Switchgear Innovations w/Cavium-XPliant®
Albert Fishman, Solutions Product Marketing Manager
Cavium-XPliant Programmable Switches

3 Switch Silicon Generations
Field Proven Solutions

Legacy Interoperability
Programmable Data Plane

Leading OEM Products
White-Box Options

EMPOWER

THE NETWORK REVOLUTION

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Cavium XPliant & the OCP Stack

OCP Approved SW
Available w/ XPliant Programmable Switch

AS7512-32X

OCP HW Spec/Design
Available w/ XPliant Programmable Switch

Wedge 100C
Introducing Packet Trakker™: XPliant Telemetry

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Packet Trakker: XPliant Programmable Telemetry
Packet Trakker: Cavium Programmable Telemetry Suite

Physical Networks Scale Out

- Data Center Networks
- Hyper Converged Networks
- Telecom 5G Networks
- Enterprise Networks

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Packet Trakker: Cavium Programmable Telemetry Suite

More Services with Different Demands

- Data Center Networks
- Hyper Converged Networks
- Telecom 5G Networks
- Enterprise Networks
Packet Trakker: Cavium Programmable Telemetry Suite

Management Challenges...

Quality of Experience
Applications Performance
Networks Efficiency
Networks Reliability
Packet Trakker: Cavium Programmable Telemetry Suite

Comprehensive Suite for Network Observability, Analytics & Telemetry on XPliant Switches

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<tr>
<th>Monitor</th>
<th>Detect</th>
<th>React</th>
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<td><img src="image1.png" alt="Monitor Image" /></td>
<td><img src="image2.png" alt="Detect Image" /></td>
<td><img src="image3.png" alt="React Image" /></td>
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Packet Trakker: Cavium Programmable Telemetry Suite

Applications Quality of Experience
- Microburst Detection
- Latency Fluctuations
- Early Congestion Alarming

Network Reliability and Efficiency
- Paths Tracking Metrics
- Exceptions Detection
- Troubleshooting Observability

New SDN Use Cases Will Emerge...
Packet Trakker: Cavium Programmable Telemetry Suite

Legacy Solutions Pull Model
Based on Polling & Probing

• NOT Event-Triggered
  – Events occur between the sample or transient in nature can be missed

• NOT Real-Time
  – polling done every few seconds is eternity (~150M packets can pass 100G single port in 1 sec)

• NOT Granular
  – Unavailability of complete telemetry data, in per flow resolution, makes difficult to measure network performance

• Limited Hardware Assistance
  – Software resources are overwhelmed with data extraction which leads to inadequate data resolution and scale
Packet Trakker: Cavium Programmable Telemetry Suite

Cavium-Xpliant Push Model
Event-Triggered in Real-Time

- **Event-Triggered**
  - No important or transient event is missed
- **Real-Time**
  - Real-time monitoring and alarming
- **Granular**
  - Complete telemetry data availability, per flow, in ns resolution
- **Hardware Assistance**
  - Telemetry data extraction to Analytics tools with no Host CPU Software Intervention
Packet Trakker: Cavium Programmable Telemetry Suite

• **Packet Trakker is**
  - A Comprehensive Suite for Network
  - Observability, Analytics & Telemetry
  - Supports In-Band & Out-Of-Band Telemetry

• **Software Programmable Telemetry on XPliant**
  - HW Flexibility is Leveraged via Programmable SW
  - Hardware Support In Real-Time With ns Resolution
  - Software-Definable States, Counters, Data Export

• **Front-End Software**
  - Data Representation, Visualization & Analytics
  - Configurations & Scriptable Events Response
Packet Trakker: Cavium Programmable Telemetry Suite

- **Supported on ALL XPliant Switches Generations**
  - Portable to XPliant-based White-Box Hardware
  - Including OCP Hardware Platforms w/ XPliant

- **NOS Integration-Ready**
  - By Porting Directly Over XDK or via SAI
  - Including Integrations w/ SONiC & OPX

- **Designed for Extensibility**
  - Modular Design Based on Kafka DB & gRPC
  - Can be Integrated w/External Analytics Tools
Packet Trakker: XPliant Programmable Telemetry
Quality of Experience (QoE): Early Congestion Alarming

Transmit Queues Build Up ➔ Latencies Fluctuate ➔ Leads to Applications Performance Degradation
Can the impact be prevented/responded promptly?

• Egress Transmit Queues State Monitoring
  - Queues States Periodic Reports
  - Queues States Change Alerting

• Latency Fluctuation Prevention / Handling
  - Alert on Queues Build-Up in Real-Time
  - Assistance in Aggressors/Elephant/Mice Flows Identification
QoE: Microburst Detection & Flows Identification Assistance

- 70% bursts sustained for at most tens of ms

- 10% chance being affected by a slow response

- Microbursts Detection
  - In real-time
  - With ns granularity

- Flows Identification Assistance
  - Elephant/Mice/Aggressor Flows
What ECMP Path My Flow Is Taking?
What Are the Latency / Distribution?

- In-band (data packets) Switch States Report
  - iOAM, INT, UDP standards & practices
  - User-Defined Transport & Metadata
- Traffic Flow Path Traceability
  - Per Flow, per Path, per Hops Data
  - ECMP Distribution Anatomy
  - ECMP Latency Analytics
Packet Trakker: Programmable Telemetry Use Cases w/XPliant

• Applications Quality of Experience
  - Egress Queuing Monitoring, Microbursts Detection, Early Congestion Alarming, Latency Fluctuations

• Network Reliability & Efficiency
  - Misconfigurations & Malfunctioning
    Exceptions Detection, Black Holing,
  - Metrics For Traffic Engineering Analytics
    Flows Path, Distribution and Latency
  - In-Band Telemetry: iOAM/INT/Any Transport
  - Custom-Condition Mirroring, Based on Packet Headers, Metadata, Queues States
Packet Trakker: Programmable SDN Telemetry Suite

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