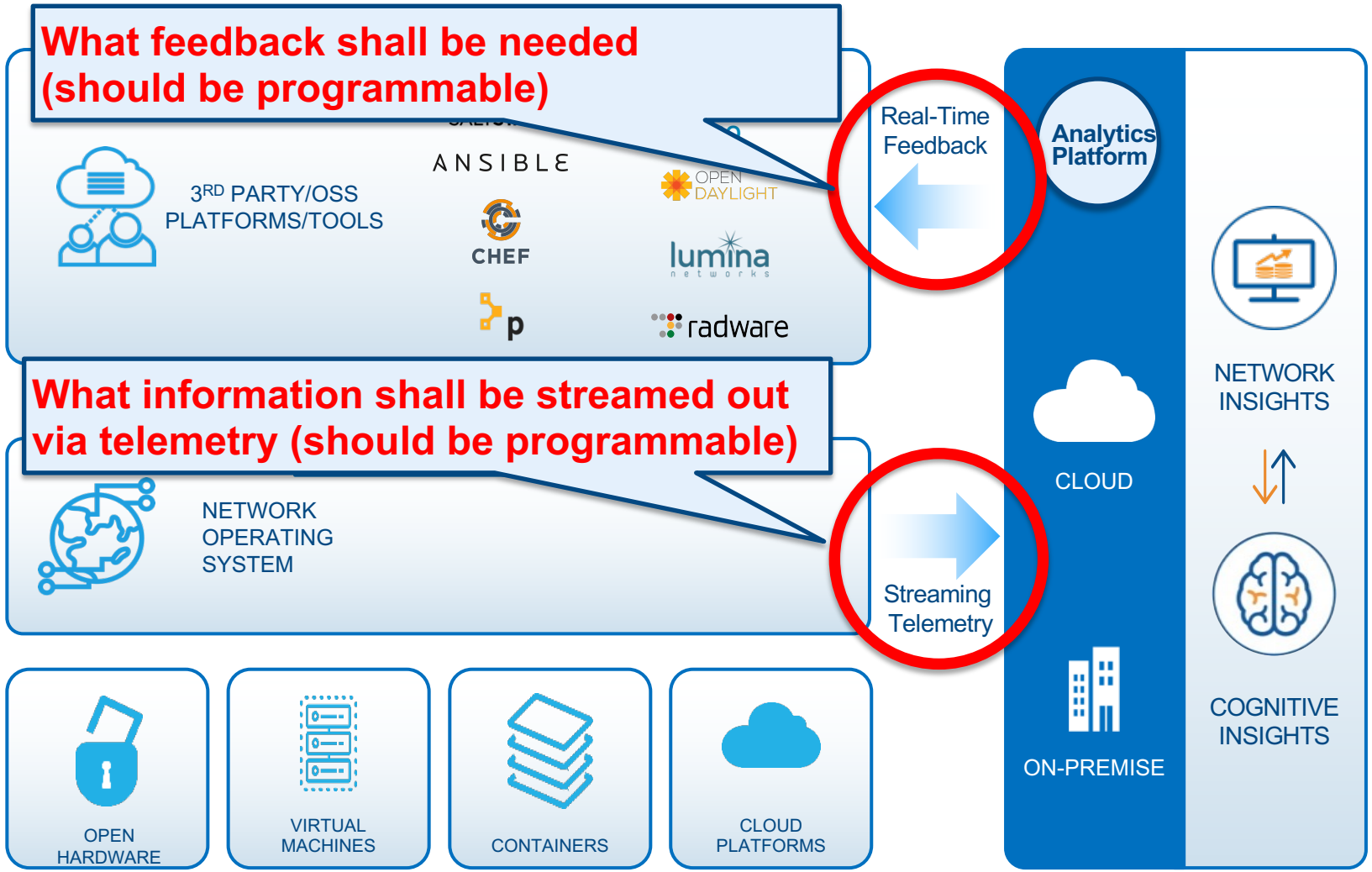
Deep Visibility and Analytics Platform Requirement



Multi-Cloud. Edge. Multi-Vendor

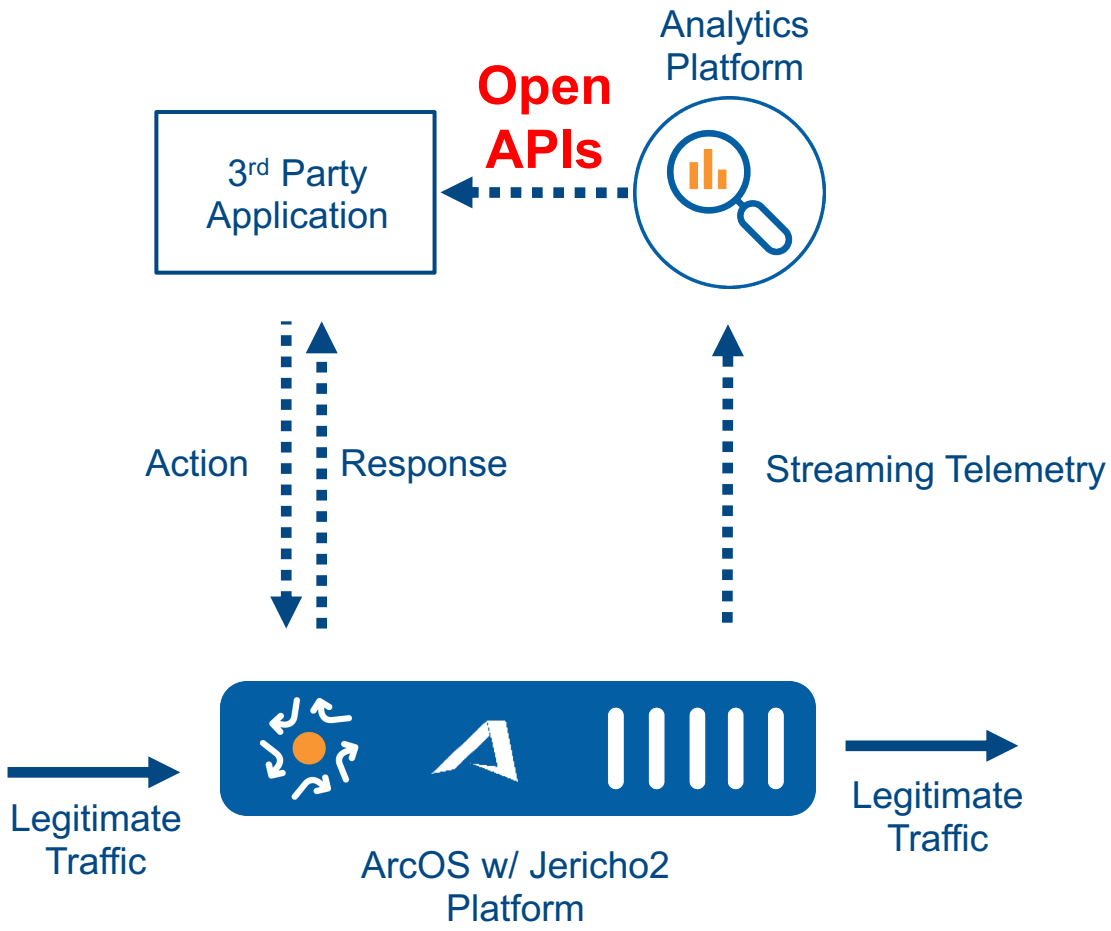
- **Visibility**
  - Open and standards-based
  - Network Health across DC, Cloud and Edge
  - Asset Management
- **Security**
  - Threat management,
  - Prevent route hijacks and leaks with route-origin-validation (ROV)
  - Support 3rd party devices for network-wide security
- **Analytics**
  - AI/ML Driven Network Computation Engine
  - Intelligent Traffic Management

Deep Visibility and Analytics Platform Overview



- **Network Security**
  - Control plane, RIB, FIB, interface stats
  - BGP topology, peers, & events
  - ACLs (most used ACLs, least used ACLs)
- **Network Health**
  - Per-device platform resource state/usage
  - Service insights: Platform software version tracking
  - Process blacklist, whitelist
- **Workload Mobility**
  - Tracking workload of VMs/containers
  - Desired state queries (production vs development)
- **SaaS/Multi-Cloud Based Offering**
  - AWS and Azure

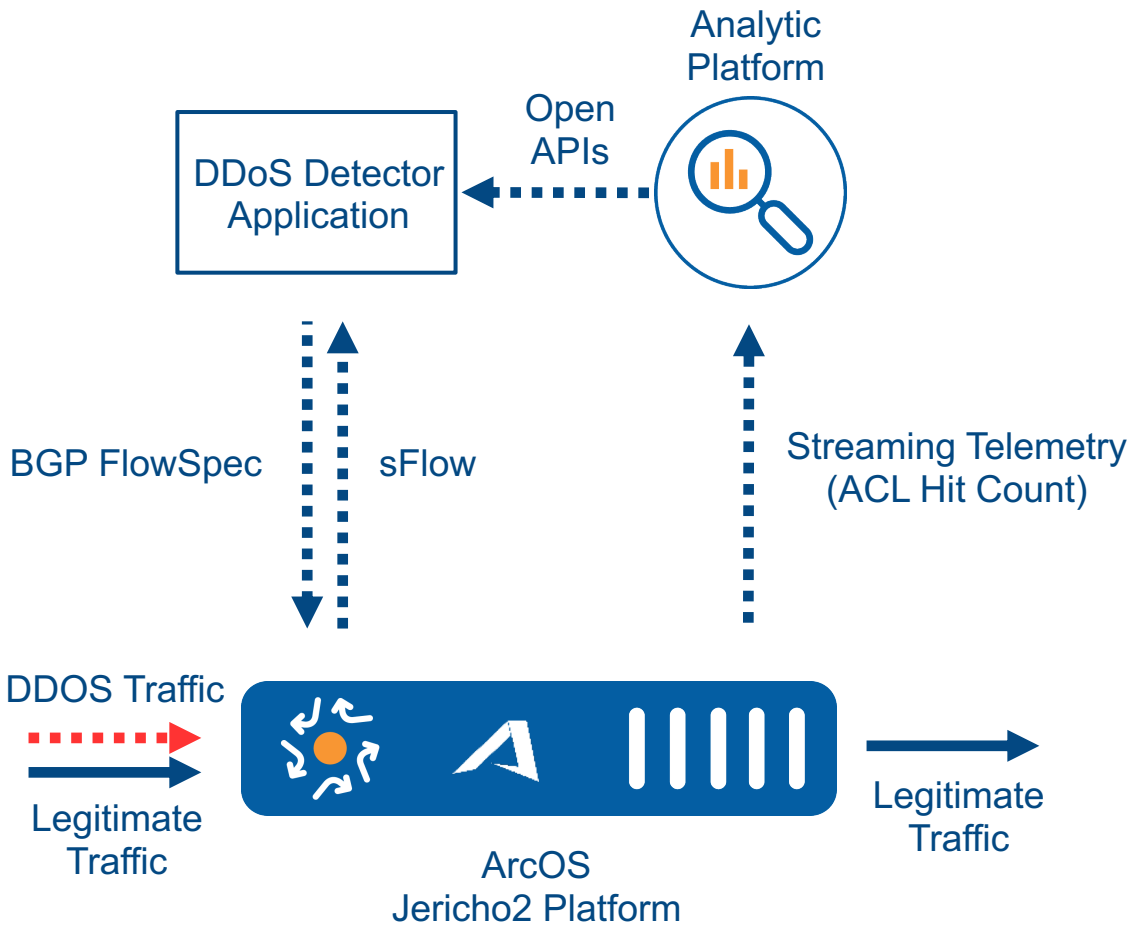
Analytics Platform Cont'd



- **Streaming Telemetry**
  - ArcOS shall store all data internally like routing info, protocol status, cpu usage, memory usage, etc…
- **Analytics Platform**
  - Gathering the telemetry data via open interface like gNMI, JSON on top of open platform like Kafka.
  - Provide the open standard based APIs to access the telemetry data from 3rd party applications.
- **Feedback**
  - Getting the required data via the open standard APIs.
  - Provide the feedback to the platform via the open standard interfaces like OpenConfig, Netconf, Rest, etc.

Example: Secure Data Plane Network Solution

BGP FlowSpec-Based DDoS Mitigation



- **Real-Time Visibility**
  - Line-rate sFlow streaming
  - Resource view before, during, and after DDoS attack
- **Dynamic Control**
  - Granular ACL rules
  - Real-time feedback to DDoS detector
- **Security Automation**
  - BGP Flowspec-based signaling w/ 3rd-party controller
  - Open standards-based APIs

Thank you