

Software Packet Processing and Hardware Packet Processing - Introduction -

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Self Introduction

Name:

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Research Topics:

SDN application for wide area network

- Multi-vendor, Multi-layer intergrated control
- Virtualized IP routing over MPLS-TE/DWDM network

Background and Motivation for This Session

The theme for this session is packet processing architecture

- Talks regarding router (L3 switch) architecture

Why talks of packet processing architecture at JANOG now?

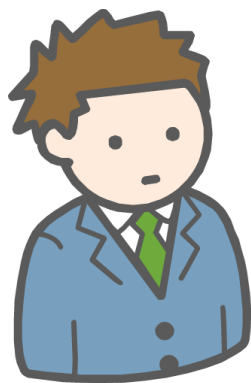
- New architecture of packet processing emerged. Choices of them continue to expand.
 1. High-performance software router (router software running on IA servers)
 - 40Gbps wire-speed
 2. White-box switches (merchant switching chips + merchant OS)
 - possible to install software on the switch OS like Linux-based server.
- Both options are based on Linux OS, but their performance is completely different

Our Goal: to provide networks cheaper and faster

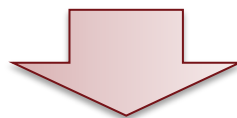
Knowledge of packet processing architecture is important for network design

For Example... White-box Switches

White-box switches (merchant switching chip + merchant OS)



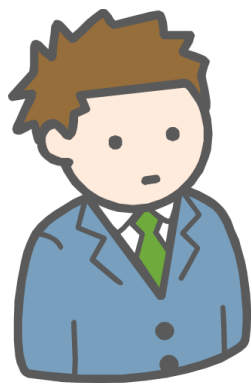
**We can add software
on the ToR-switch by
ourselves**



1. Adding server monitoring agent
2. Adding contents cache agent

For Example... White-box Switches

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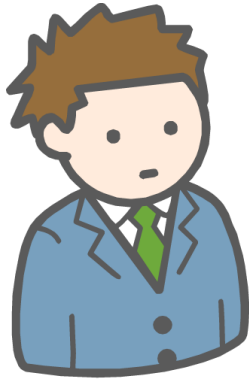
We can add software
to OS on switches by
ourselves



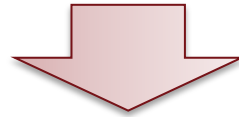
1. Adding server monitoring agent
=> Possible
1. Adding contents cache agent
=> Difficult (on current hardware)

For Example... Software Router

Software router (router software running on IA servers)



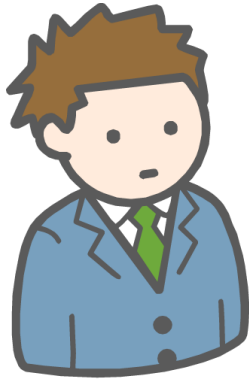
**We can achieve 10Gbps
software router on an IA
server**



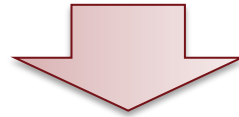
1. Running as a gateway router with content caching
2. Running as a ToR switch.

For Example... Software Router

Software router (router software running on IA servers)



We can recently get
about 10Gbps on an IA
server

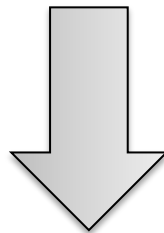


1. Running as a gateway router with content caching
=> Possible
2. Running as a ToR switch.
3. => Very difficult (even though you increase # of NICs)

How Do We Make a Decision?

Difficulty of using and applying white box switches and software routers.

- Spec sheet doesn't show any detail information.
- Limited time to test hardware or software equipment
- Hard to even speculate how they work due to 'blackbox'



Knowledge of packet processing architecture helps to consider

Overview of This Session

Goal of this session

- Understand differences between software and hardware packet processing
- Understand performance differences caused by its architecture
- Discuss new use cases of whitebox switches and software routers

Discussing packet processing architecture

- Hardware processing (marchant switching chip)
- Software processing (x86 Server)

Contents

1. Overview of router (L3 switch) architecture (Ebisawa-san)
2. Implementation methods for hardware/software router and their advantages/disadvantages (Nakajima-san)
3. Actual use cases of software routers (Asama-san)
4. Discussion

Summary

Advantages & disadvantages of hardware/software

- Hardware (D-Plane on switching chip)
 - Stable D-Plane performance in case of many ports
 - High-precision D-Planes, such as hierarchical QoS
- Software (D-Plane on IA server)
 - Easy to add non-L2/L3 functions working with other applications
 - Easy to co-exist server functions and D-Plane functions (ex. cache)
 - flexibly support new protocols on new software
 - Dynamic scaling

Select suitable equipment considering technical requirement

Discussion Points

■ People who provide network services by using software routers, whitebox switches

- Talk about your operational use cases!
- What are good/bad points of software routers and whitebox switches in real use cases?

■ People who have never provided network services by using software routers, whitebox switches or who gave up

- What are bad and worrying points of software routers and whitebox switches?

■ Any additional functions which should co-exist with software routers?

- For instance...
 - Automation agent
 - Monitoring agent