A story to adopt SONiC in LINE's Clos Network

Ikuo Nakajima

Shu Mukai

Takuma Yuzurihara

2023.1

LINE

About Us

Ikuo Nakajima

Network **Development**

Shu Mukai

Network **Construction**

Takuma Yuzurihara

Network **Operation**

© LINE

Contents

01 What Led us to SONiC

02 Operational Challenges

03 Roadmap

© LINE

LINE network

© LINE

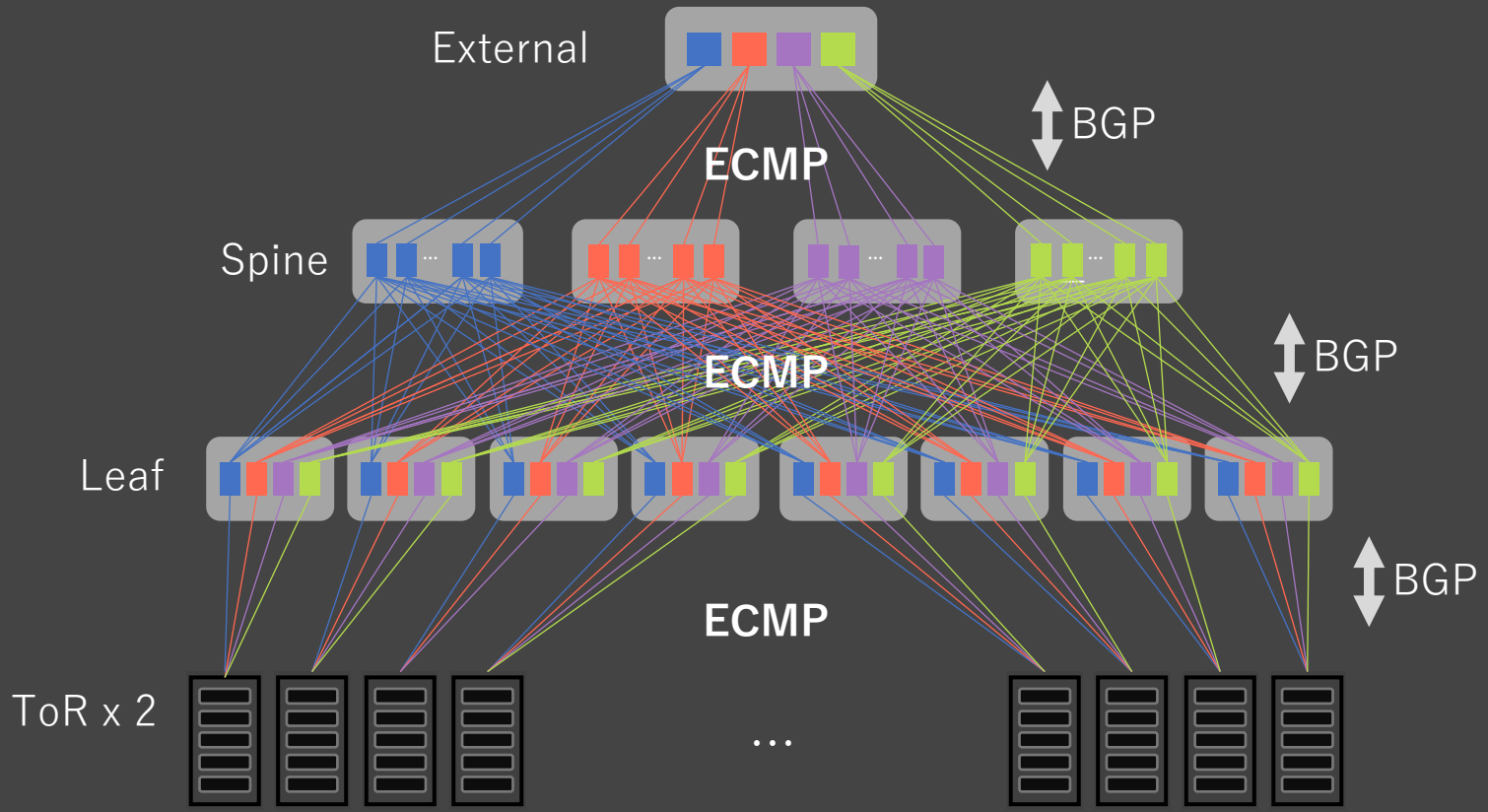
What is Verda?

- Verda is the private cloud platform for LINE.
- This platform hosts many of LINE's services.
- We host 2 Verda Clusters.
  - Verda Prod : For production service
  - Verda Dev : For service development

© LINE

IP CLOS Data Center Network

- Verda is working on IP CLOS Data Center Network
- CLOS Topology
- BGP only simple network. No need for complex protocol like EVPN, VXLAN
- Orchestrated by internally developed CLOS Controller



© LINE

LINEのネットワークオーケストレータをリニューアルした話@JANOG49<https://www.janog.gr.jp/meeting/janog49/lineorc/>

What Led us to SONiC

© LINE

What is SONiC?

SONiC is a Linux-based containerized network operating system supporting more than 100 switch platforms and ASICs.

Reference: SONiC Community 2022 Update and Beyond

© LINE

What Led us to SONiC

Why We Looked for Another Option

ISSUES

Delivery

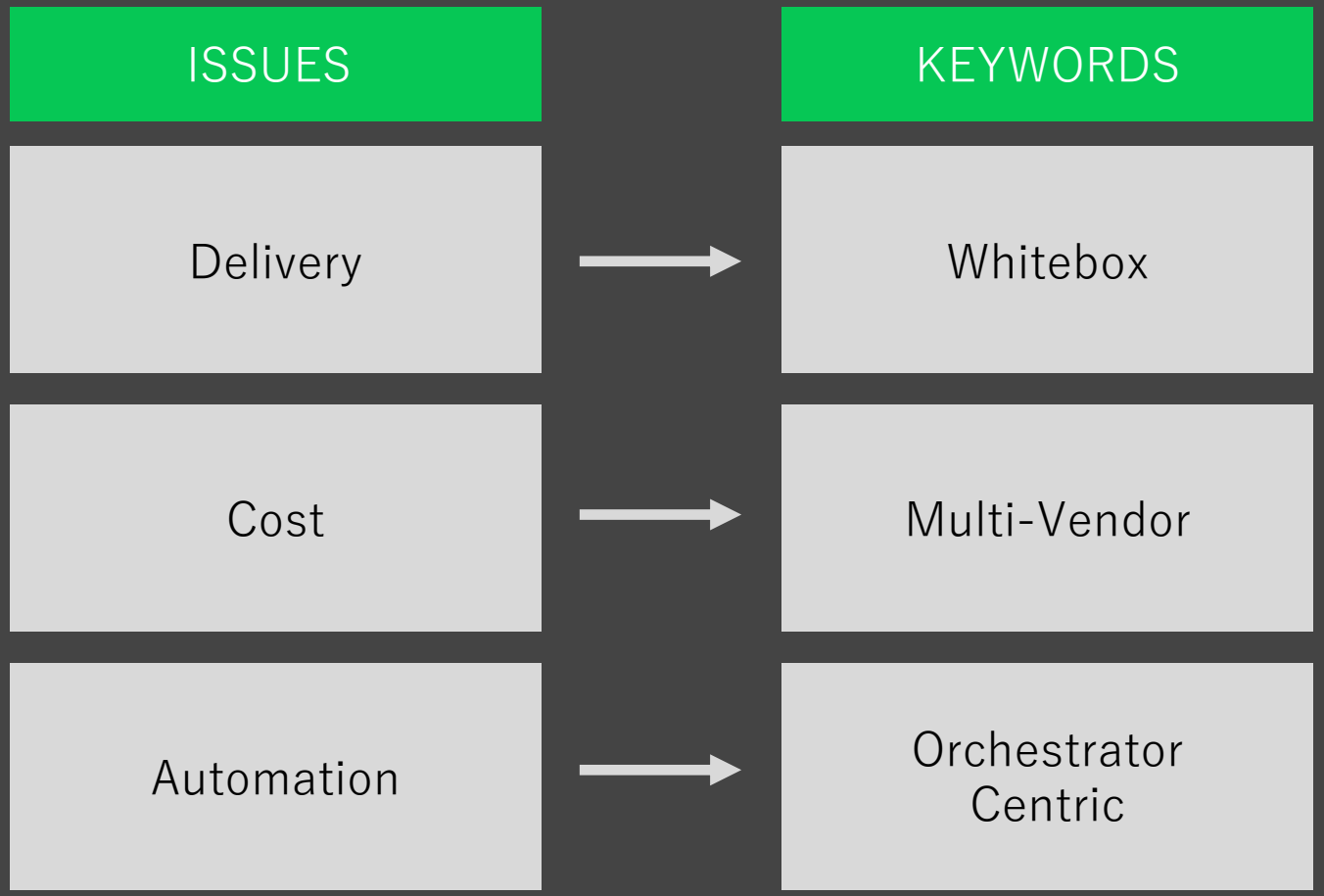
Cost

Automation

© LINE

What Led us to SONiC

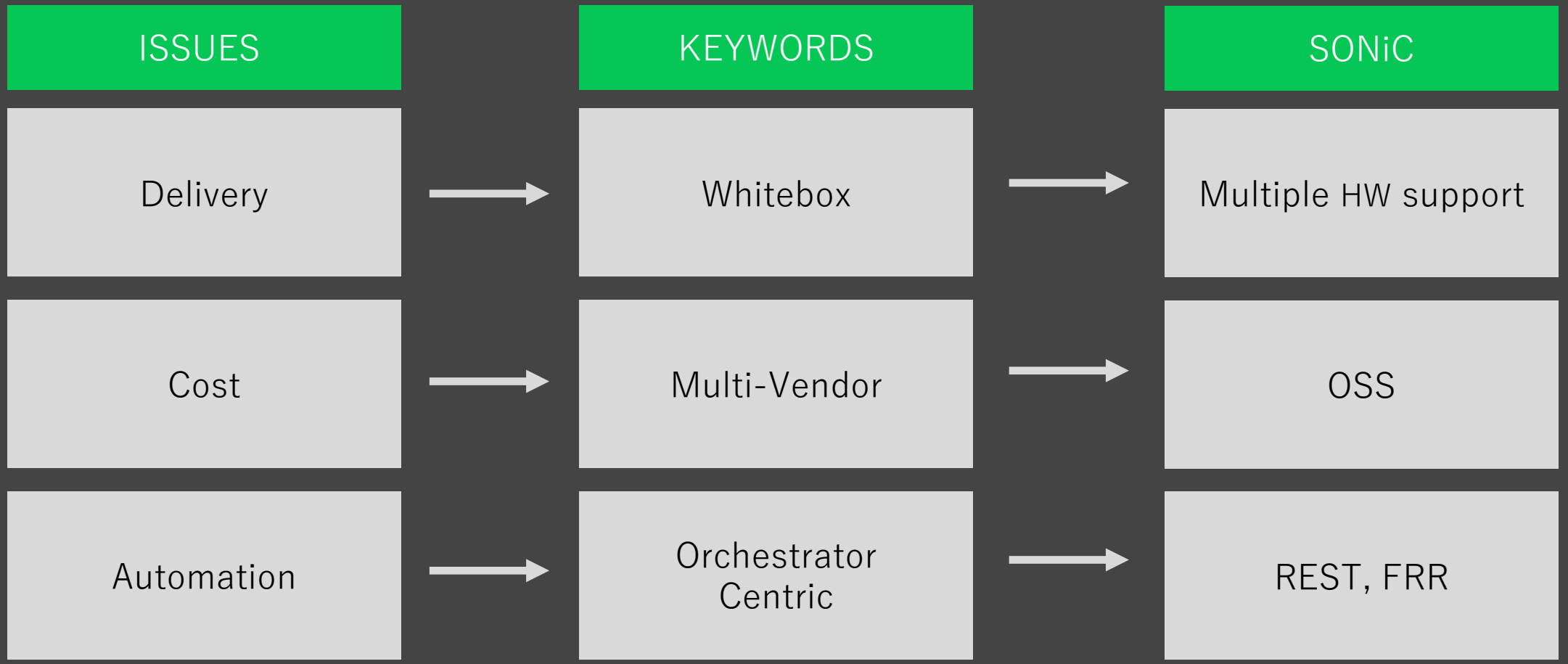
Why We Looked for Another Option



© LINE

What Led us to SONiC

Why We Looked for Another Option



© LINE

What Led us to SONiC

Northbound I/F

CLI Base	API Base
• Text parsing Error-prone	• Structured data Validation

```
switchA#configure terminal
switchA(config)#ntp server xxxxxx.com minpoll 6 maxpoll 10 prefer
switchA(config)#exit
switchA#
```

```
"openconfig-system:servers": {
  "server": [
    {
      "address": "xxxxxx.com",
      "config": {
        "address": "xxxxxx.com",
        "openconfig-system-ext:minpoll": 6,
        "openconfig-system-ext:maxpoll": 10,
        "prefer": true
      }
```

© LINE

What Led us to SONiC

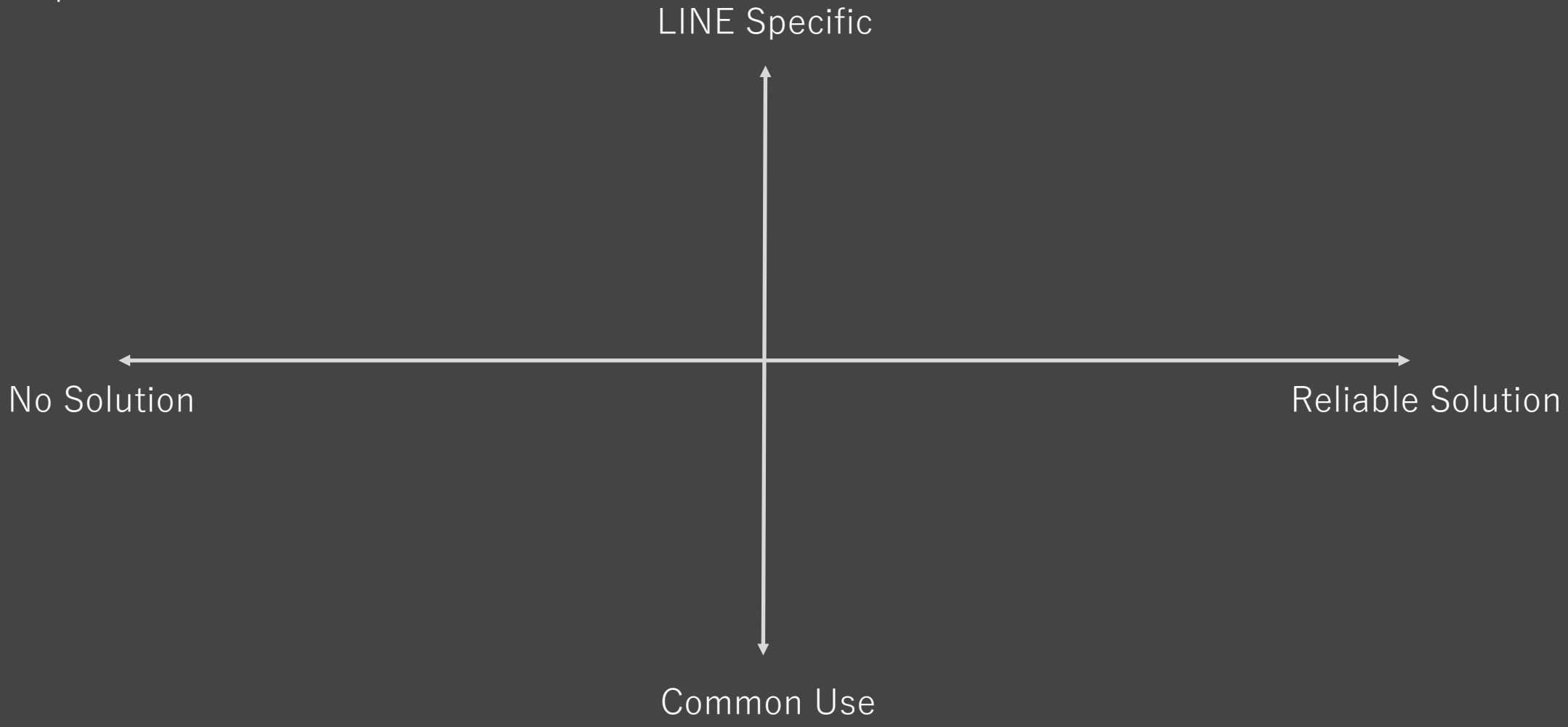
FRRouting

```
"DEVICE_METADATA": {
    "localhost": {
        "default_config_profile": "l3",
        "docker_routing_config_mode": "split",
        "hostname": "switch-A",
        "hwsku": "Accton-AS7326-56X",
        "mac": "xx:xx:xx:xx:xx:xx",
        "platform": "x86_64-accton_as7326_56x-r0",
        "type": "LeafRouter"
    }
},
```

© LINE

What Led us to SONiC

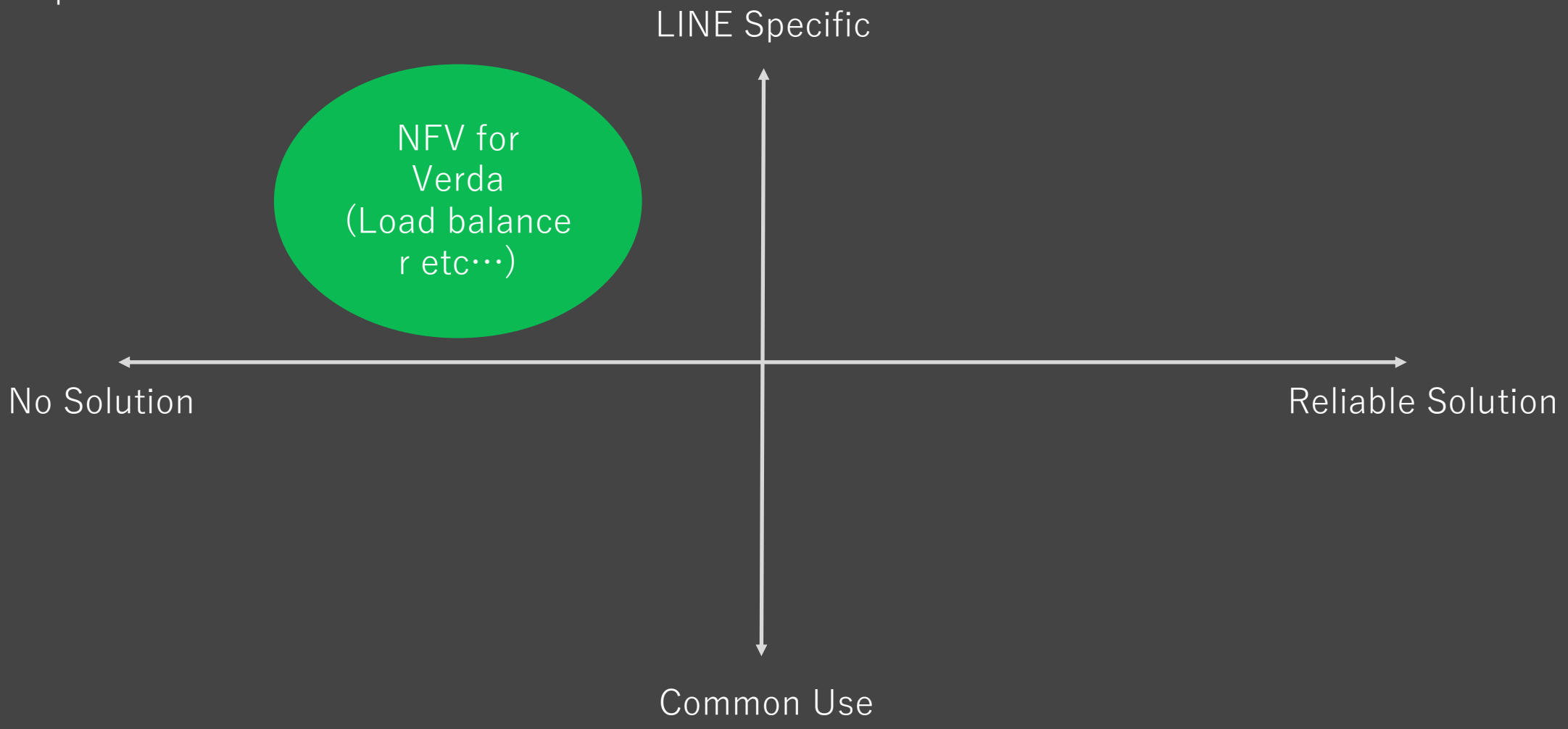
Development or Solution?



© LINE

What Led us to SONiC

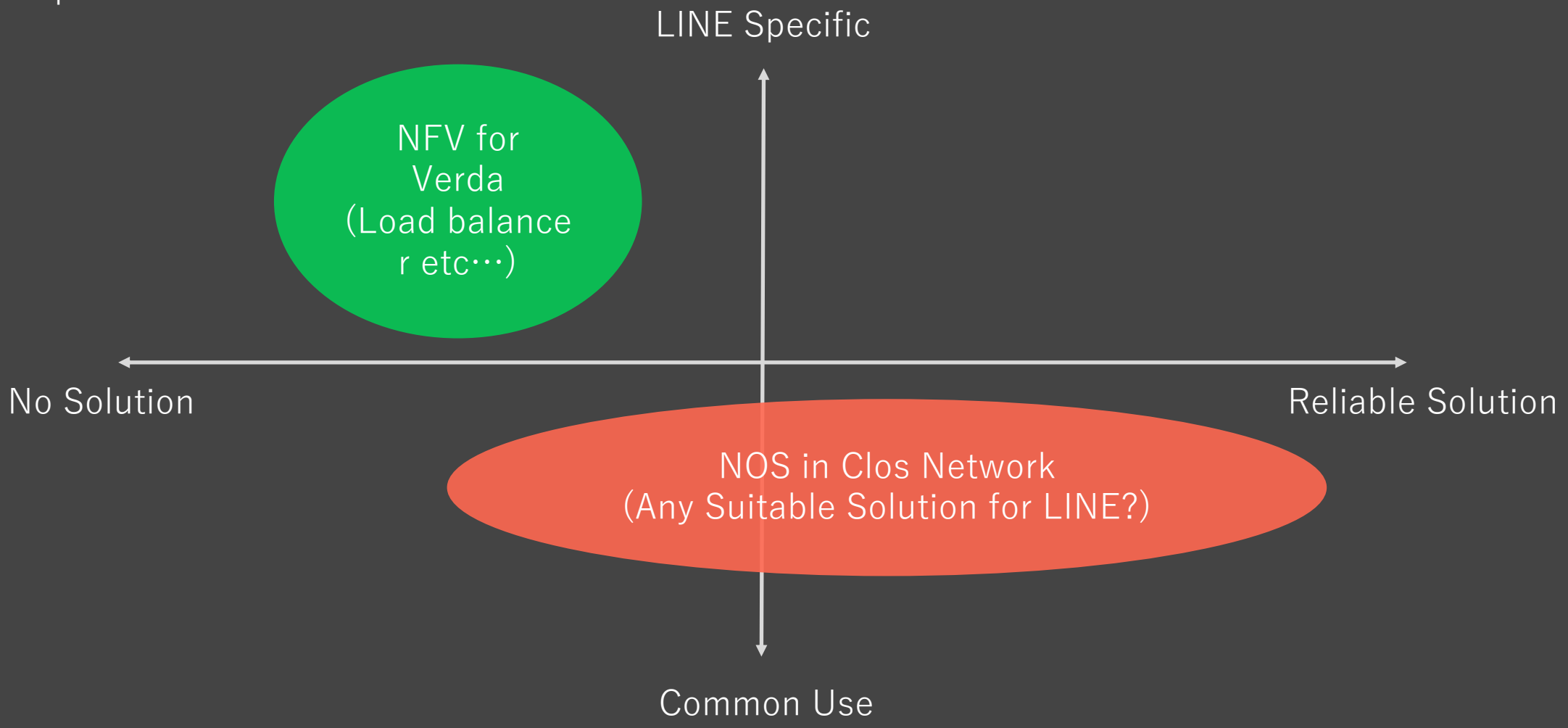
Development or Solution?



© LINE

What Led us to SONiC

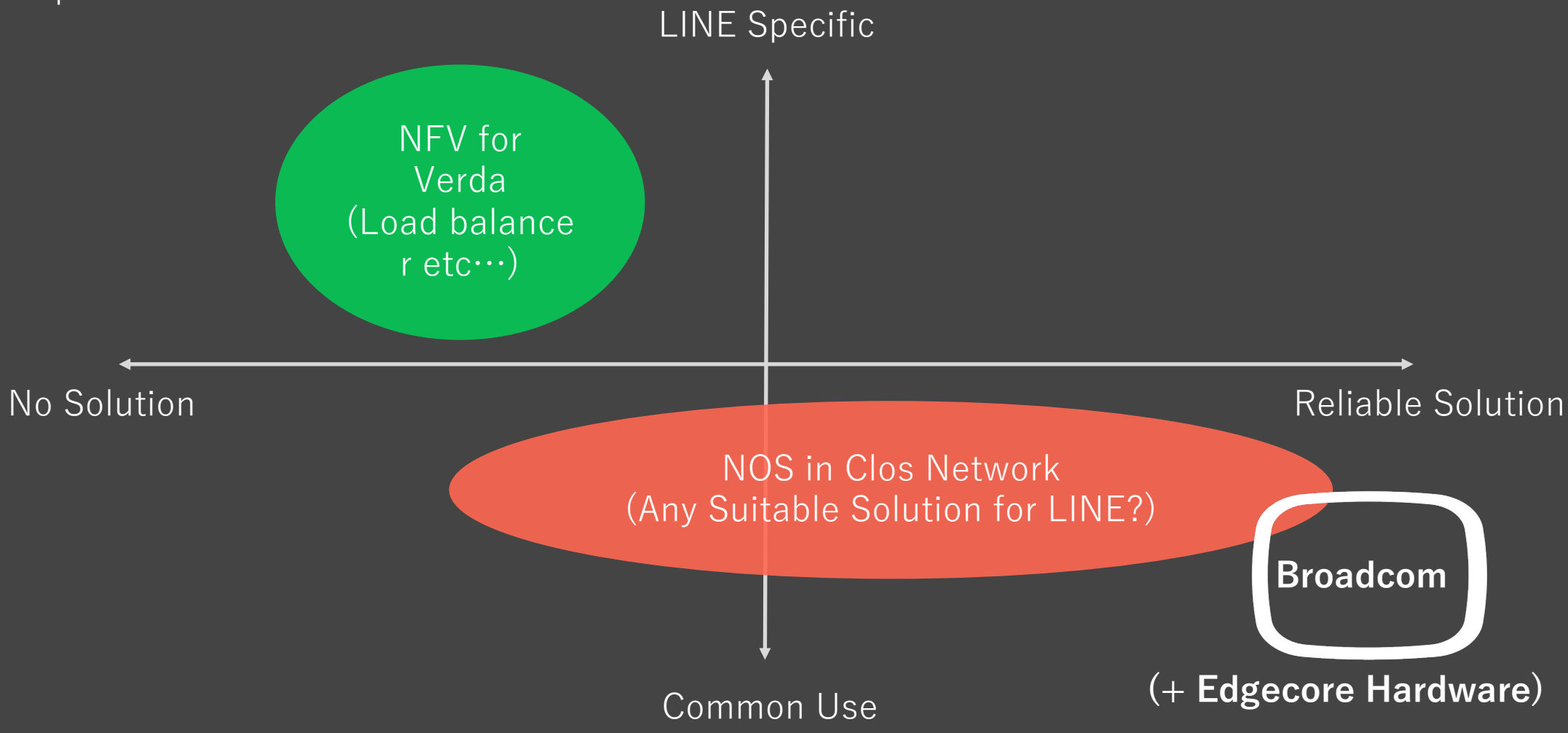
Development or Solution?



© LINE

What Led us to SONiC

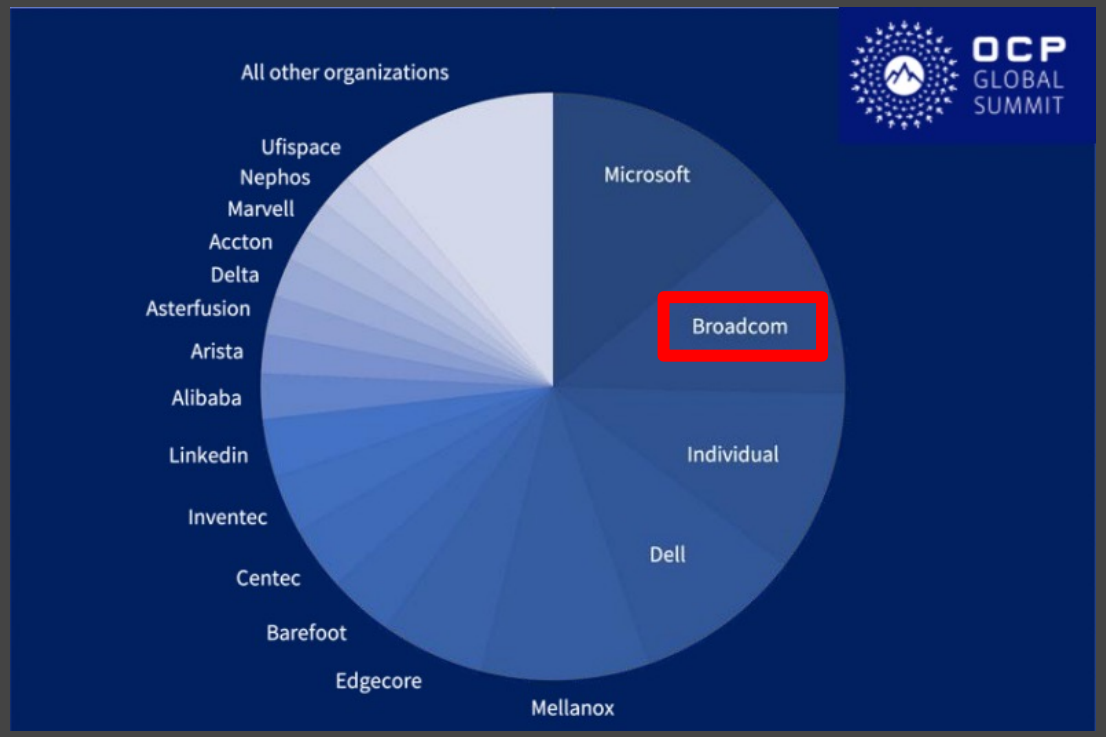
Development or Solution?



© LINE

What Led us to SONiC

Why Enterprise SONiC



Reference: https://www.opencompute.org/events/past-events/webinar-sonic-paves-the-way-for-open-networking

© LINE

What Led us to SONiC

Evaluation Result Summary

- Edgecore HW
  - 7326-56X, 7816-64X

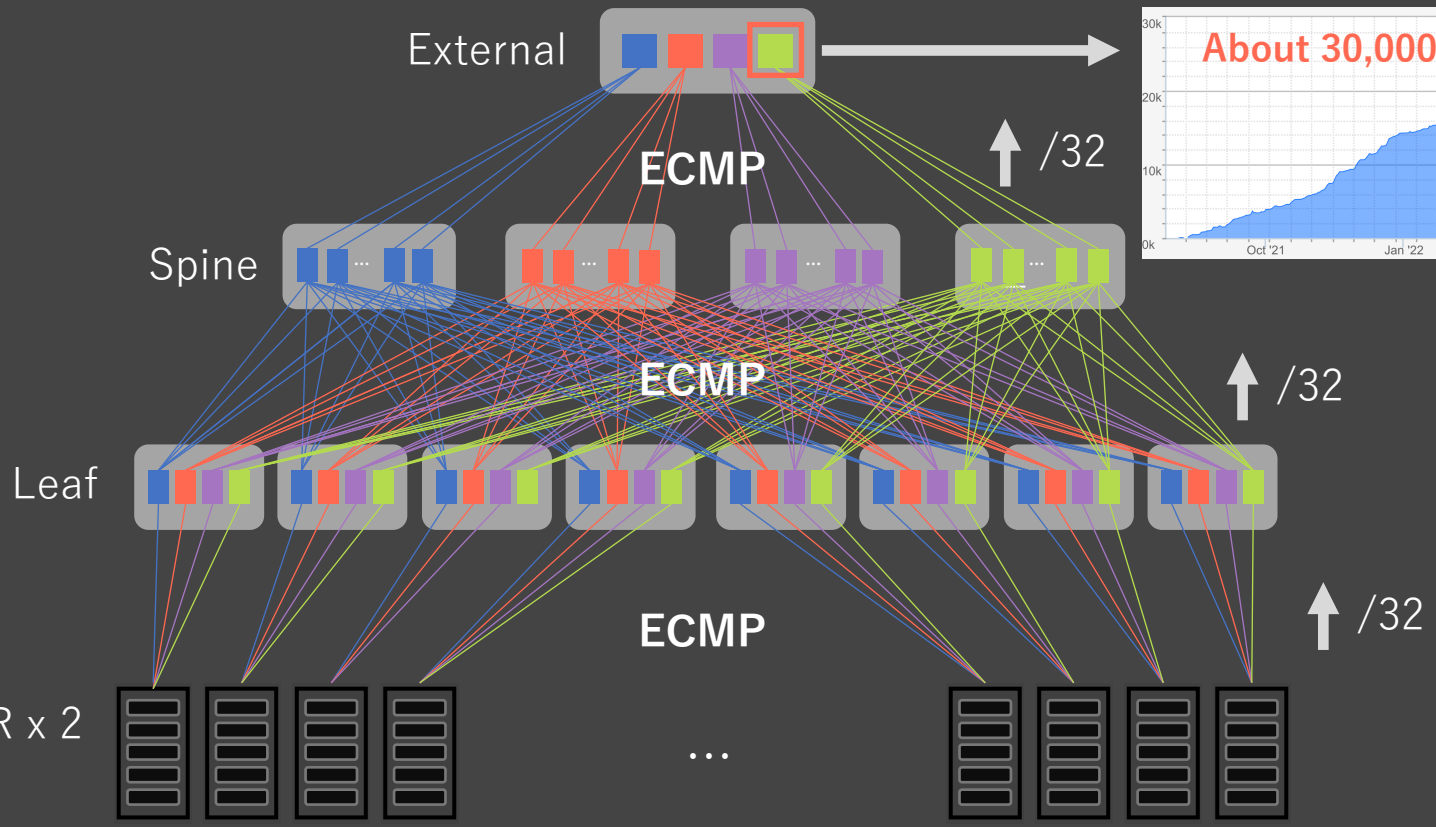
TEST TYPE	OK	NG
Function	19	0
Performance	4	0
Traffic Loss Measurement	40	0
Long Term Endurance	2	0
Monitoring	14	3(Low Priority)
Operation	8	0

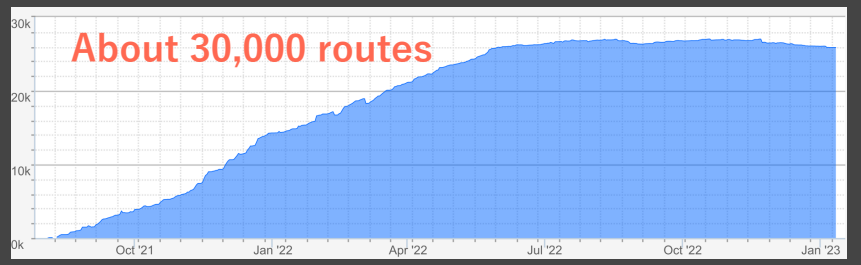
© LINE

What Led us to SONiC

FIB writing performance

- Issues
  - CLOS network switches have a lot of /32 host routes, especially on upper layer switch.
  - Insufficient FIB writing performance cause packet loss.





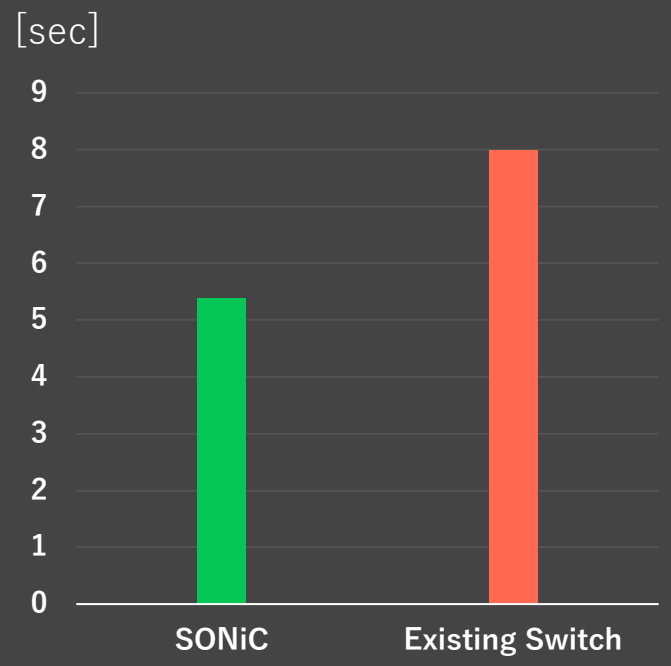
Route Count

© LINE

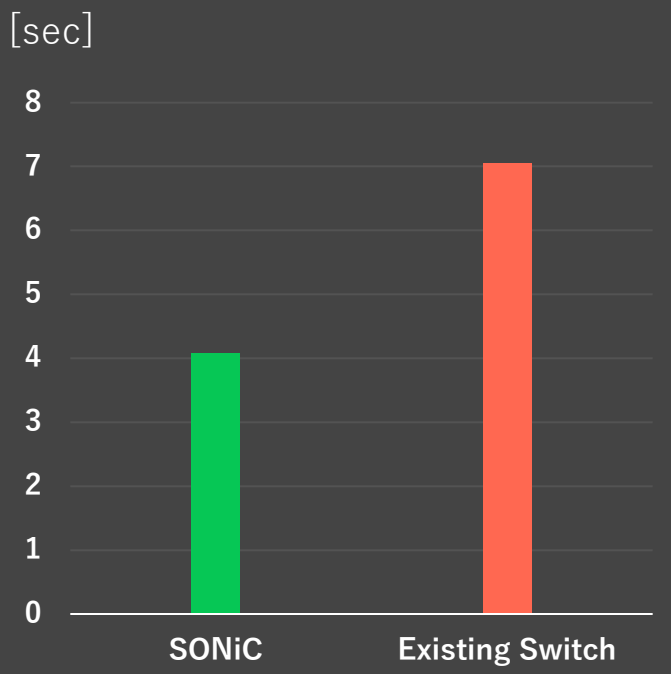
What Led us to SONiC

FIB writing performance

- Solution
  - Test FIB writing performance.
  - No big difference between Enterprise SONiC and Existing Switch.



20,000 ipv4 host routes add

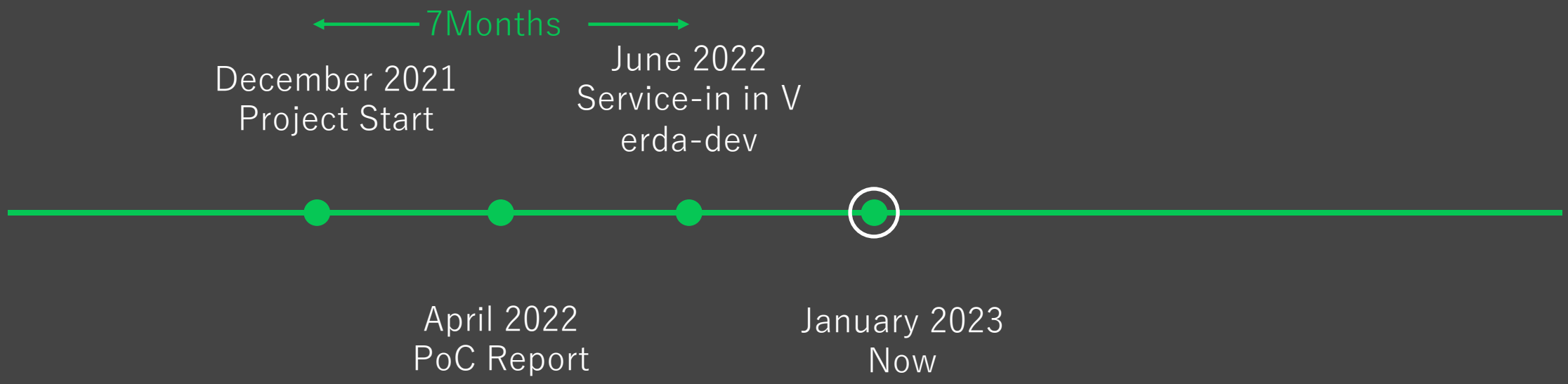


20,000 ipv4 host routes delete

© LINE

What Led us to SONiC

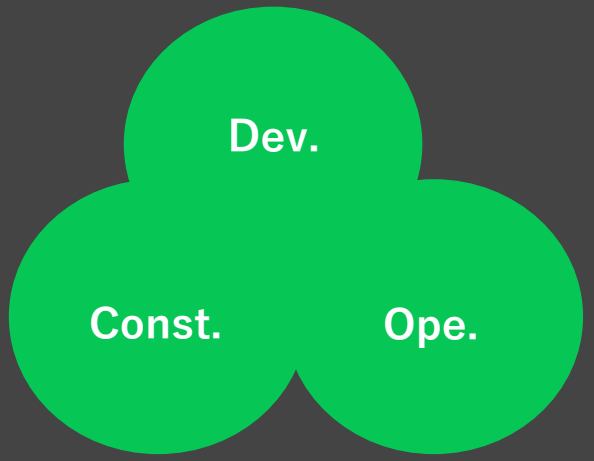
Why Enterprise SONiC



© LINE

What Led us to SONiC

Why Enterprise SONiC



7Months

December 2021
Project Start

June 2022
Service-in in V
erda-dev

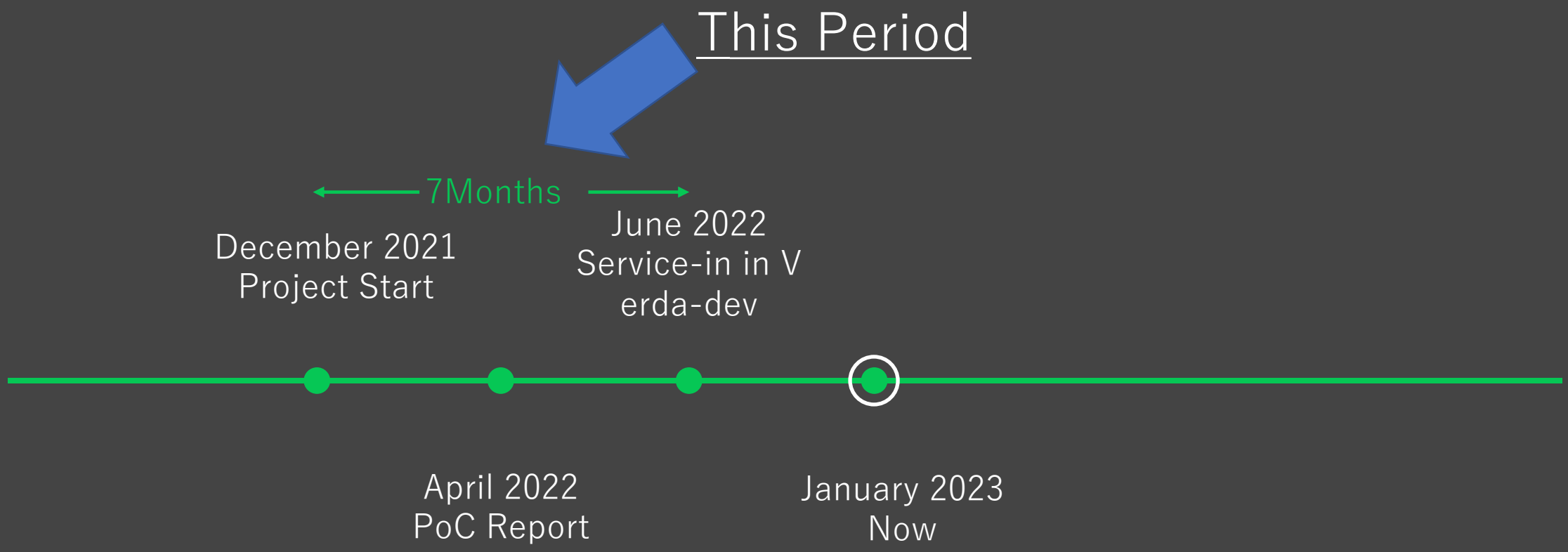
April 2022
PoC Report

© LINE

Operational Challenges

© LINE

Operational Challenges

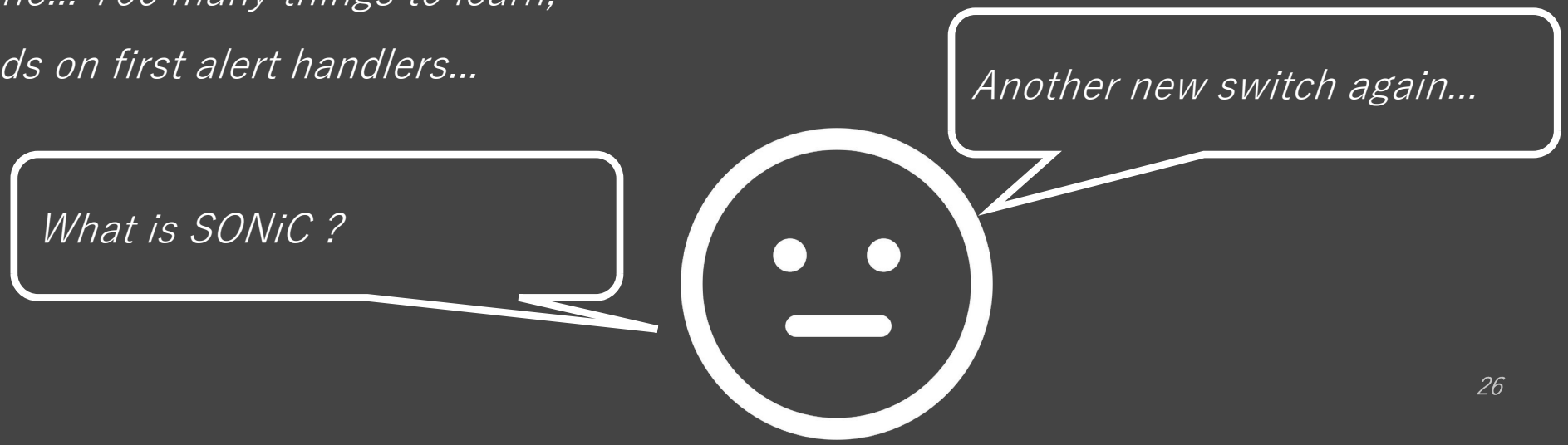


© LINE

Operational Challenges

My *First Impression on SONiC Adaption*

- *Just recently, you deployed a large number of the new devices without a notice…*
- *Another new switch? No, thank you…*
- *That model frequently rebooting and mulfunctioning.*
- *We are on fire because of the heaps of interface failure.*
- *SONiC MUST NOT be that problematic. Are you sure about that?*
- *Oh, feeling headache… Too many things to learn,*
  operating cost, loads on first alert handlers…
  Tool fixes…



© LINE

Operational Challenges

Operation	Concerns about Interface Flapping, Silent Rebooting
Operation	Operational Complexity
Function	Interface Name Policy
Function	Rack arrangement
Function	Monitoring

© LINE

Operational Challenges

How to Proceed

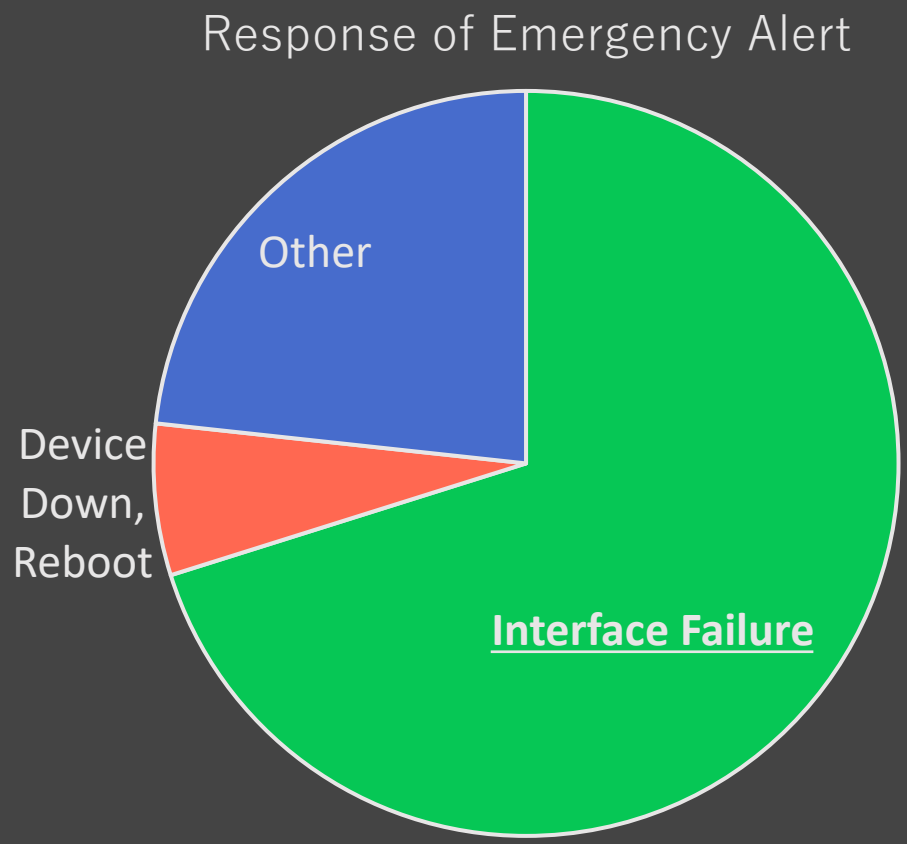
- Weekly Meetings
  - Development, Construction, Operation participated
  - Check Status of Evaluation, Construction, etc.
  - Sharing of Operational Issues
    - Seeking Solutions

© LINE

Operational Challenges

Concerns about Interface Flapping and Silent Rebooting

- Issues
  - If another new switch has the followings…
    - Frequent Interface Flapping
    - Frequent rebooting and mulfunctioning
  - It's going to be a NIGHTMARE for operation.....



© LINE

Operational Challenges

Interface Flapping and Silent Rebooting

- Calcuration based on the number of exchanged transcievers (xcvrs)
- For the specific switch in a server room

Failure rate in a month

	Case 1	Case 2
Exchanged xcvr	30/month	13/month
Total xcvrs	44 switches x 32 links = 1408 xcvrs	276 switches x 4 links = 1104 xcvrs
Failure Rate	30 / 1408 = 2.1%	13 / 1104 = 1.1%

- For SONiC/Edgecore, 16 switches x2 links = 32 xcvrs
  - No alert for 4 months is our expectation.
  - Need more monitoring in Verda-dev environment.

© LINE

Operational Challenges

Operational Complexity

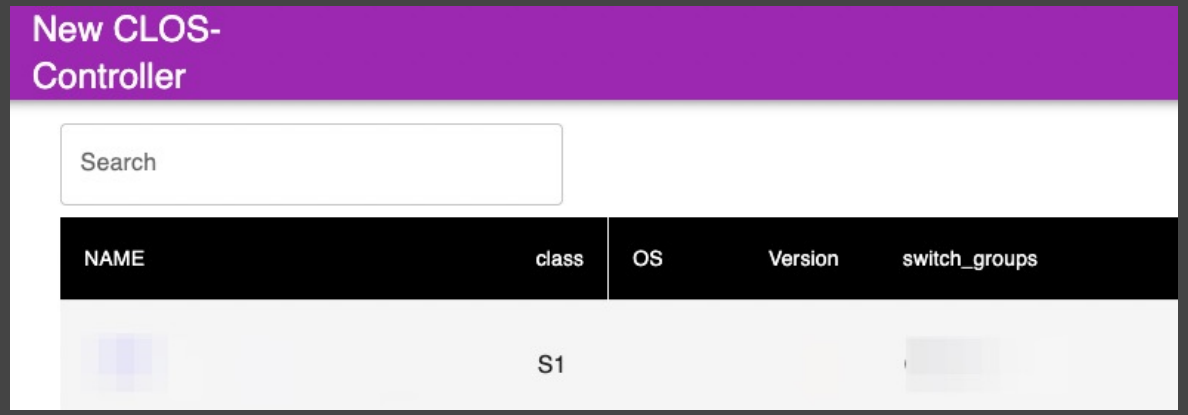
- Issues
  - Need to have operators learn the operating commands of the new OS.
  - Operations manual needs to be revised.

© LINE

Operational Challenges

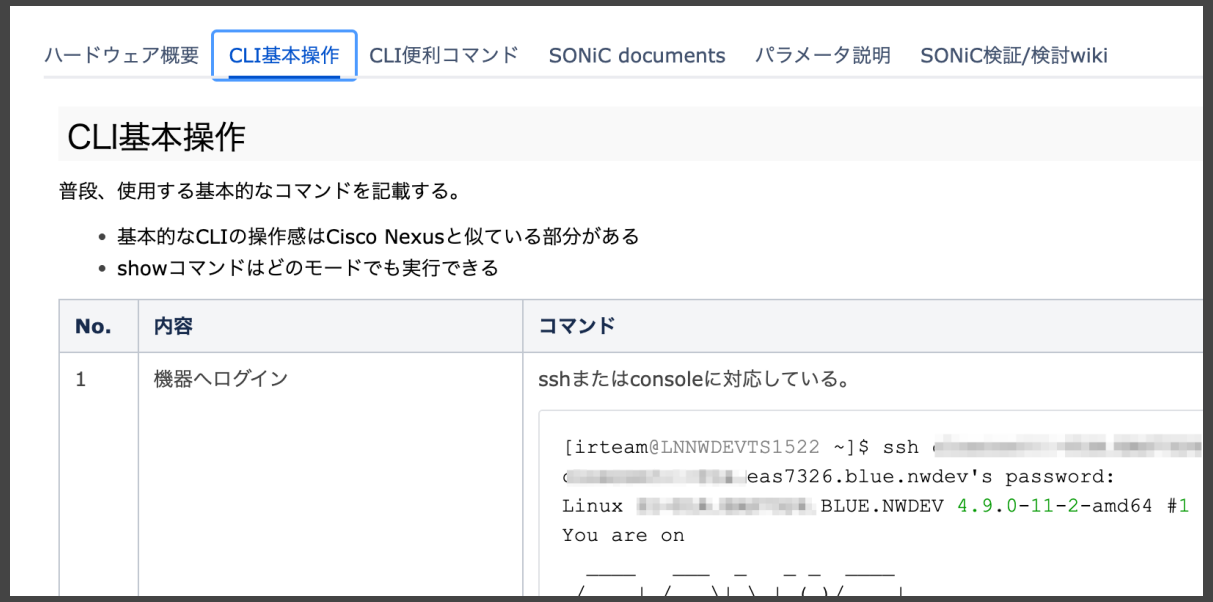
Operational Complexity

- Solution
  - CLOS controller
    - Setup, Detour, etc…



- CLI Command Manuals

NOS-A	NOS-B	NOS-C
Detour Check Commands		
net show time	show clock	sonic-cli -c 'show clock | no-more'

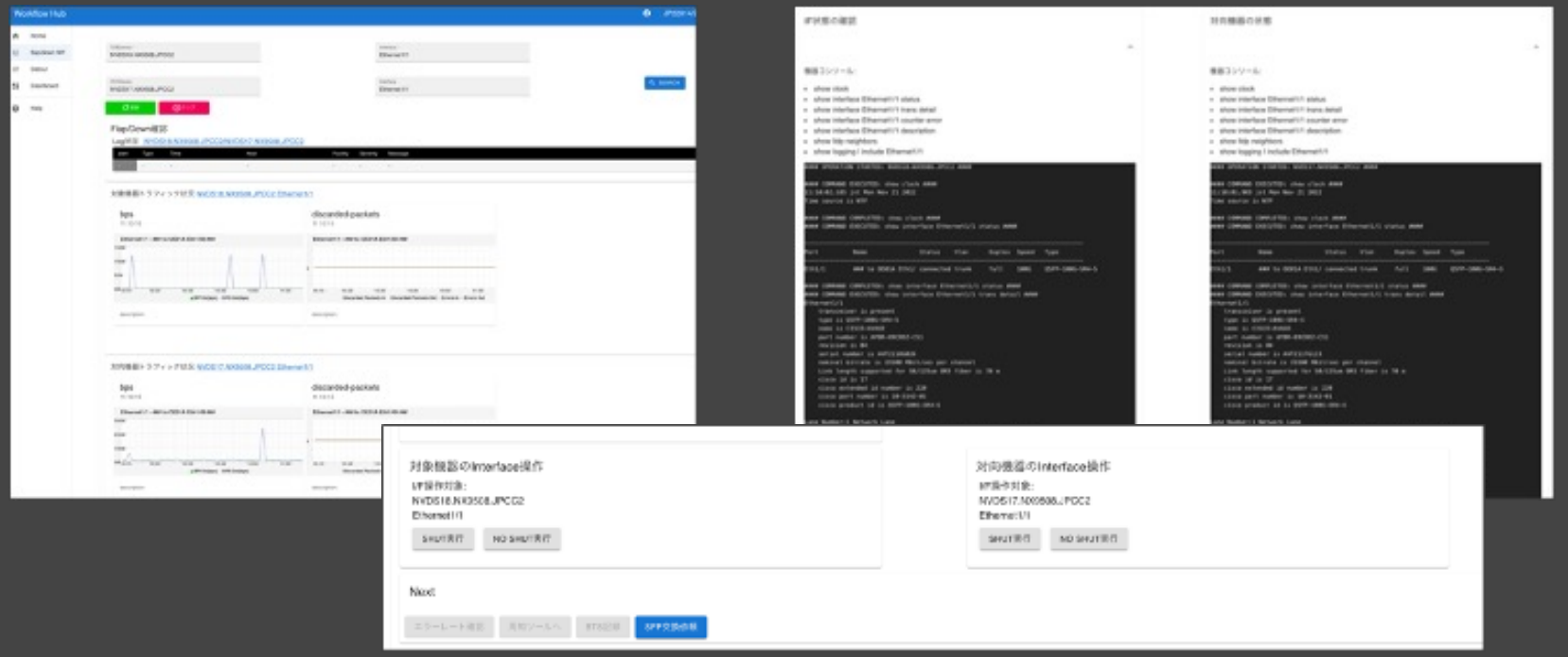


© LINE

Operational Challenges

Operational Complexity

- Automation with CLOS Controller to minimize the operational loads (Same UI for NOSes and autoti c check)
- However, operators are required to learn all NOSes to some extent for handling issues.



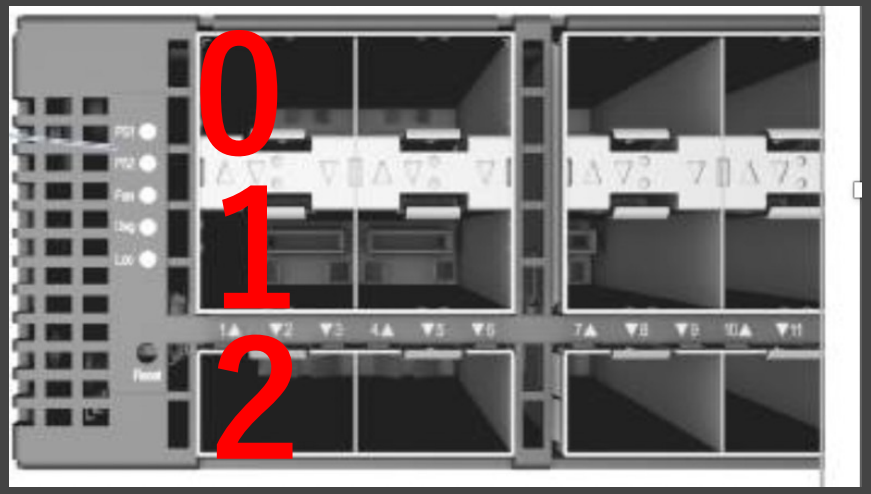
© LINE

Operational Challenges

Interface Name Policy

- Issues
  - Interface numbering starts from 0.
  - Interfaces to servers are from Eth0 to Eth47.
  - Generarlly, it starts from 1. The difference will cause a human error.
  - Interface numbers on the front panel start from 1...

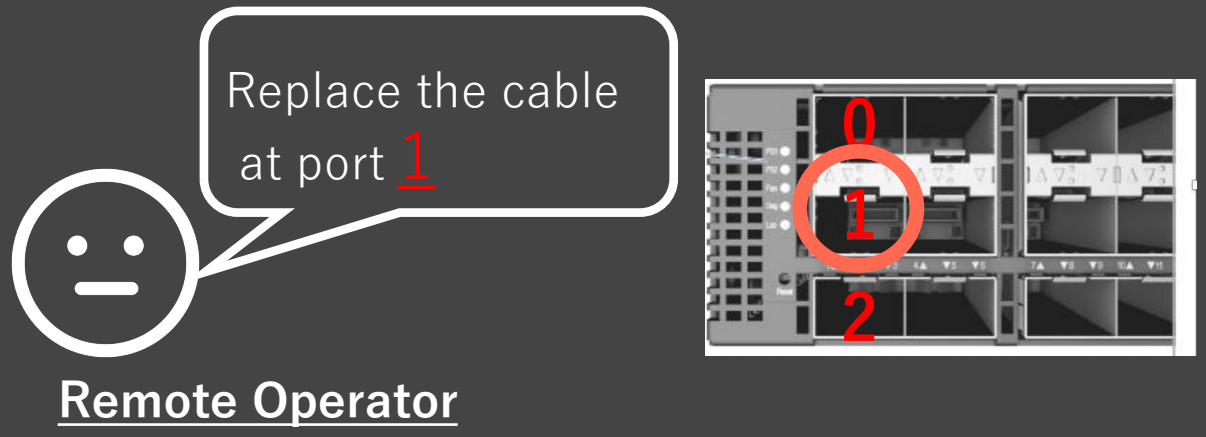
Numbers On SONiC

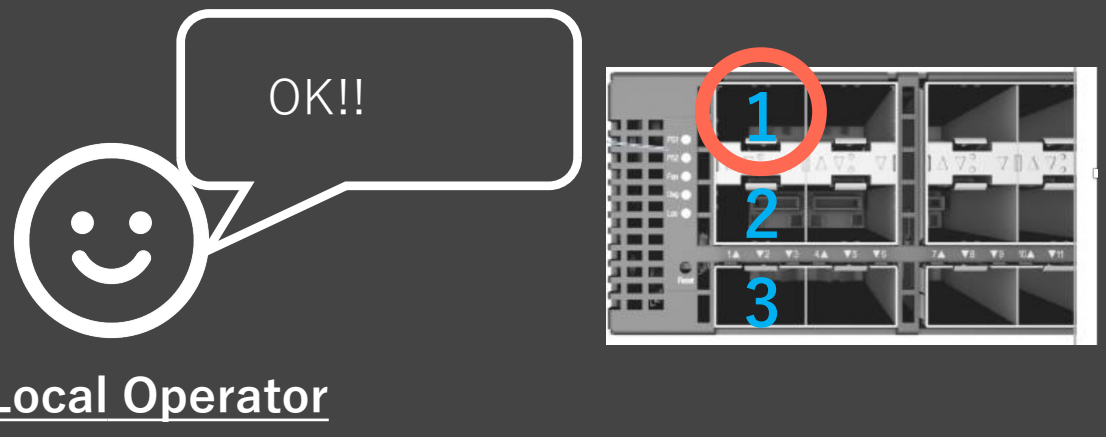


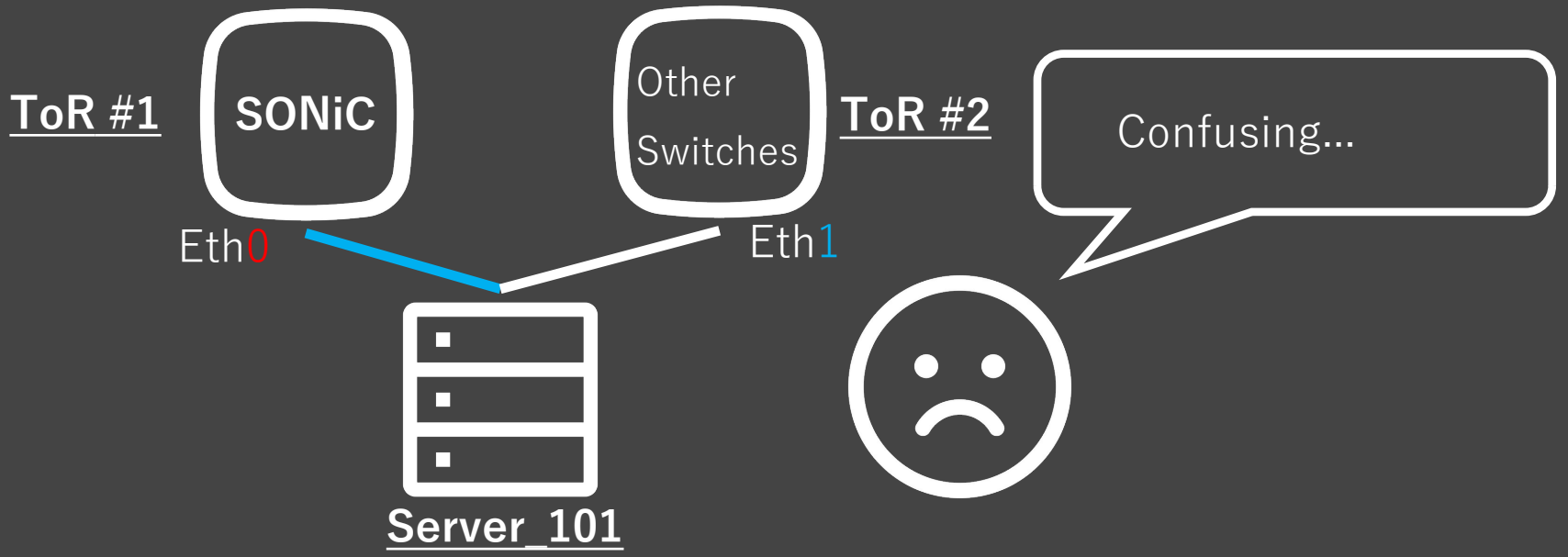
Printed Numbers

© LINE

Operational Challenges



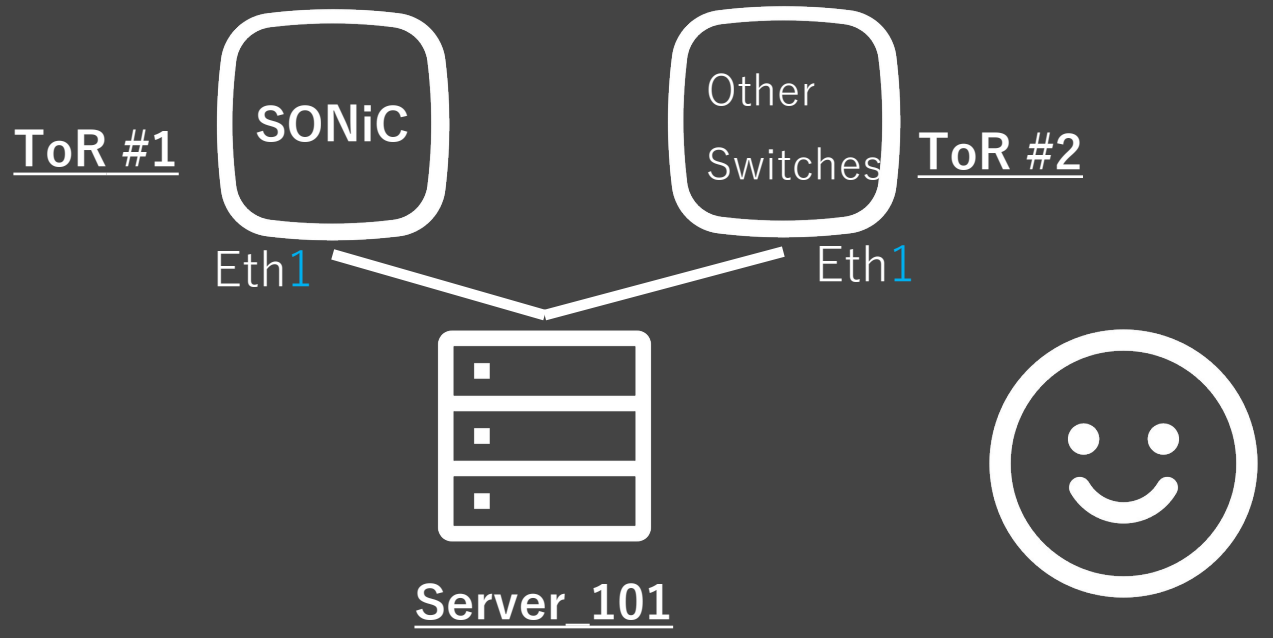




© LINE

Operational Challenges

- Solution
  - Fix in Enterprise SONiC
    - The scope includes REST, GNMI, Config_db.json, frr.conf, syslog, SNMP etc.
    - The new numbering policy is optional.



© LINE

Operational Challenges

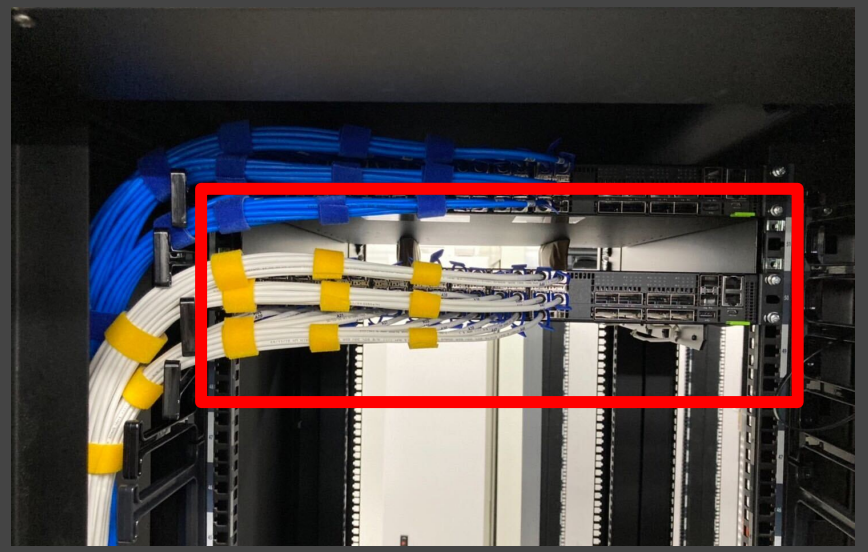
Rack arrangement

- Change Rack arrangement for smooth DAC removal.

52	
51	ToR-A
50	ToR-B
49	
48	Server
…	Server

AS-IS

52	
51	ToR-A
50	
49	ToR-B
48	Server
…	Server



TO-BE

© LINE

Operational Challenges

Monitoring by SNMP

- Issues
  - SNMP process crash periodically.
  - Some SNMP MIB which LINE use was not available.

© LINE

Operational Challenges

Monitoring by SNMP

- Solution
  - Shared the issue detail on meeting with Enterprise SONiC development members.
  - Both issues was fixed within only 1 month.

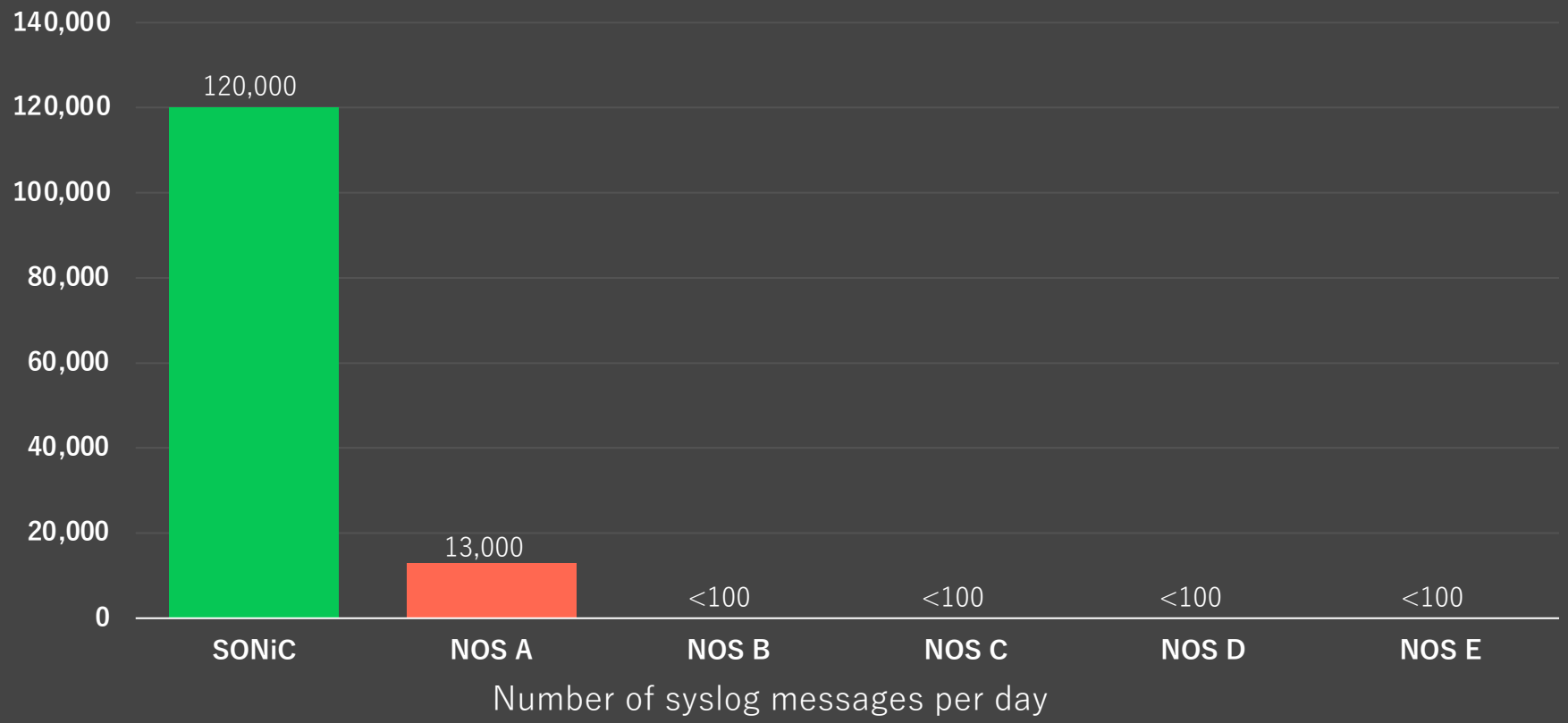
SNMP MIB	status
Memory usage	OK
CPU usage	OK
Interface counter	OK
temperature	OK
LLDP info	OK
Power status	NG -> OK
FAN status	NG -> OK

© LINE

Operational Challenges

Logging

- By default, Enterprise SONiC send a large number of syslog messages. This cause High load of s yslog server.
- Classify syslog messages manually and stop sending unnecessary syslog .



© LINE

Operational Challenges

Summary

- There were various operational problems, but we managed to clear them.
  - So far, SONiC nodes are running stably.

- It was good that we were able to check and discuss from an operational perspective from the early stages of the new NOS support project.

© LINE

Roadmap

© LINE

What We're Working On

Project Schedule

© LINE

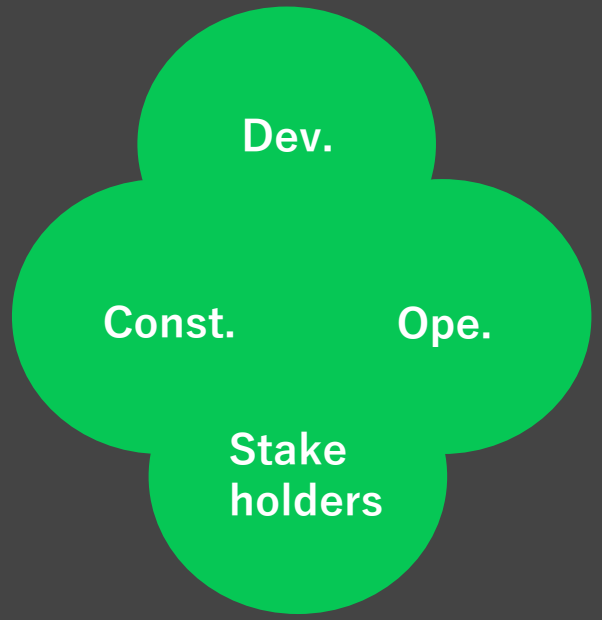
Roadmap

- Hardware Agnostic Network Management
- Clos Network Verification
- SRv6 Termination on ToR
  - Private Network Extension to Physical Servers
  - High Performance Private Network Gateway

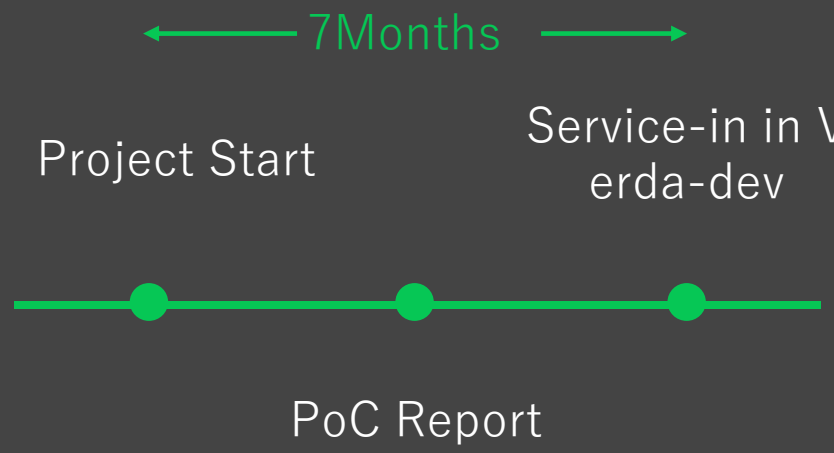
© LINE

Summary

- Collaborative Decision-making



- Fast Service-in



© LINE

Questions from Speakers

1. **How do you evaluate a new NOS?**

   Ex. When operation team join the project?

2. **Expectations on SONiC**

   Ex. Where do you plan to use SONiC? Management? Campus?

Any questions are welcome!

© LINE

THANK YOU