P4 Users Community Update, Japan

21st Dec, 2021

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Principal Researcher

InfoTech, Connected Company

Toyota Motor Corporation

https://www.linkedin.com/in/ebiken/

Principal Researcher at Toyota Motor Corporation

Kentaro Ebisawa

Independent Internet Professional
Terrasence
Apr 2010 – Present · 10 yrs 3 mos
Privately owned entity for consultancy work.
Technical consultancy / development and research in IP networking, Cloud and Data Center area.

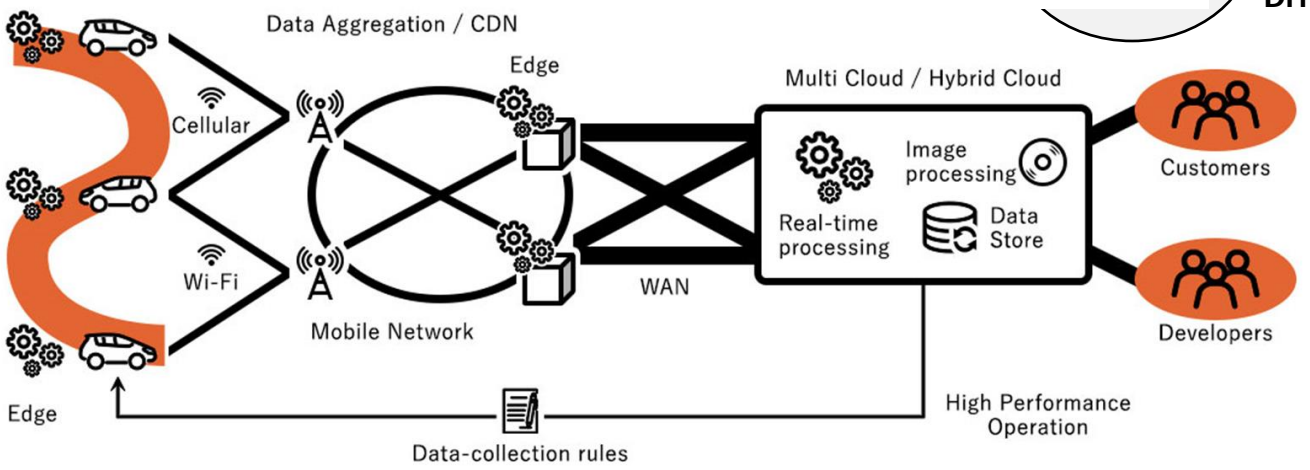
BizDev / Japan Entry and more...
Market & Product Development,
Consultation, Translation (Tech & Manga)

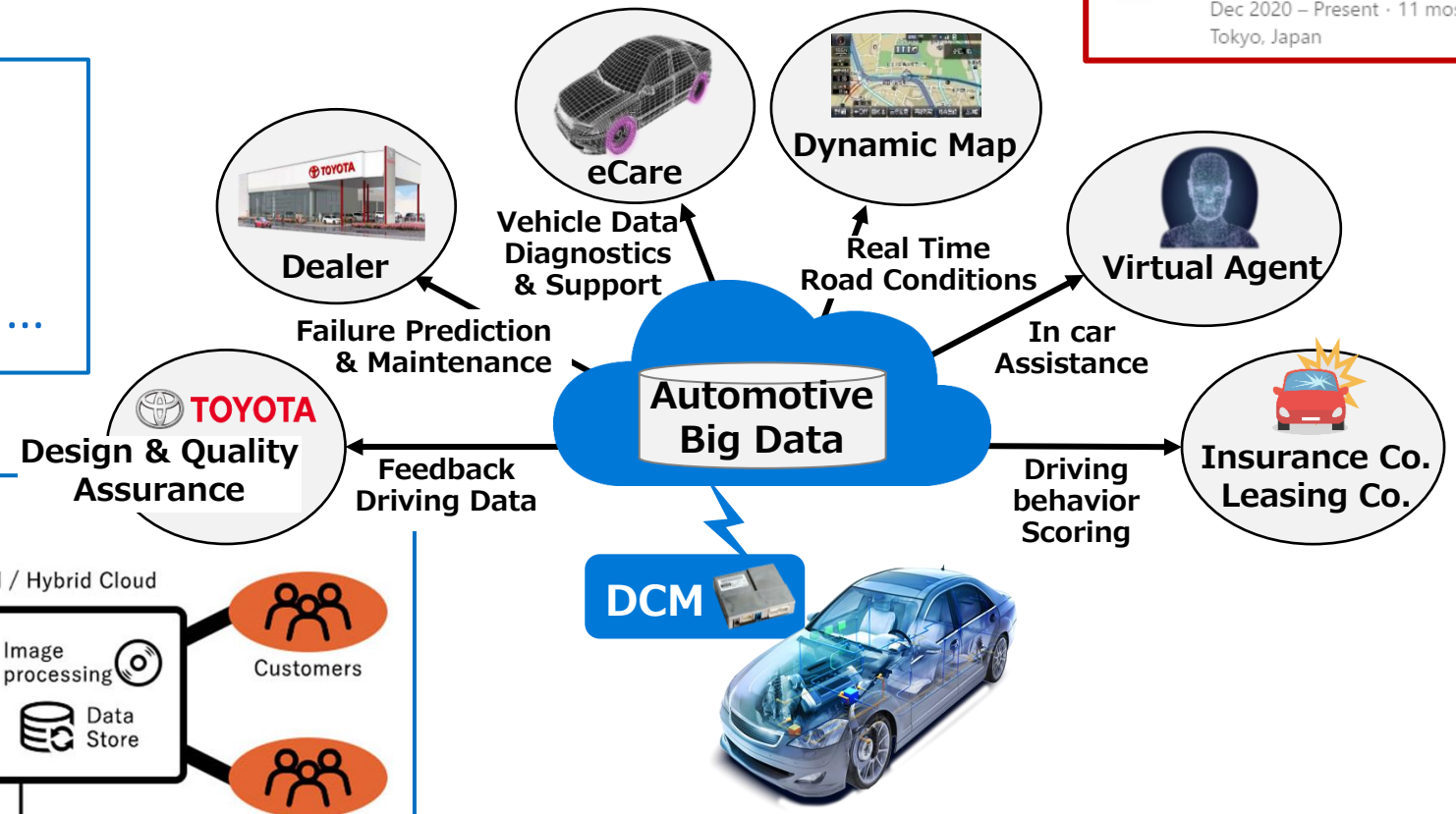
Operator Network Technology
SDN, Automation / Orchestration

Research Professional
NTT Ltd. · Part-time
Dec 2020 – Present · 11 mos
Tokyo, Japan

Research Area

Network Infra for Connected Cars
in Data Center & Mobile network
P4, SRv6, GTP, Switch&Network OS, SDN ...



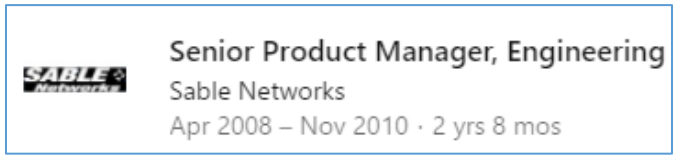


Connected Service Utilizing Automotive Big Data for better Mobility Experience

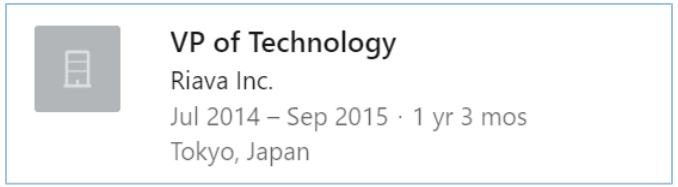
P4 Community and Activity in Japan

My “P4” Journey

A journey to find the best platform to implement “something new” on scalable dataplane.



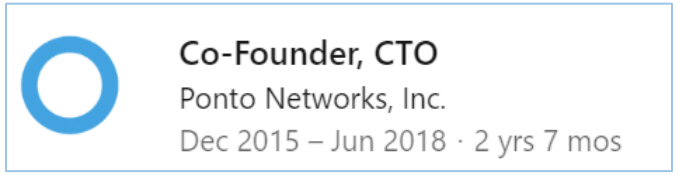
nat64, CGN on Flow Router ASIC (ex-Caspian)



More Flexibility

Full featured OpenFlow Switch on FPGA

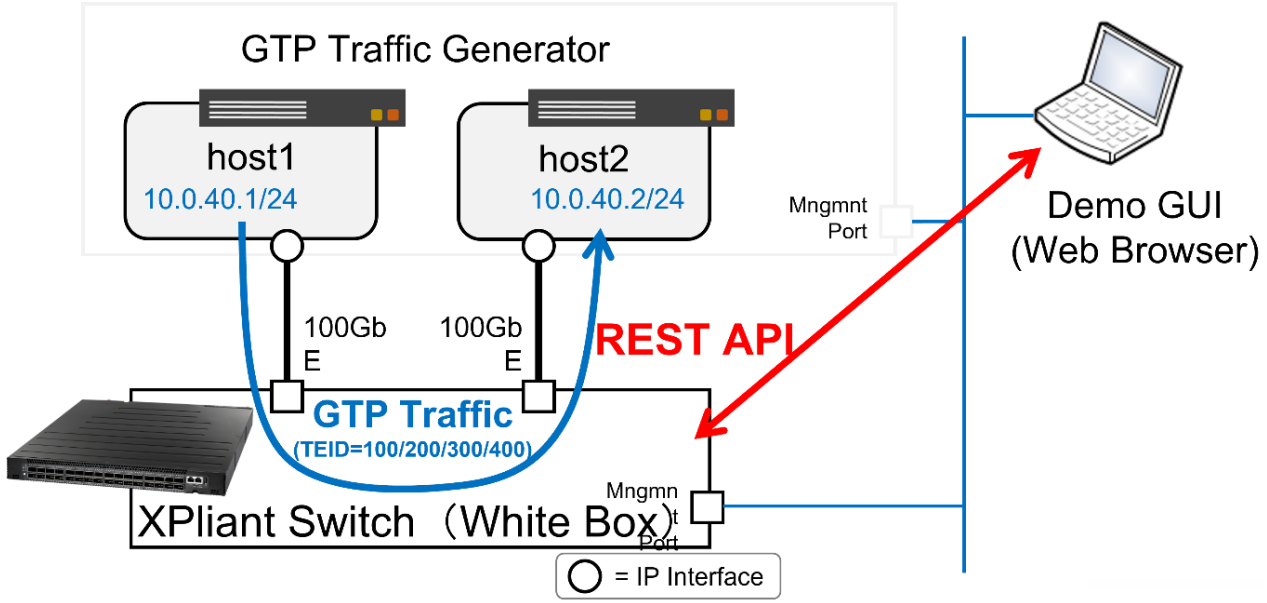
(Funded by Invester in Taiwan. Platform developed by HW dev team in Taiwan)



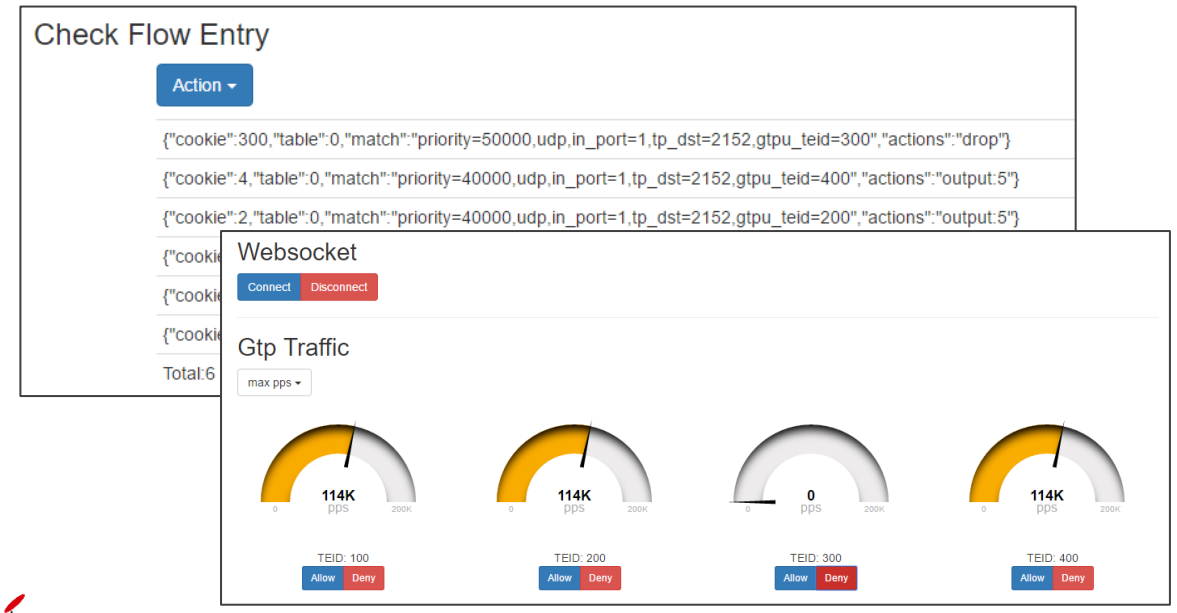
More Flexibility + Performance
(And low cost ... WhiteBox Switch)

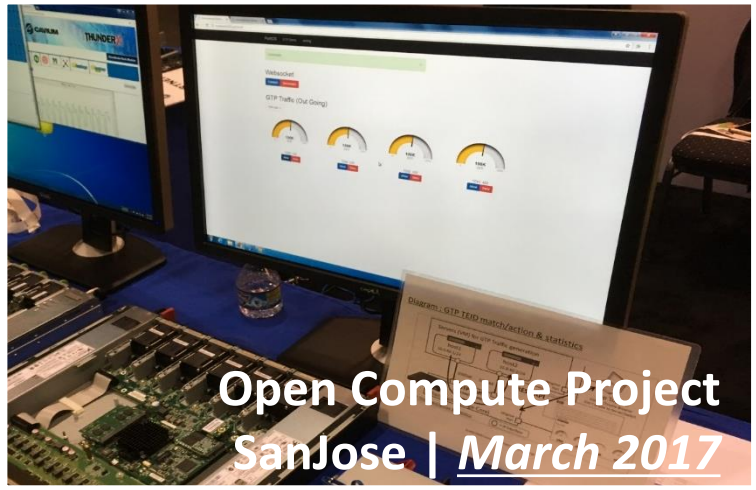
GTP + SRv6 on XPliant ASIC

GTP TEID match/action & stats using XPliant ASIC



- Parse GTP Header
- Match/Action based on GTP TEID
- Set config & Get stats via REST API





https://www.reuters.com/article/us-cavium-m-a-marvell-technlgy-idUSKBN1DK02S

Project terminated due to acquisition.
(and XPliant discontinuation)

Nov 2017

A Technology being good is not good enough.
... It MUST have community large enough to survive.
(to support the ecosystem)

Started giving talk about “Dataplane Programmability”

- 2017/10/20 | ONIC Japan 2017

  “The era of **Programmable Dataplane** and Network Operation Stack”

- 2017/11/29 | Software Router BoF @ Internet Week 2017
- 2017/12/07 | Okinawa Open Days 2017

  “p4alu ... Arithmetic Logic Unit in **P4**”

  https://www.slideshare.net/kentaroebisawa/p4alu-arithmetic-logic-unit-in-p4

  https://github.com/ebiken/p4sandbox/tree/master/p4alu

- 2018/02/23 | ENOG#49@NIGATA Rankei-So

  “Zebra 2.0 **SRv6 CLI** on Linux dataplane”

- 2018/04/20 | ONOS/CORD meetup in Tokyo

  “proto-typing new protocol with **P4 SRv6** for Mobile User Plane”

... and more ...

README.md

p4srv6 ... proto-typing SRv6 functions with P4 lang.

The objective of this project is to implement SRv6 functions still under discussion using P4 Lang to make running code available for testing and demo. Since there is no Open Source P4 switch implementation supporting SRv6, this should include basic switch features required to test SRv6.

List of SRv6 functions of interest and status:

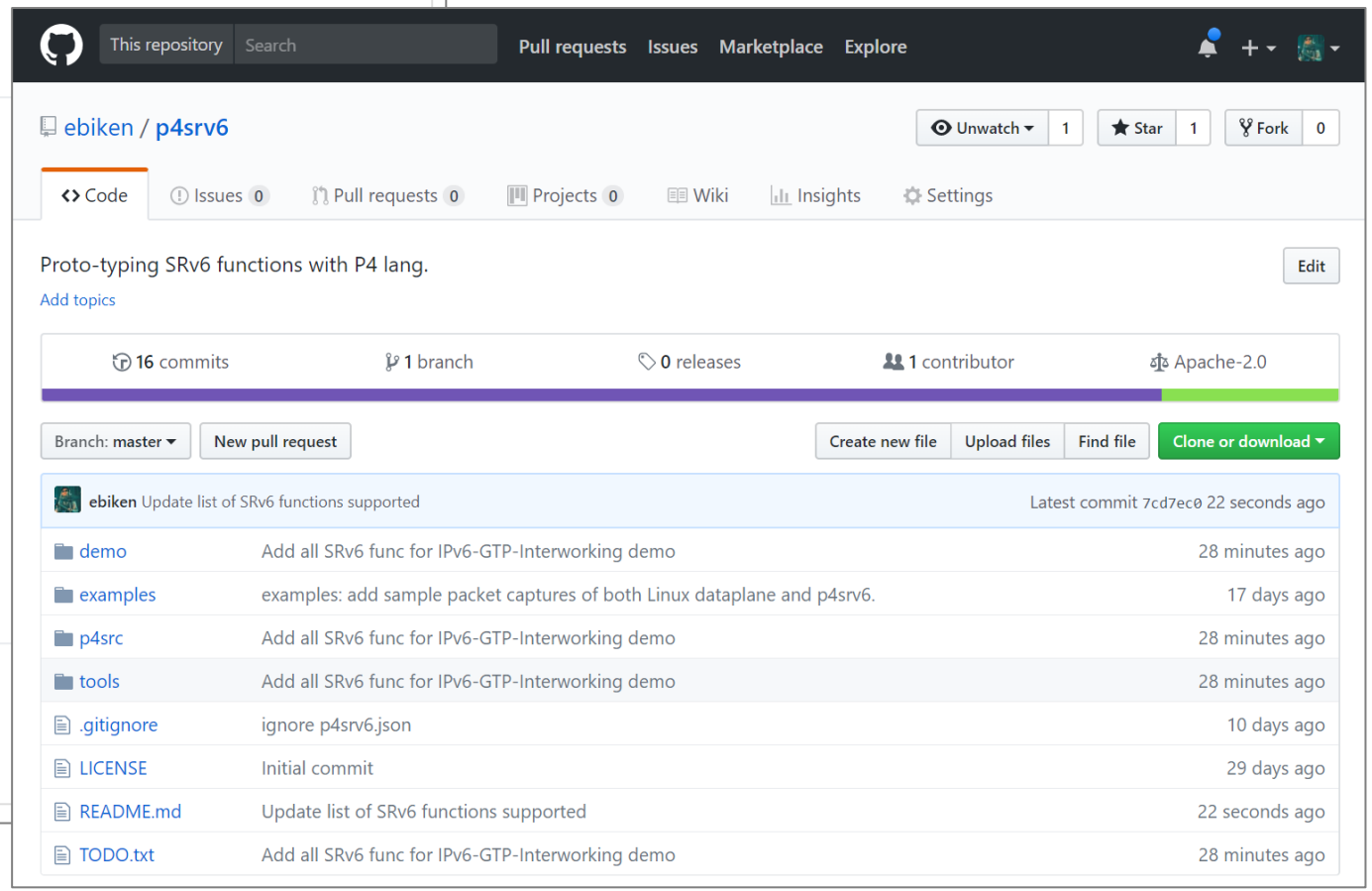
- draft-filsfils-spring-srv6-network-programming-04
  - T.Insert
  - T.Encaps, T.Encaps.Red
  - End, End.DT6
- draft-ietf-dmm-srv6-mobile-uplane-01
  - End.MAP (future)
  - End.M.GTP6.D
  - End.M.GTP6.E
  - End.M.GTP4.E (future)
  - T.M.Tmap (future)
  - End.Limit (not planned)

List of helper actions:

- GTP
  - Encap/Decap GTP-U

Open Sourced SRv6 / GTP on P4-14

https://github.com/ebiken/p4srv6



P4 Workshop 2018 in Tokyo

The First

P4 Language Community Gathering in Japan

By P4.org, Barefoot Networks, NetOne Systems (Japan Local SIer)

Sessions

Barefoot Networks
NetOne Systems
P4.org
Arista
Cisco
APRESIA Systems & Edgecore
Kaloom Software

22 Oct, 2018

In the news: https://www.globenewswire.com/en/news-release/2018/10/22/1625097/0/en/Barefoot-Networks-to-Present-at-P4-Workshop-2018-Tokyo.html

Japan P4 Users Group
28th June, 2019

Founding Members

Net One Systems Co., Ltd

Toyota Mortor Corporation

APRESIA Systems, Ltd.

Intel K. K.

MACNICA, Inc. ALTIMA Company

After 6 month of seeking for & talking with “P4 enthousiasts”, we finally founded Users Group focused in “P4”

日本 P4 ユーザ会 運営委員
（Committee Members of P4 Users Japan ）

氏名	役職	所属
ハディ ザケル Zaker Hadi	会長	ネットワンシステムズ株式会社 Net One Systems Co., Ltd.
海老澤 健太郎 Kentaro Ebisawa	役員	トヨタ自動車株式会社 Toyota Motor Corporation
岸本 貴之 Takayuki Kishimoto	役員	APRESIA Systems株式会社 APRESIA Systems, Ltd.
桑田 斉 Hitoshi Kuwata	役員	APRESIA Systems株式会社 APRESIA Systems, Ltd.
小柳 敏則 Toshinori Koyanagi	役員	インテル株式会社 Intel K. K.
清水 裕晶 Hiroaki Shimizu	役員	株式会社マクニカ　アルティマ カンパニー MACNICA, Inc. ALTIMA Company
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久田 勇気 Yuki Hisata	役員	ネットワンシステムズ株式会社 Net One Systems Co., Ltd.
平部 真彬 Masaaki Hirabe	役員	株式会社マクニカ　アルティマ カンパニー MACNICA, Inc. ALTIMA Company
山崎 大輔 Daisuke Yamasaki	役員	インテル株式会社 Intel K. K.

https://p4users.org/committee-members/

The First P4 Users Japan Meet Up on 11th Oct, 2019

The First P4 Users Japan Meet Up on 11th Oct, 2019

時間	講演タイトル / 登壇者
09:30〜14:30	受付
10:00〜10:10	**冒頭挨拶・会場説明** ネットワンシステムズ株式会社 藤田 雄介
10:10〜10:55	**P4の現状と展望・そして我々にできること** トヨタ自動車株式会社 海老澤 健太郎
10:55〜11:40	**キャリアにおける P4 ユースケースの紹介** NTTネットワークサービスシステム研究所 武井 勇樹
11:40〜12:25	**P4 テストベッドについて** 国立研究開発法人情報通信研究機構（NICT） 石井 秀治
12:25〜14:00	休憩
14:00〜14:30	**Programmable スイッチによる GTP/SRv6 の Stateless 変換の性能評価** トヨタ自動車株式会社 李 忠翰
14:30〜15:00	**インテル® FPGA PAC N3000 を P4 でプログラミングする NETCOPE P4 コンパイラの使用事例** インテル株式会社 小柳 敏則 株式会社マクニカ　アルティマ カンパニー 清水 裕晶
15:00〜15:30	**CiscoにおけるP4の活用と展望** シスコシステムズ合同会社 佐藤 哲大
15:30〜16:00	**Arista 7170紹介とデモンストレーション** アリスタネットワークスジャパン合同会社 土屋 師子生
16:30〜17:00	**Cloud-Grade Routing Stack for P4/Stratum** ジュニパーネットワークス株式会社 有村 淳矢
17:00〜17:30	**進化するデータプレンプログラマビリティ対応ハードウェアと実現されるユースケース** APRESIA Systems株式会社 桑田 斉
17:30〜18:00	**In-band Network Telemetry とその可能性** ネットワンシステムズ株式会社 新林 辰則

- Community
- Users (Service Providers, Enterprise)
- Academia / Research
- Technology Provider (Vendor)
- System Integrator (VAR)

Hands-on Workshop in Japanese (online)

イベント

P4 勉強会+ハンズオン – イベント・フィードバック

2021年5月27日

2021年4月16日に開催されたイベント（P4ハンズオン）の様子、参加者からのコメントを公開致

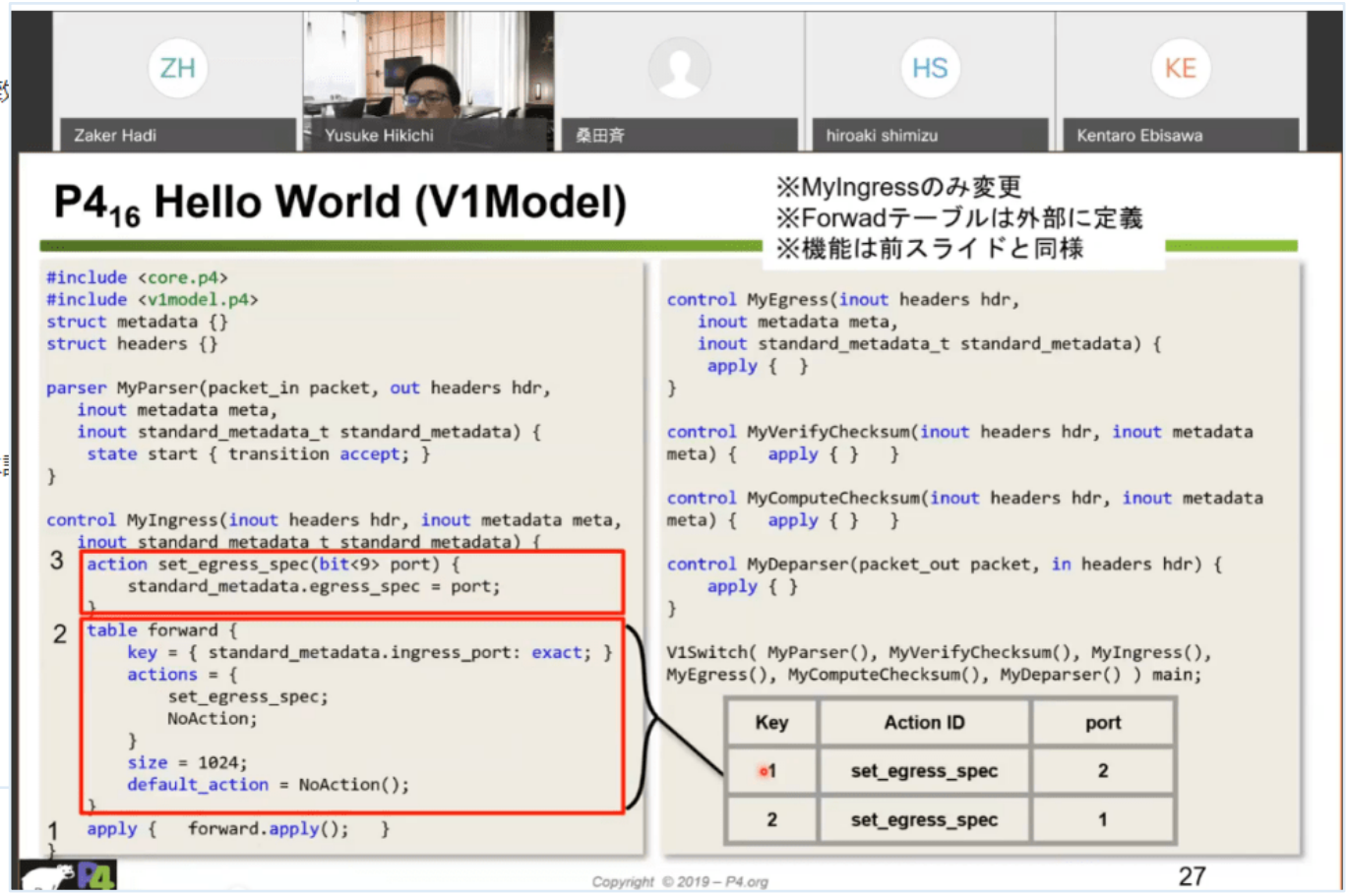
【実施概要】

- イベント名　：【オンライン開催】P4 勉強会+ハンズオン
- 開催日時　：2021年4月16日（金） 13:10～17:30
- 開催方法　：Connpass 経由の開催（https://connpass.com/event/206153/）
- 主催　：日本 P4 ユーザ会
- 資料　：P4.org Education Working Group から頂いた資料をベースにした日本語

【参加状況】

- 申し込み　：10名（勉強会3名、ハンズオン7名）
- 出席者　：9名（勉強会1名、ハンズオン8名）

https://p4users.org/2021/05/27/p4-handson-202104-feedback/

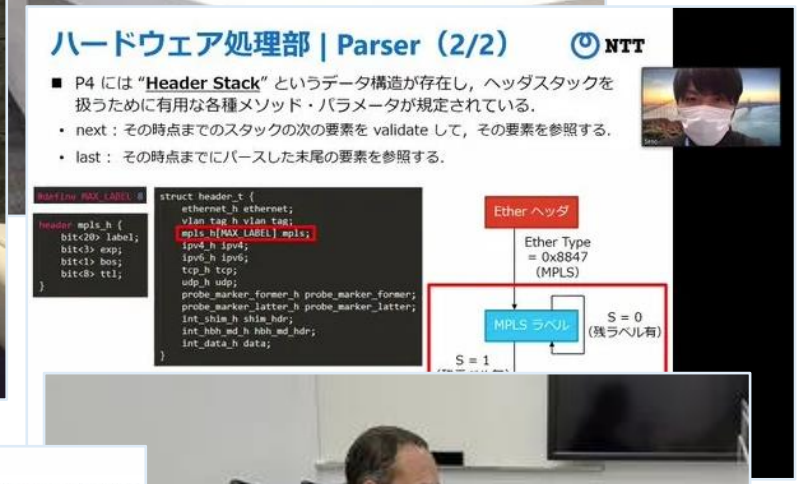


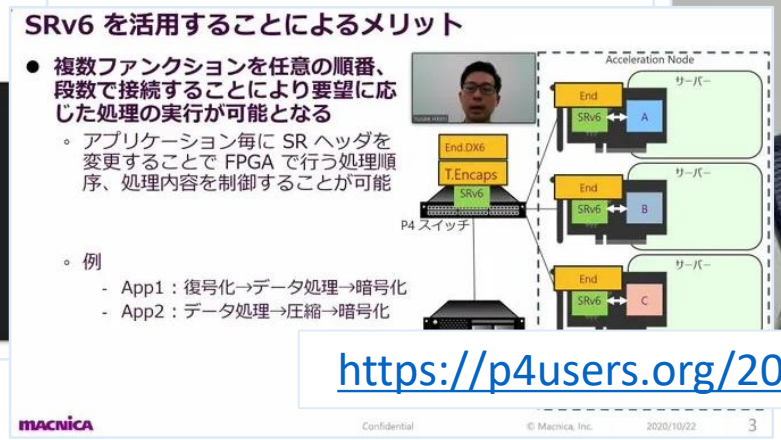
The 2nd P4 Users Japan Meet Up on 22nd Oct, 2020

https://p4users.org/events/event-en/

ONLINE event with only the speakers onsite.

- x7 Live talk Session + x2 Panel Discussions
- x7 Recorded Sessions.

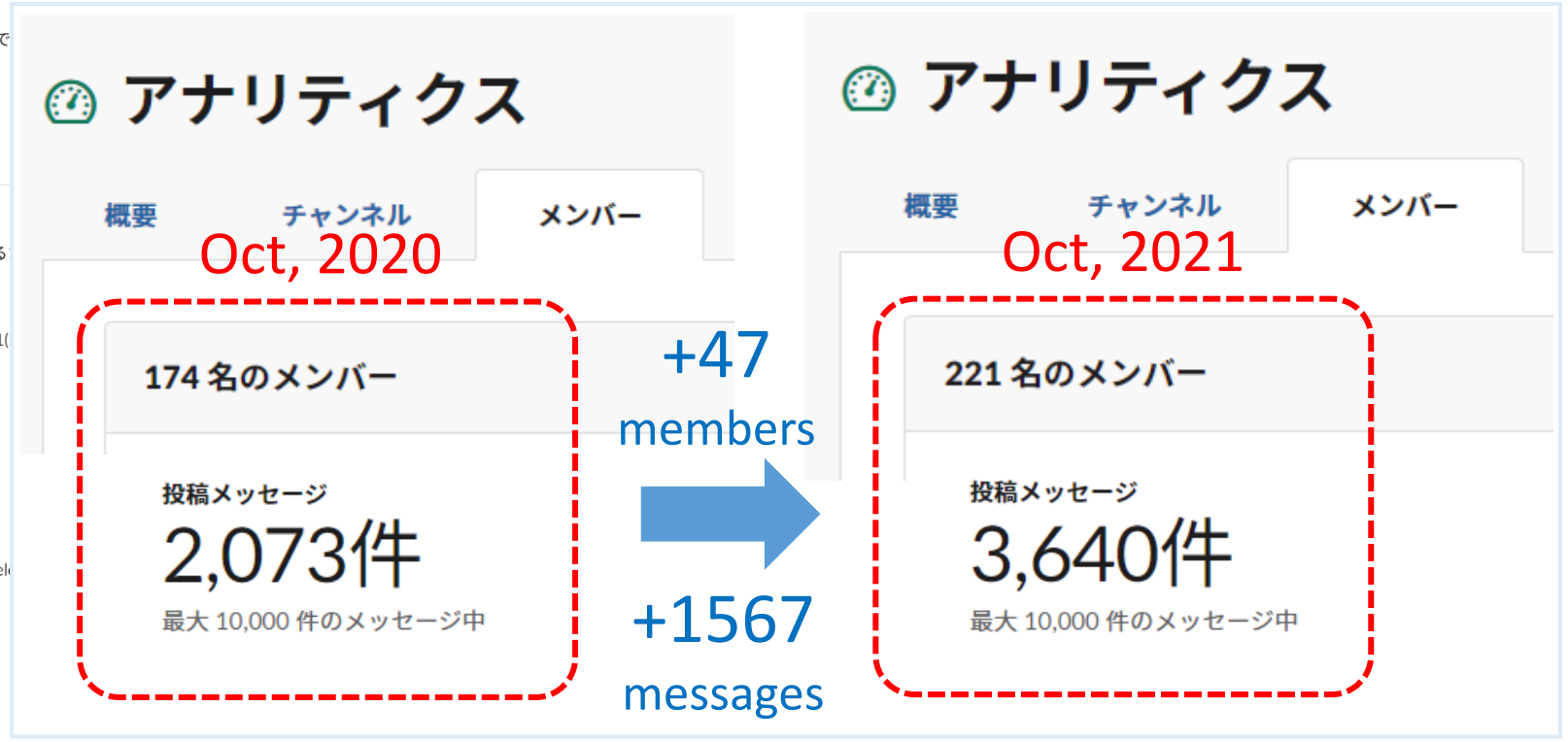




https://p4users.org/2020/12/28/event2020-feedback/

https://p4users-jp.slack.com

p4users-jp Slack Workspace is still growing.



The 3rd P4 Users Japan Meet Up on 21st Oct, 2021

https://p4users.org/events/p4usersjp2021-en/

P4 Users Japan 2021

P4 Users Japan 2021
Thursday, October 21, 2021 - 1.00 p.m. Japan Time - Virtual
October 20, 9.00 p.m. PDT

日本語のページはこちら

The growing global health concerns about the spread of COVID-19, the Japan P4 Users Group is pleased to announce that this year's event will be held online. There have been many P4 related updates since last year's event. This latest information will be held in this event in two configurations, the LIVE session, and the on-demand sessions.

The P4 Users Japan would like to inform you about a Call for Presenters (both live and on-demand sessions) for the P4 Users Japan 2021 Event.

We're looking forward to welcoming you and mark your calendar on October 21, 2021(October 20 in PDT).

Date	LIVE Session / October 21st, 2021 1:00 PM Japan Standard Time(JST) On-demand session will be opened 9:00 AM Japan Standard Time(JST)
Venue	Online / access information will be provided later
Fee	Free (Registration requested)
Hosted by	P4 Users Japan
Language	Japanese
Sponsors	APRESIA Systems, Ltd. Intel K. K. Macnica, Inc. Altima Company Net One Systems Co., Ltd. Toyota Motor Corporation

Live session timetable

Details will be updated as available
Starts from 1:00 PM Japan Standard Time(JST), October 21st, 2021

No.	Time	Title & Presenter
1	01:00-01:10	**Welcome Address** Yuki Hisata P4 Users Japan Chairman
2	01:10-01:30	**P4 Updates** Kentaro Ebisawa Toyota Motor Corporation
3	01:30-02:00	**Performance Made Flexible ~Toffino X and Load-Balancer use cases ~** Ryosuke Kobuna Intel Corporation
4	02:00-02:30	**Implementation of end-to-end network monitoring system** Kazuma Kamienoo NTT Network Innovation Center
5	02:30-03:00	**P4 usecase for mobile platform in ONF** Shinji Yonesaka NIPPON TELEGRAPH AND TELEPHONE WEST CORPORATION
6	03:00-03:10	Break
7	03:10-03:20	**Introducing on-demand sessions** Yuki Hisata
8	03:20-03:30	**Testbed for NICT P4** Yoshihiko Kanamui NEC/NICT ICT Testbed Research, and Development Promotion Center
9	03:30-04:00	**NOS and use case for P4 switch** Hitoshi Kuwata APRESIA Systems, Ltd.
9	03:30-04:00	**NOS and use case for P4 switch** Hitoshi Kuwata APRESIA Systems, Ltd.
10	04:00-04:20	**P4 Use Cases in Programmable NICs -Pensando** Ryosunata Suhartono Net One Systems Co., Ltd.
11	04:20-04:50	**GTP Packet Broker Development by P4** Wataru Kumagai SoftBank Corp.
12	04:50-05:20	**Inovative Development Flow for C/D plane with P4** Yusuke Hikichi MACNICA, Inc. ALTIMA Company
13	05:20-05:50	**Panel Discussion** How to be more "OPEN" **Moderator:** Kishimoto Takayuki **Panelist:** Kentaro Ebisawa Kuwata Hitoshi Wataru Kumagai Kazuma Kamienoo YOU (questions from online participants)

The 3rd P4 Users Japan Meet Up on 21st Oct, 2021

https://p4users.org/events/p4usersjp2021-en/

On-demand sessions

Starts from 9:00 AM Japan Standard Time(JST), October 21st, 2021

No.	Category	Title & Presenter	Resources (VoD, Documents, URL)
1	Network	**In-band Telemetry** Shishio Tsuchiya Arista Networks Japan Limited.	
2	Case Study	**A Journey from OpenFlow to P4 – Improved Performance and Reduced Development Time** Jeff Elpern NoviFlow Inc.	
3	Case Study	**Smart NIC を活用した短期間でのデータプレーン開発：NAT 編** Yusuke Hikichi MACNICA, Inc. ALTIMA Company	
4	Case Study	**Post Card Based Telemetry** Masashi Takano NTT COMWARE Corporation	

Sponsors

APRESIA Systems, Ltd.

Intel K. K.

Toyota Motor Corporation

Net One Systems Co., Ltd.

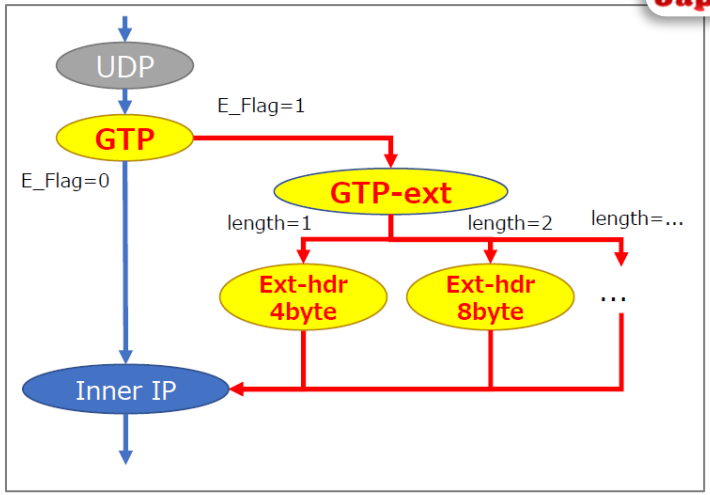
Macnica, Inc. Altima Company

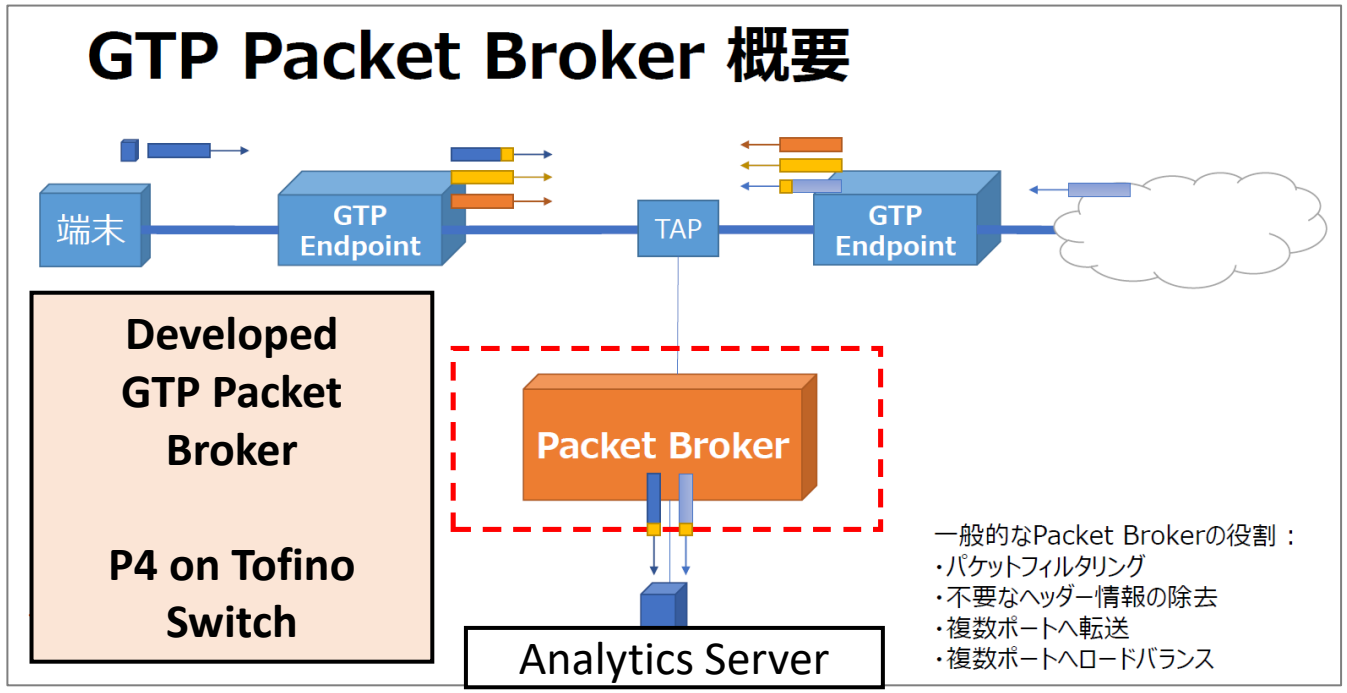
How P4 is used in Japan?

Use cases presented in The 3rd P4 Users Japan Meet Up (21st Oct, 2021)

Mobile Packet Broker

- Softbank developed Mobile Packet Broker on Tofino Switch.
  - Parser for GTP and extention headers
  - Load Balance based on Inner IP address and L4 port
  - Rewrite outer header to support RSS on analytic server






```
@symmetric("hdr.inner_ipv4_src", "hdr.inner_ipv4_dst")
@symmetric("hdr.inner_l4_src", "hdr.inner_l4_dst")
Hash<bit<32>>(HashAlgorithm_t.CRC32) loadbalance_hash;
...
table load_balance {
        key = {
            ingress_port        : exact;
            loadbalance_hash    : selector;
        }
        actions = {
            set_egress_port;
        }

        implementation = loadbalance_selector;
}

apply {
...
        hash = loadbalance_hash.get({hdr.inner_ipv4_src,
hdr.inner_ipv4_dst, hdr.inner_l4_src, hdr.inner_l4_dst});
        load_balance.apply(hash);
...
```

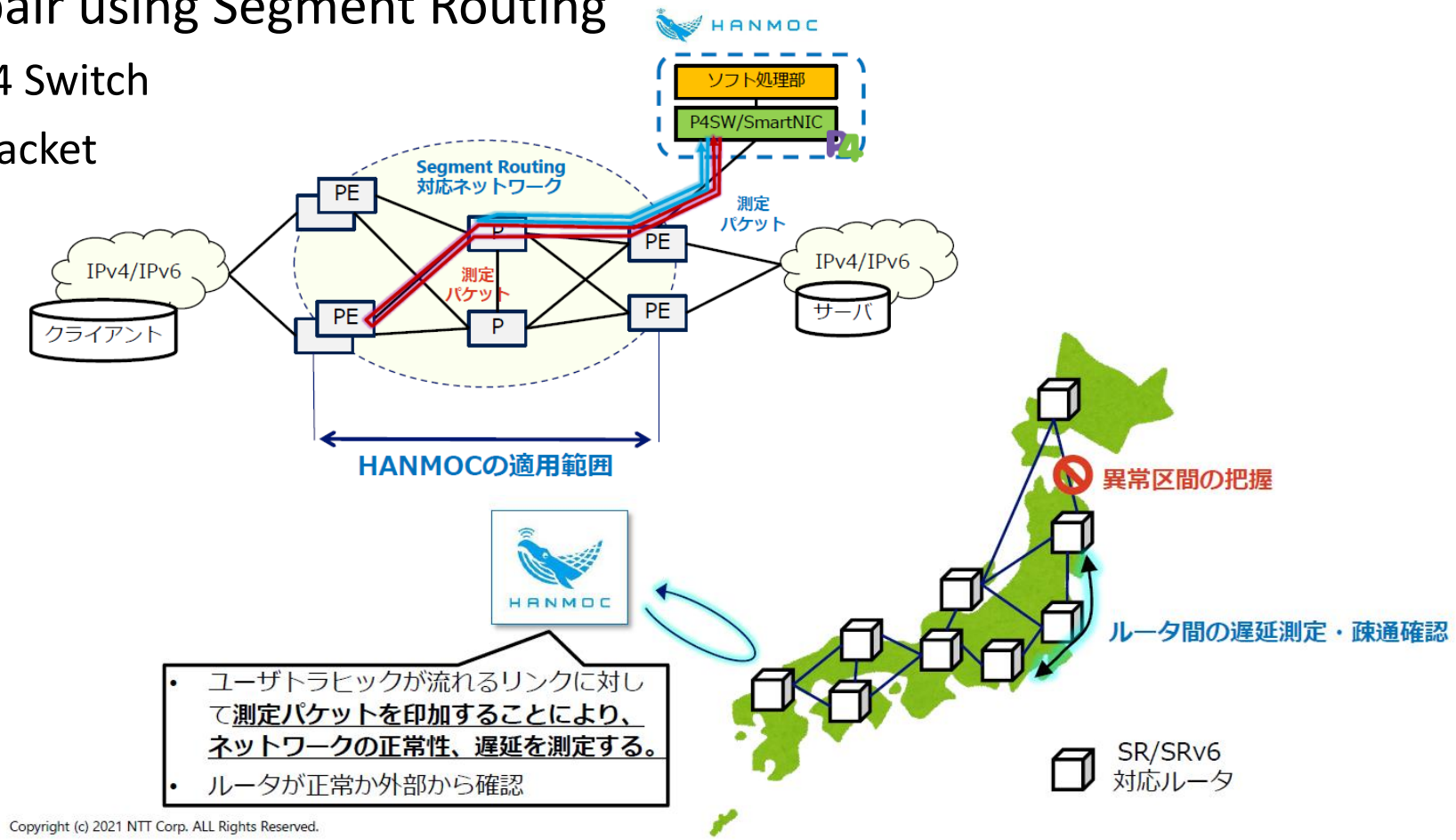
symmetric hashの定義

生成したHash値により、Load balanceの送信先ポートを選定

Inner情報よりHash値を生成

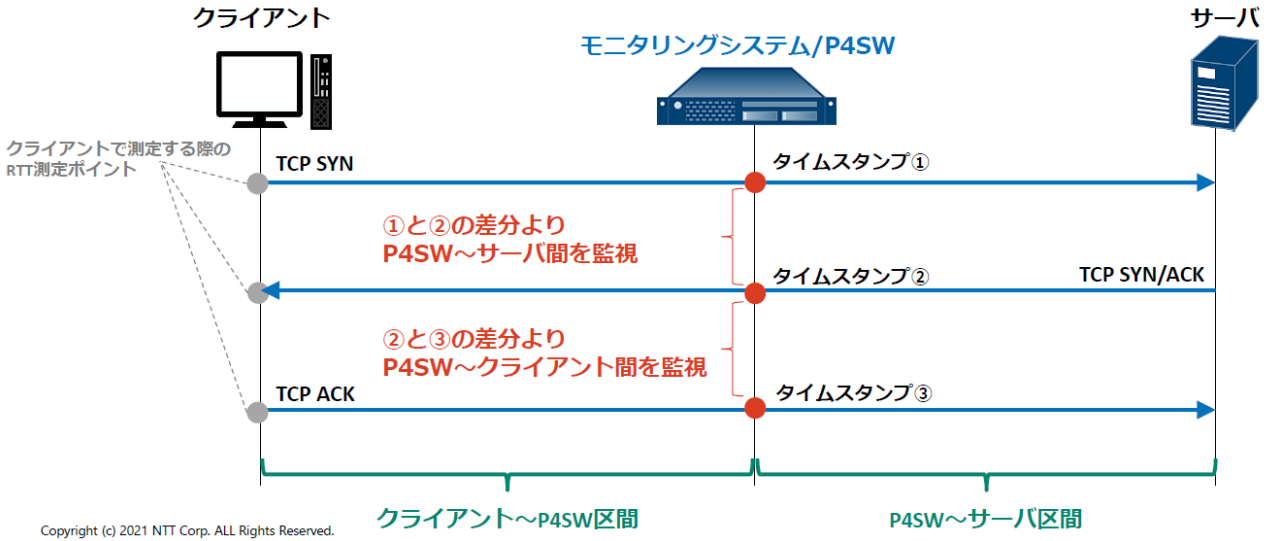
Network Latency Monitoring System (NTT)

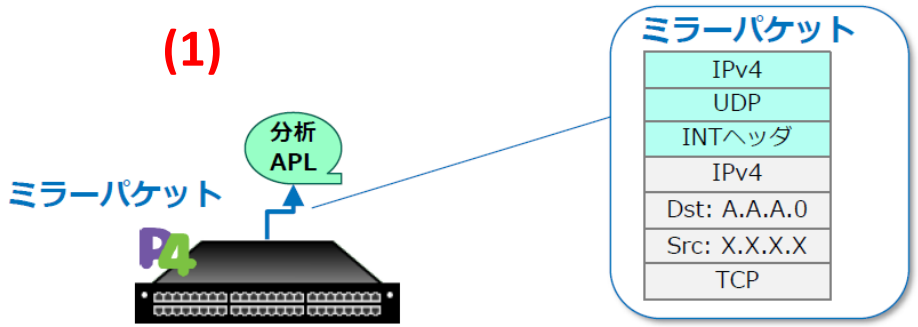
- HANMOC ... High-Accuracy Network MOnitoring and Control
- Measure Latency of any node pair using Segment Routing
  - Ingect timestamp to packet on P4 Switch
  - Calculate delay when receiving packet

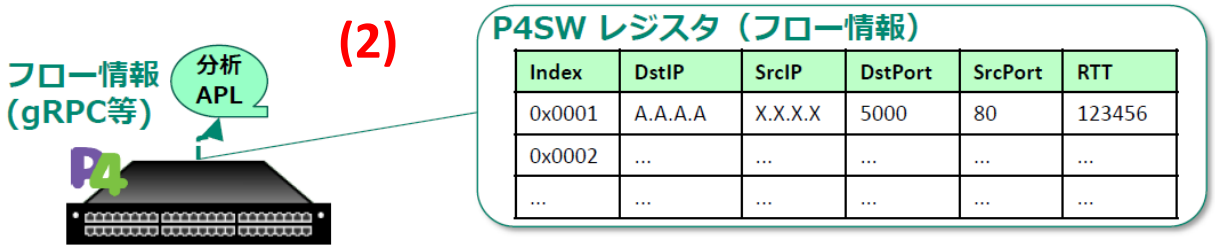


End-to-End Network Monitoring System (NTT)

- Monitor and record timestamp in the middle of network.
- Corelate and identify session and packet order using arbitrary field in packet header.
  - e.g. 5 Tuple + ACK for TCP
- 2 options
  - (1) mirror packet to analytics server
  - (2) store & calculate RTT using P4 SW register

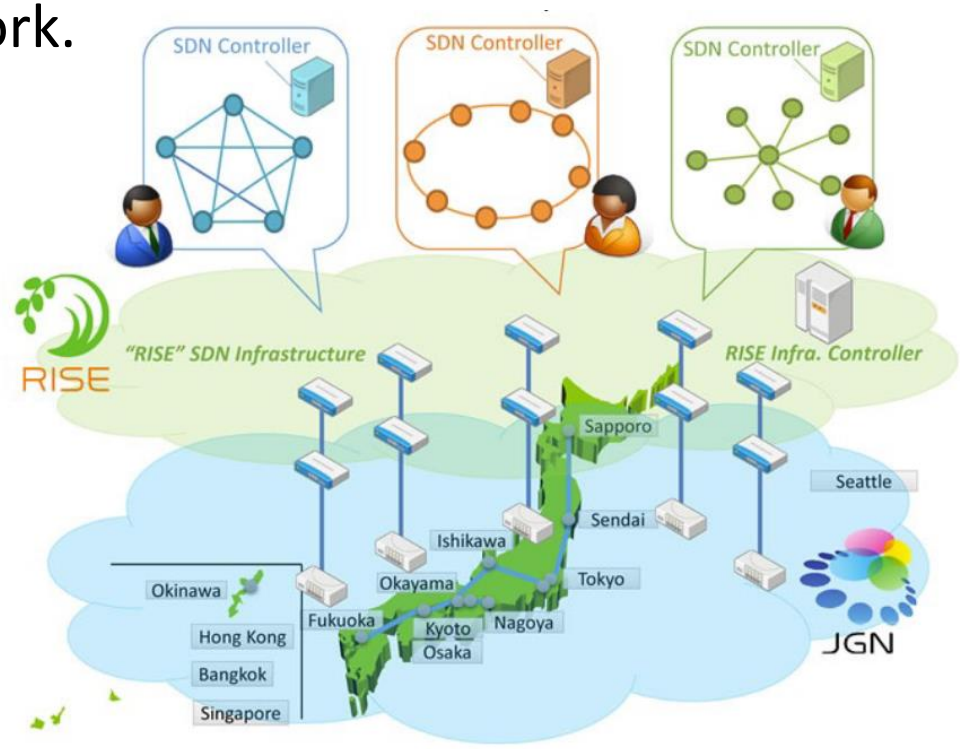






P4 Test bed by NICT (Under Construction)

- Adding “P4 Test bed” to nationwide SDN research network.
  - Currently used to test “OpenFlow”.
- Evolve SDN with dataplane programmability.
- Easy challenge, fail, and learn!!



- Provide “virtual” P4 environment to users.
  - BMv2 on VM
  - SmartNIC (FPGA - Intel PAC N3000)
  - Tofino Switch (Wedge 100BF-32X)
- Trying to figure out how to support multi-tenancy on P4 switch.

=> If there is any (research) activity on “P4 + multi-tenancy”, please let us know!!

How we see current P4 status in Japan?

- Platform is steadly increasing... ☺
  - BMv2 on CPU (Learning & POC)
  - Switch ASIC (Tofino)
  - SmartNIC (Intel IPU, NVIDIA DPU, Pensando DSC)
- “OPEN” is the key for even more active P4 community.
  - Difficult to prove “it’s worth spending my time & budget” to convince managers without trying.
  - Strong demand for Tofino Emulator & P4 Compiler for ASIC ... just like gcc for Intel CPU ☺
  - We also expect other vendors to follow Intel’s Open Strategy: Pensando, NVIDIA, Xilinx etc.
- Some use cases are made public ... but should have more.

Looking forward to attending the sessions today,
and bring ideas and use cases back to Japan P4 community ‼