Programmable Networking
Our Journey

Yiqun Cai
yiqun.cai@alibaba-inc.com
Alibaba Cloud
Alibaba Cloud

**Services**
- Compute
- Storage
- Networking
- Databases
- CDN
- AI
- ...

**Reach**
- 60+ regions
- 20+ zones
- 70+ countries
- 6 continents

Global Infrastructure
Networking in the Era of Cloud Computing

Is the enabler of the growth

- Scale
- Bandwidth
- Low latency
- High availability
- Flexibility
- Economics
- Reach
- ...

But with antiquated tools and mindset

- Pair-wise
- System oriented
- OPS/management framework
- ...

...
Our Journey on Network Programming

Partnership

2016

- Telemetry
- Datapath programming
- P4
Our Journey on Network Programming

**Partnership**
- Telemetry
- Datapath programming
- P4

**RDMA**
- P4 based load balancer
Our Journey on Network Programming

**Partnership**
- Telemetry
- Datapath programming
- P4

**RDMA**
- P4 based load balancer

**Gateways**
- Hybrid cloud gateway
- Edge gateway
- Flow control
Our Journey on Network Programming

2016
- Telemetry
- Datapath programming
- P4

2017
- P4 based load balancer

2018
- Hybrid cloud gateway
- Edge gateway
- Flow control

2019
- Dedicated hardware
- Unified OS platform
- Advanced tooling
- More scenarios
- Community
Supporting 11.11

- Largest hybrid cloud
- Terabits per second
- Virtualization, Security
- Global reach
NetSeer: Flow-Event Telemetry

Counters

Management Plane

Data Plane

Packet Telemetry

Management Plane

Data Plane

Flow-Event Telemetry

Management Plane

Data Plane

- Coarse-grain Information
- Telemetry packets
- Fine-grain
- Scale

Data Plane

Flow - Event Telemetry

Data Plane

- Telemetry packets
Lyra: One Big Pipeline Abstraction

Per-switch model

One-big-pipeline model

One-big-switch model

Aggregation
ToR

Aggregation
ToR

Switch
ARP

Firewall
ARP

Lyra Program
Intermediate Representation
Hardware

Frontend

Backend

One big switch
Our Holistic Approach

Platforms
- Dedicated hardware
- Unified OS

Applications
- Gateways
- Flow control (HPCC)
- Flow-Event Telemetry

Tools
- Compilers to reach platform independence
- Network wide verification
Summary

We are still just starting
THANK YOU