OCP SUMMIT

March 20-21
2018
San Jose, CA

OPEN. FOR BUSINESS.

Switchgear Innovations w/Cavium-XPliant®

Albert Fishman, Solutions Product Marketing Manager

Cavium-XPliant Programmable Switches

3 Switch Silicon Generations

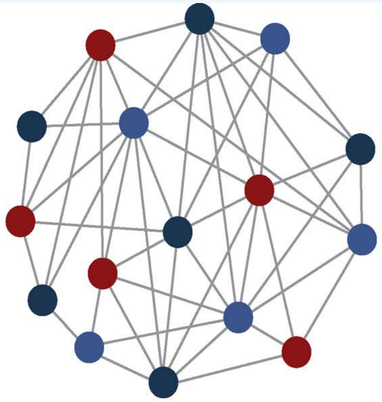
Field Proven Solutions

Legacy Interoperability

Programmable Data Plane

Leading OEM Products

White-Box Options



THE NETWORK REVOLUTION

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CAVIUM

Cavium XPliant & the OCP Stack

sai

SONiC

OCP Approved SW Available w/ XPliant Programmable Switch

AS7512-32X

Edge-corE NETWORKS

Accton Making Partnership Work

Wedge 100C

OCP HW Spec/Design Available w/ XPliant Programmable Switch

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CAVIUM

Introducing Packet Trakker™: XPliant Telemetry

Albert Fishman, Solutions Product Marketing Manager

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PACKET TRAKKER

Packet Trakker: XPliant Programmable Telemetry

ENTER

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CAVIUM

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

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Management Challenges…

Quality of Experience

Applications Performance

Networks Efficiency

Networks Reliability

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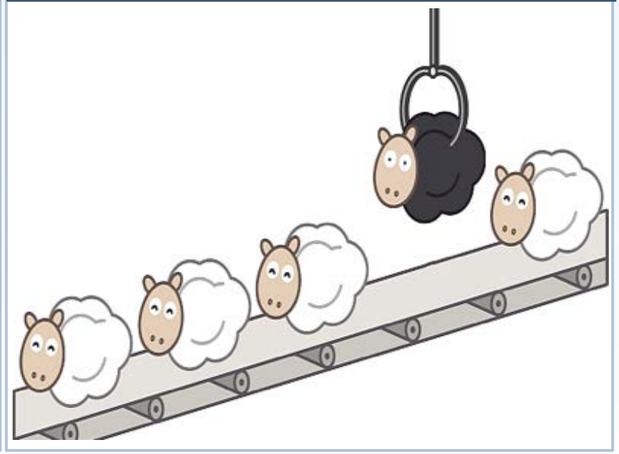
Packet Trakker: Cavium Programmable Telemetry Suite

PACKET TRAKKER

XPliant

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

Monitor	Detect	React
		

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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 …

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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

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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

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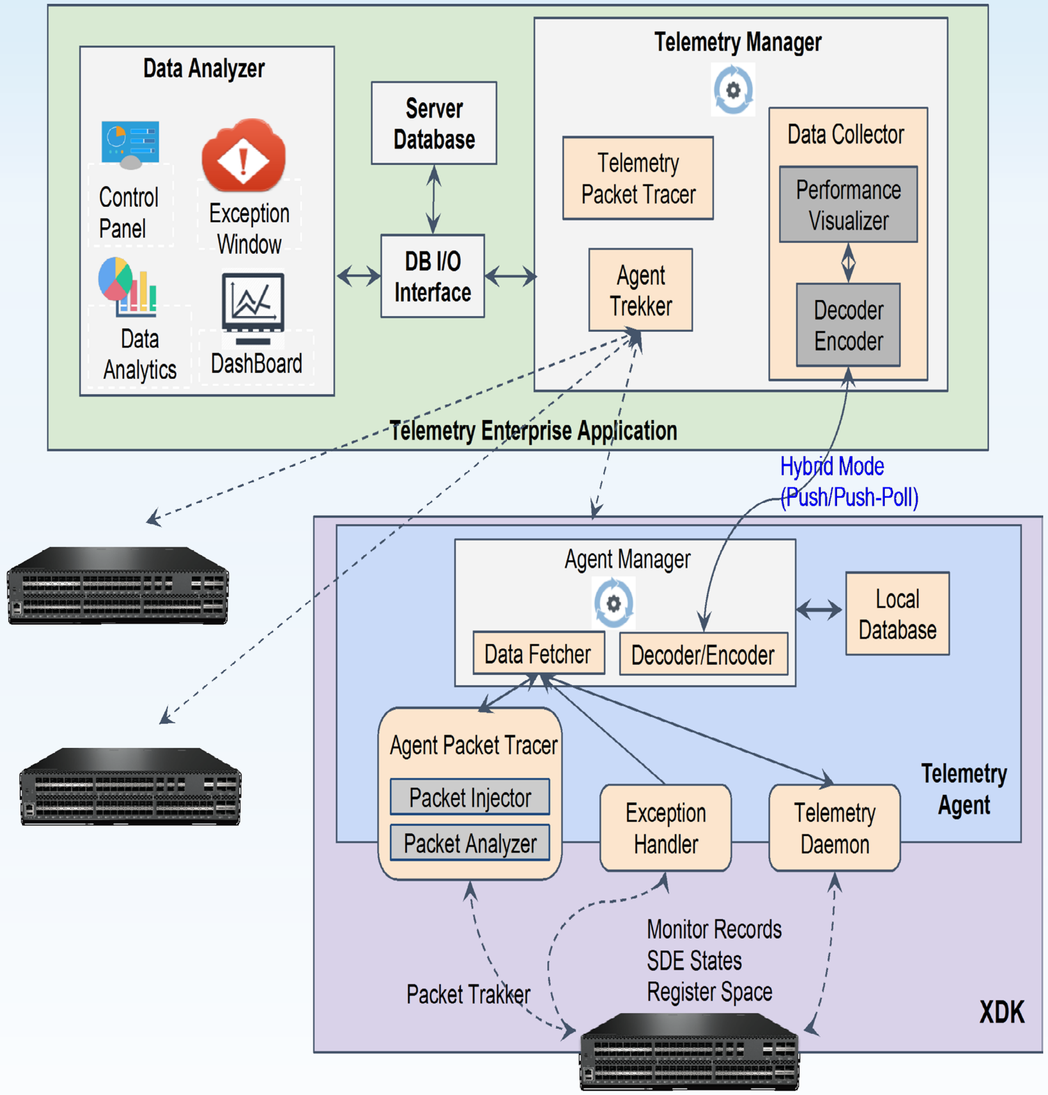
Packet Trakker: Cavium Programmable Telemetry Suite

- **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



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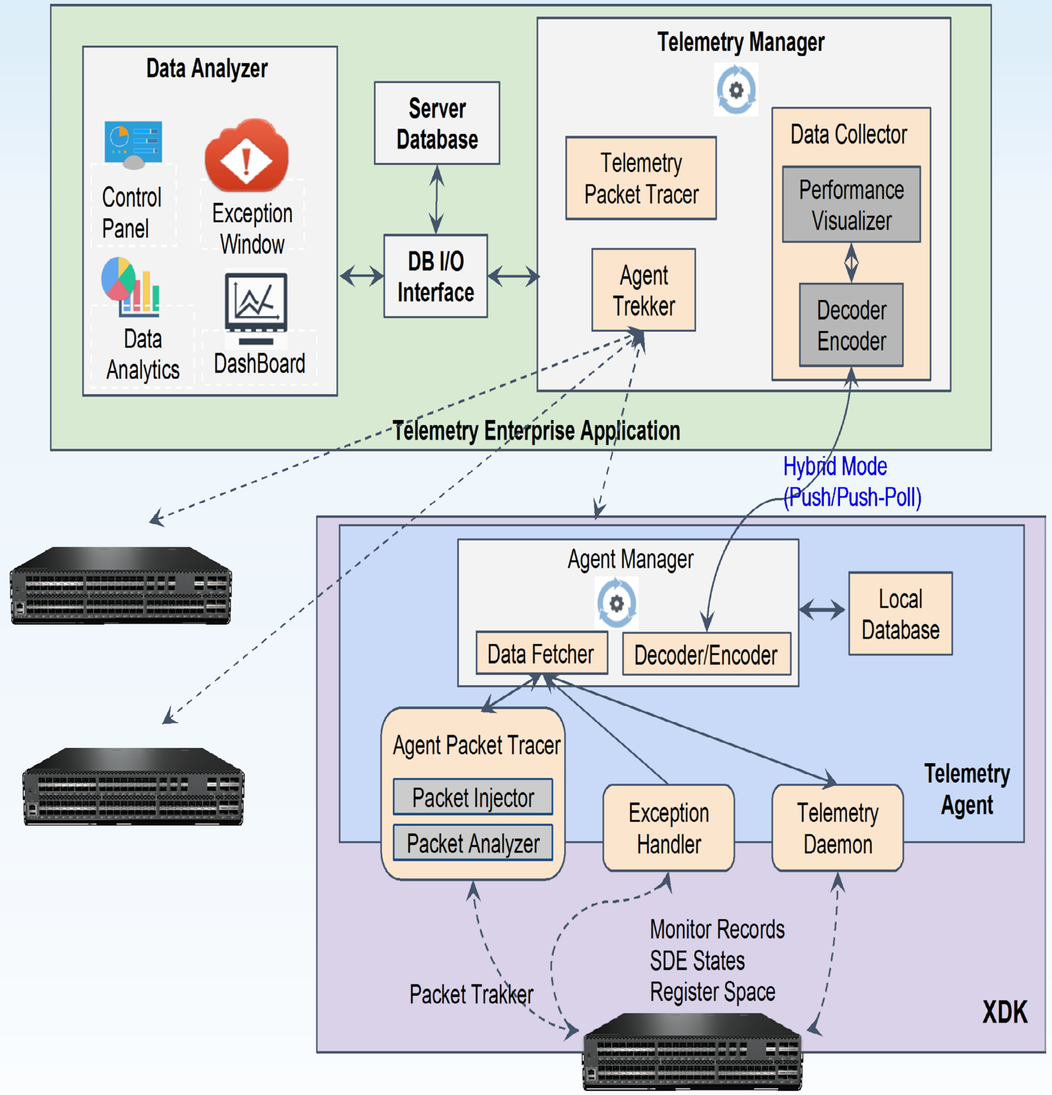
Packet Trakker: Cavium Programmable Telemetry Suite

- **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



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Packet Trakker: XPliant Programmable Telemetry

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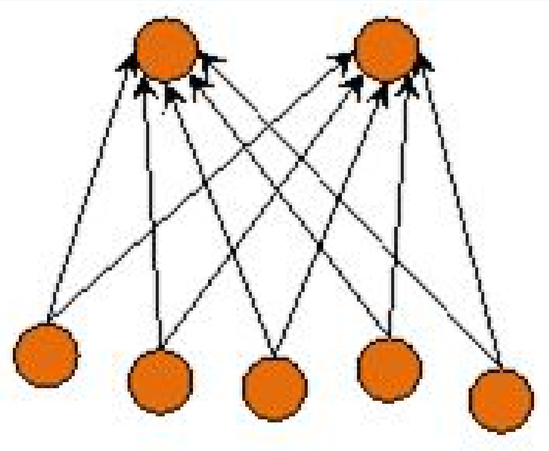
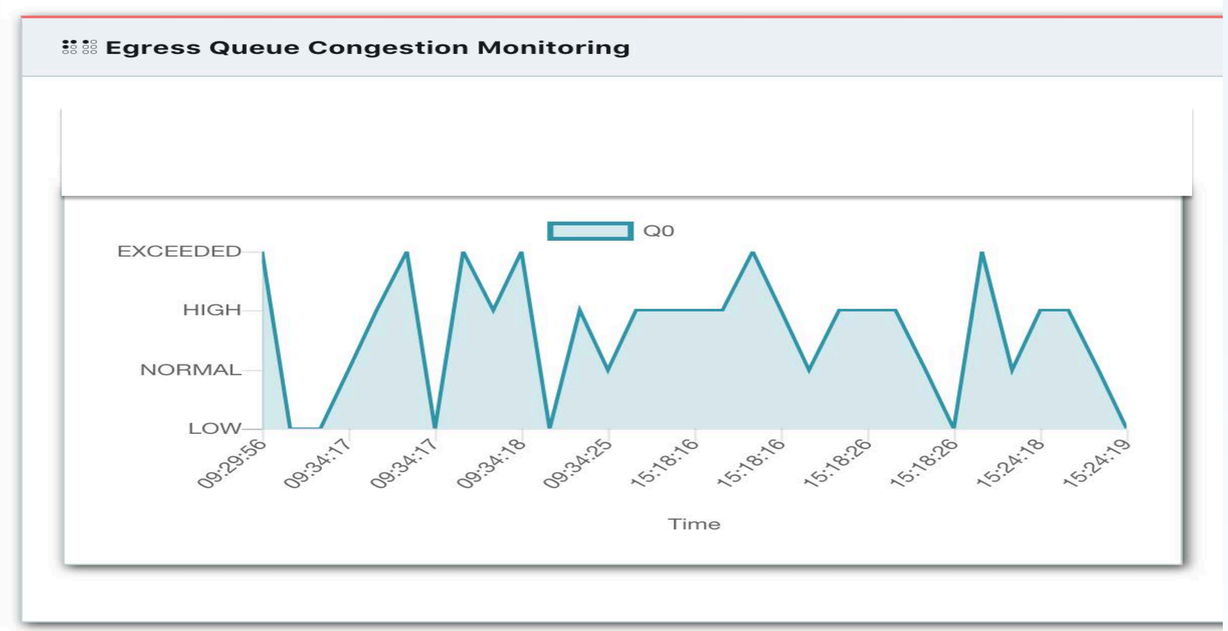
Quality of Experience (QoE): Early Congestion Alarming





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

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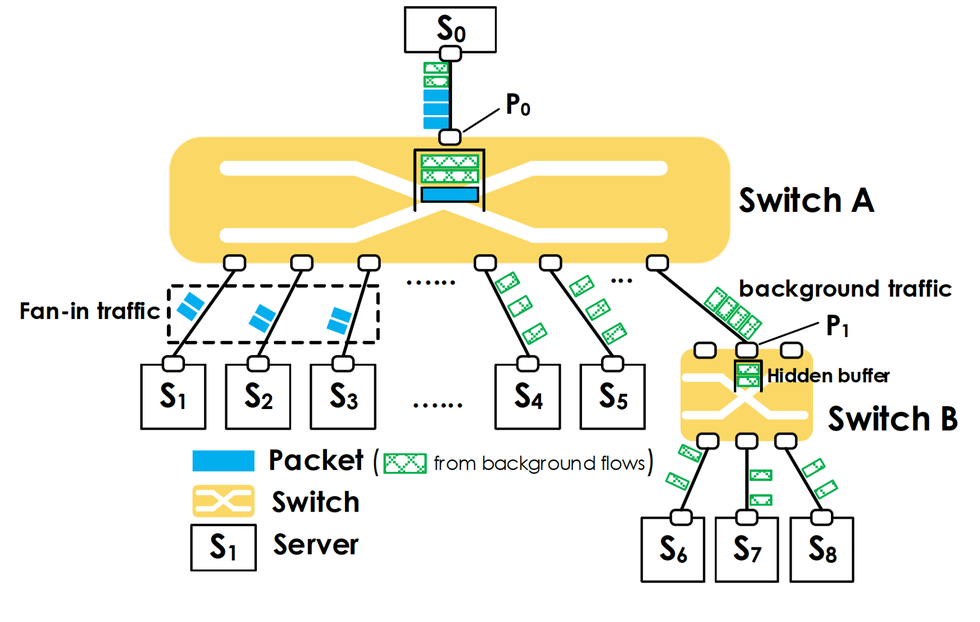
QoE: Microburst Detection & Flows Identification Assistance



- 70% bursts sustained for at most tens of ms
  https://homes.cs.washington.edu/~qiao/paper/imc.pdf
- 10% chance being affected by a slow response
  https://engineering.linkedin.com/performance/who-moved-my-99th-percentile-latency

- **Microbursts Detection**
  - In real-time
  - With ns granularity
- **Flows Identification Assistance**
  - Elephant/Mice/Aggressor Flows

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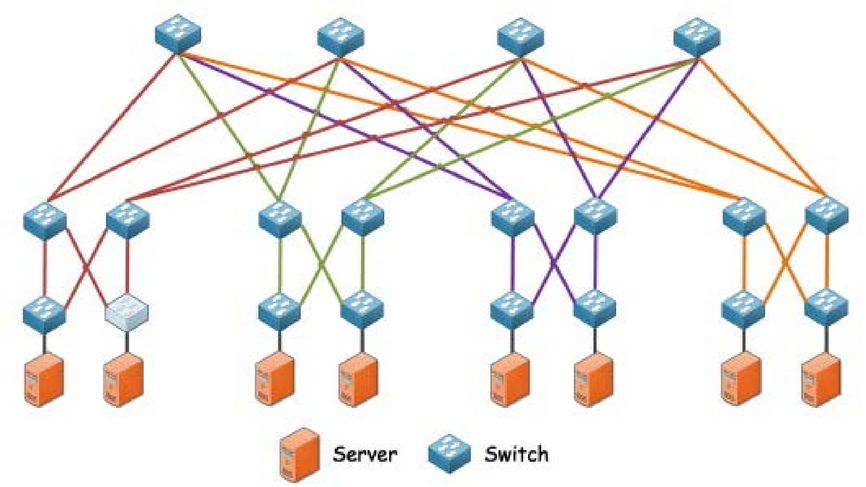
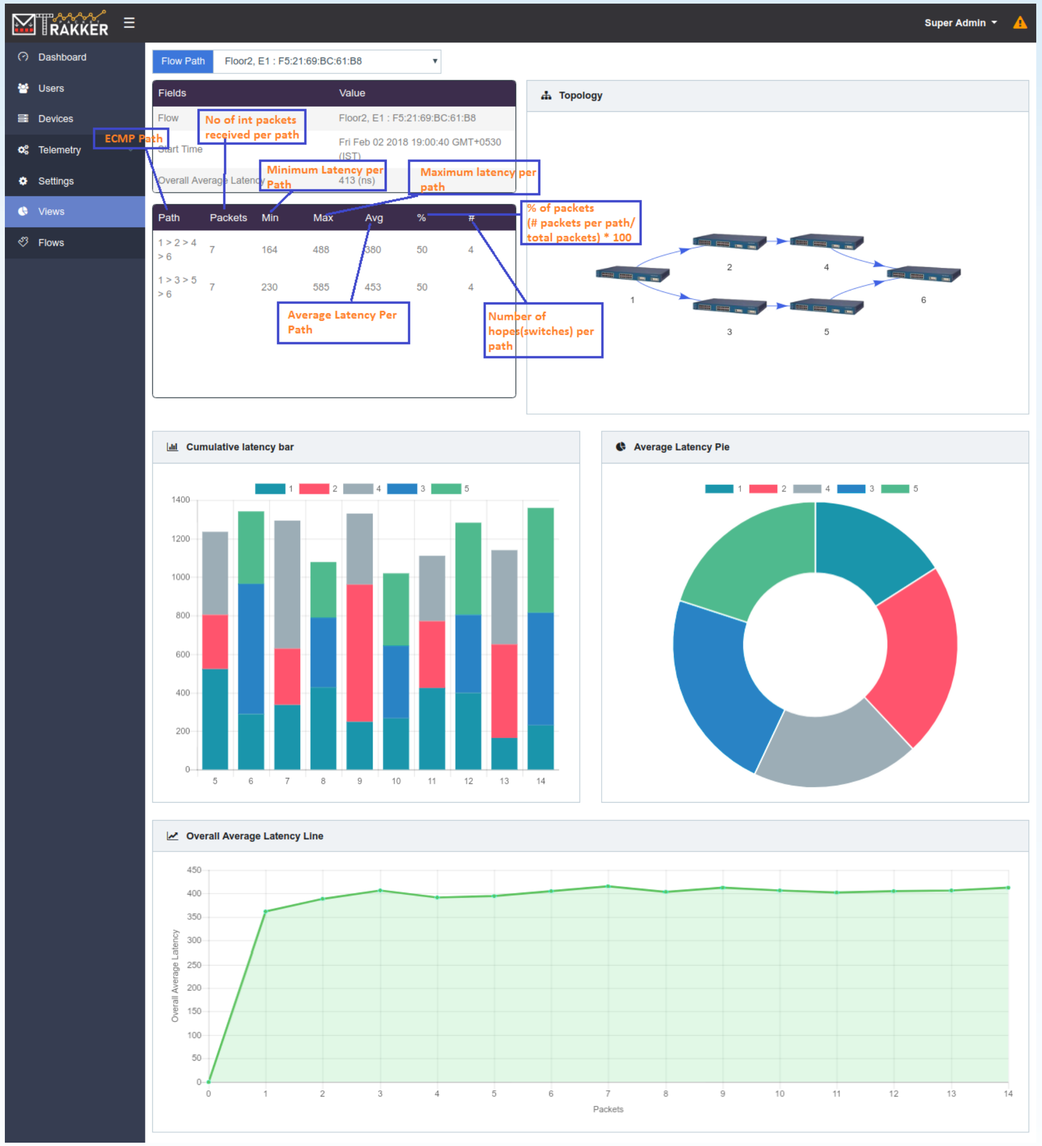
Network Efficiency: Latency/Distributions Metrics w/Embedded Telemetry





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

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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

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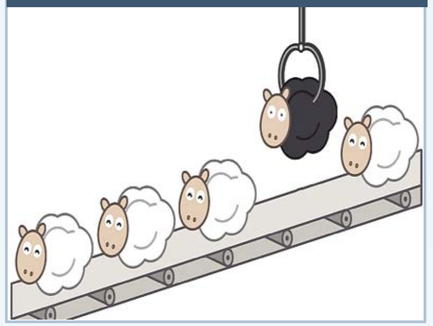
Packet Trakker : Programmable SDN Telemetry Suite

Monitor	Detect	React
		

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