Kaizen(改善) from reactive to proactive troubleshooting

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jpix Japan Internet Exchange

About JPIX

■ Foundation

- Founded on 10th July 1997
  As a 1st commercial IX in Japan built by several stake holders

- Founders intention: Contributing to flourish Internet for all of Japan. And be open globally.

- Although JPIX is now KDDI group, our spirits remain neutral to serve the internet for everyone equally

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JPIX sites are located in top three major cities in Japan

1, Tokyo
2, Osaka
3, Nagoya

1 site in Nagoya

3 sites in Osaka

9 sites in Tokyo

1 site in Okayama

1 site in Okinawa

Figure #1

Osaka Segment
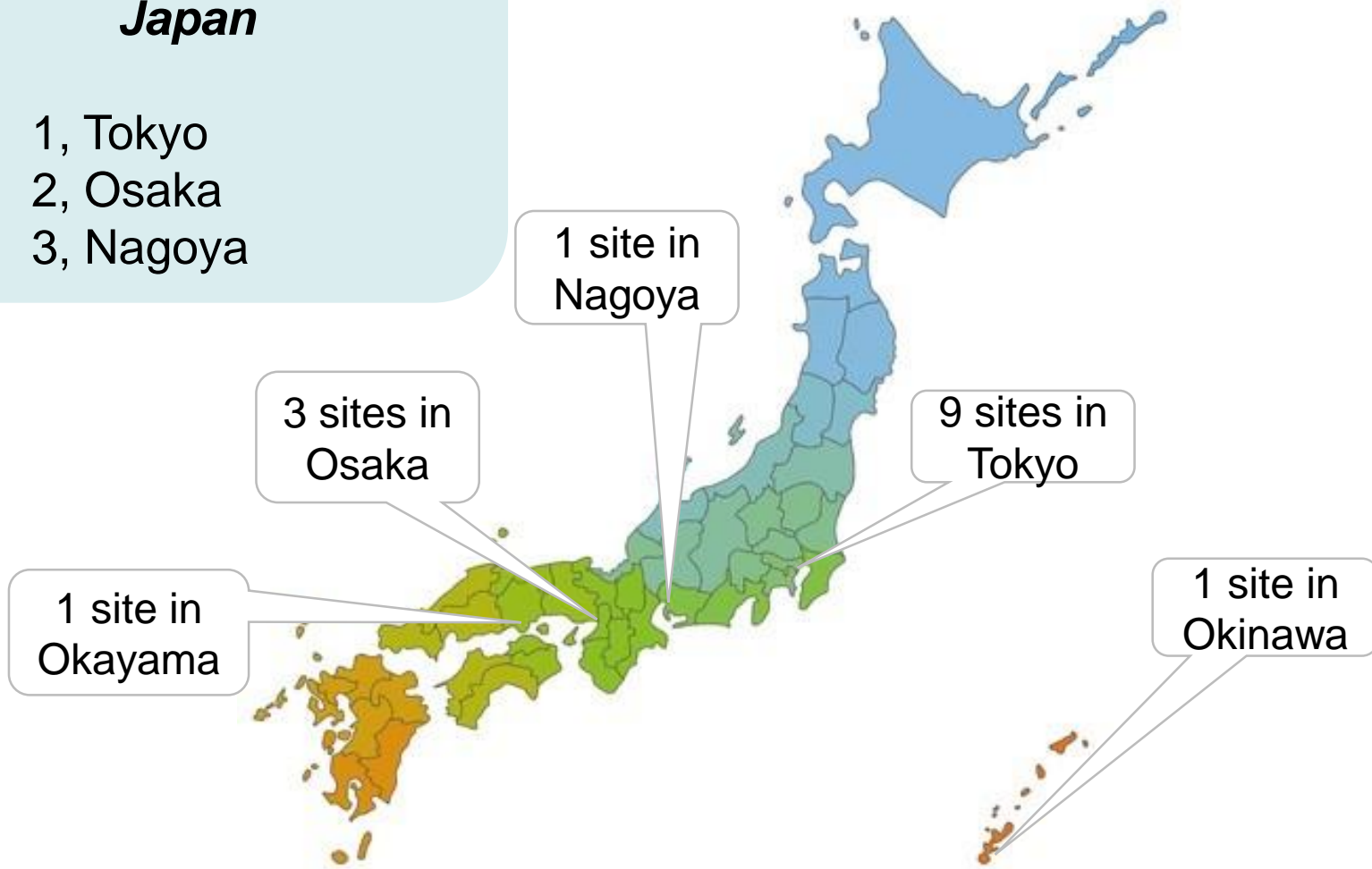
Tokyo Segment
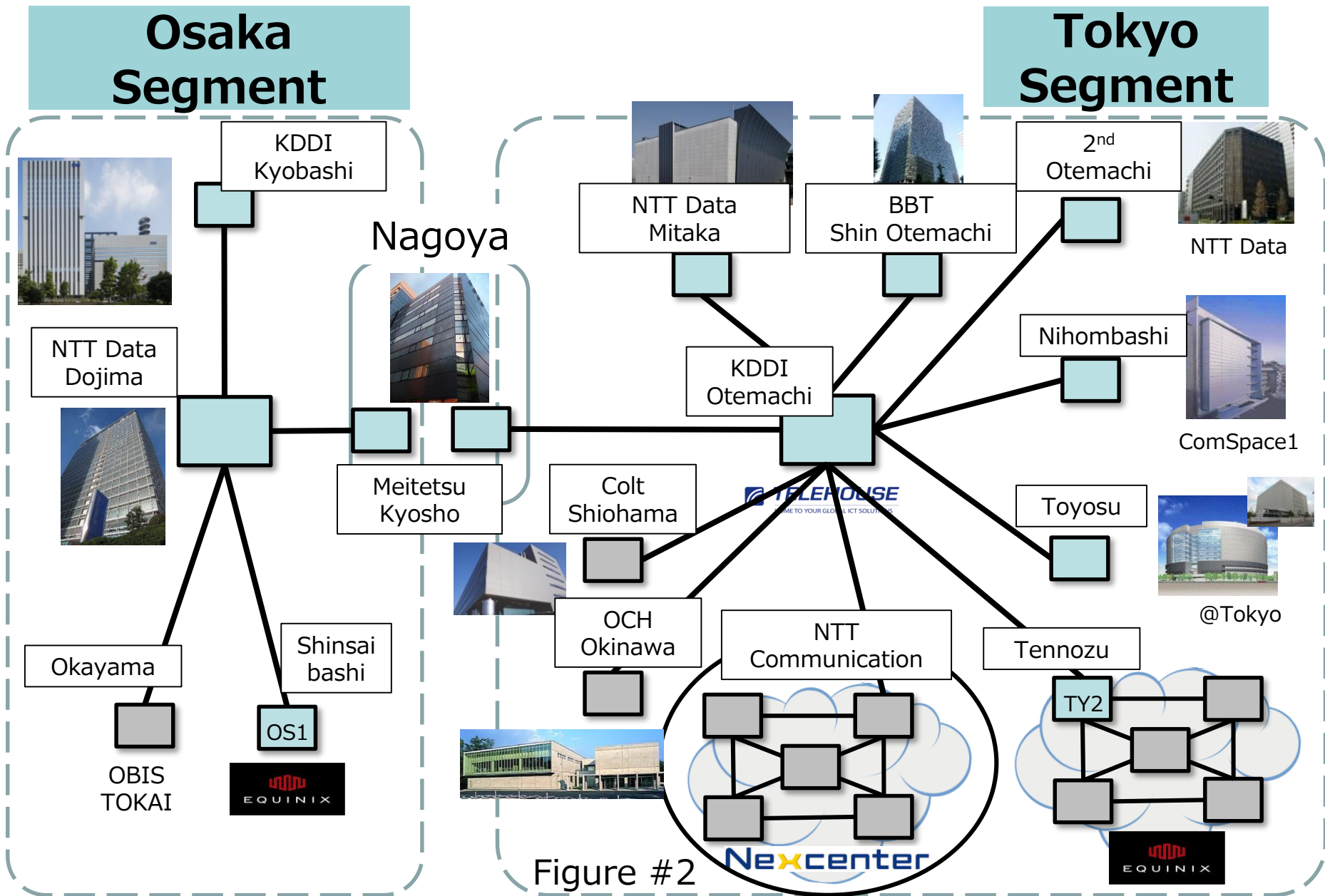
Figure #2

About JPIX – Number of customers

■ The Number of customers (Tokyo Segment)

Figure #3

About JPIX – Traffic trend
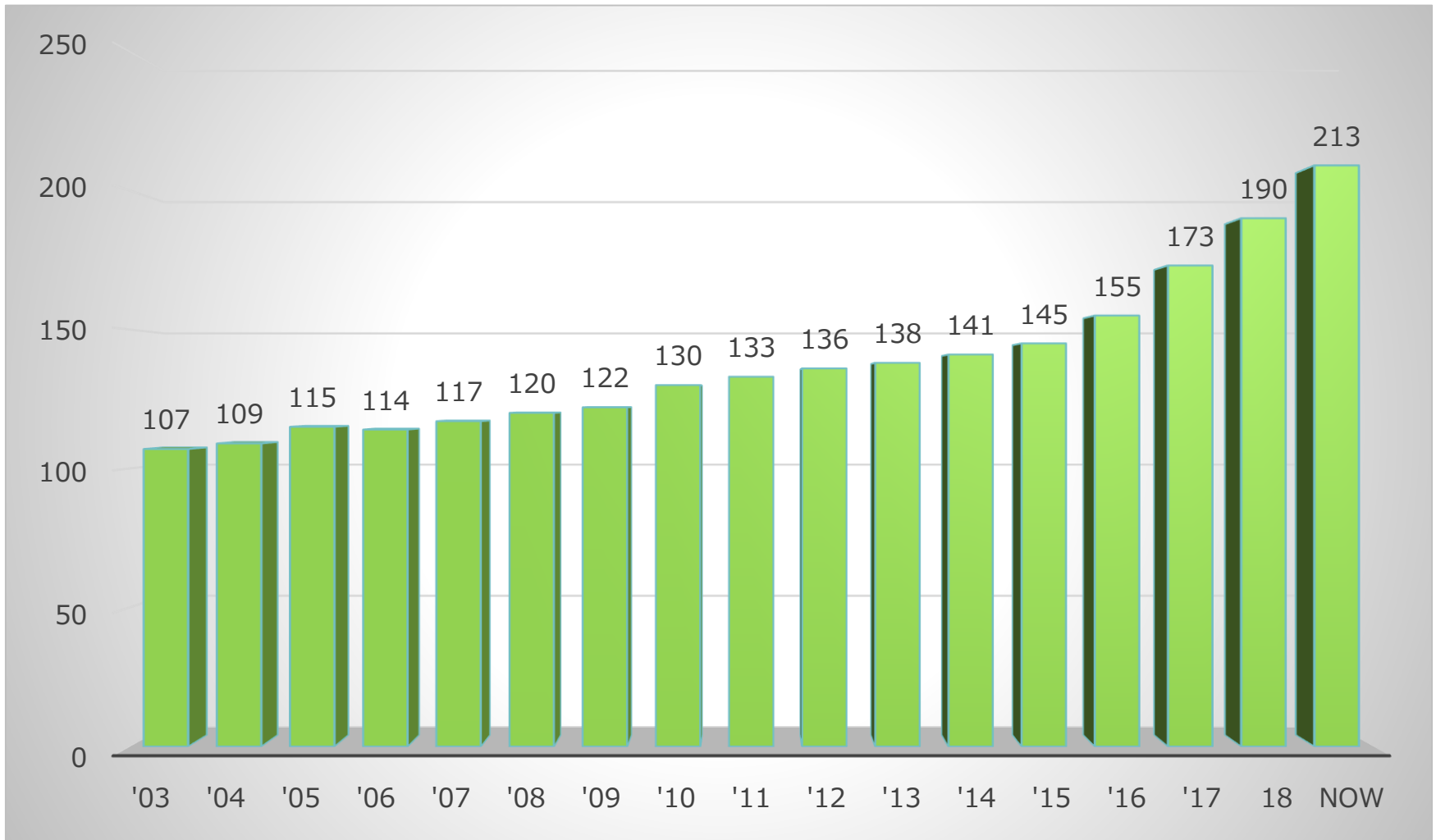
■ Traffic trend – latest 10 years
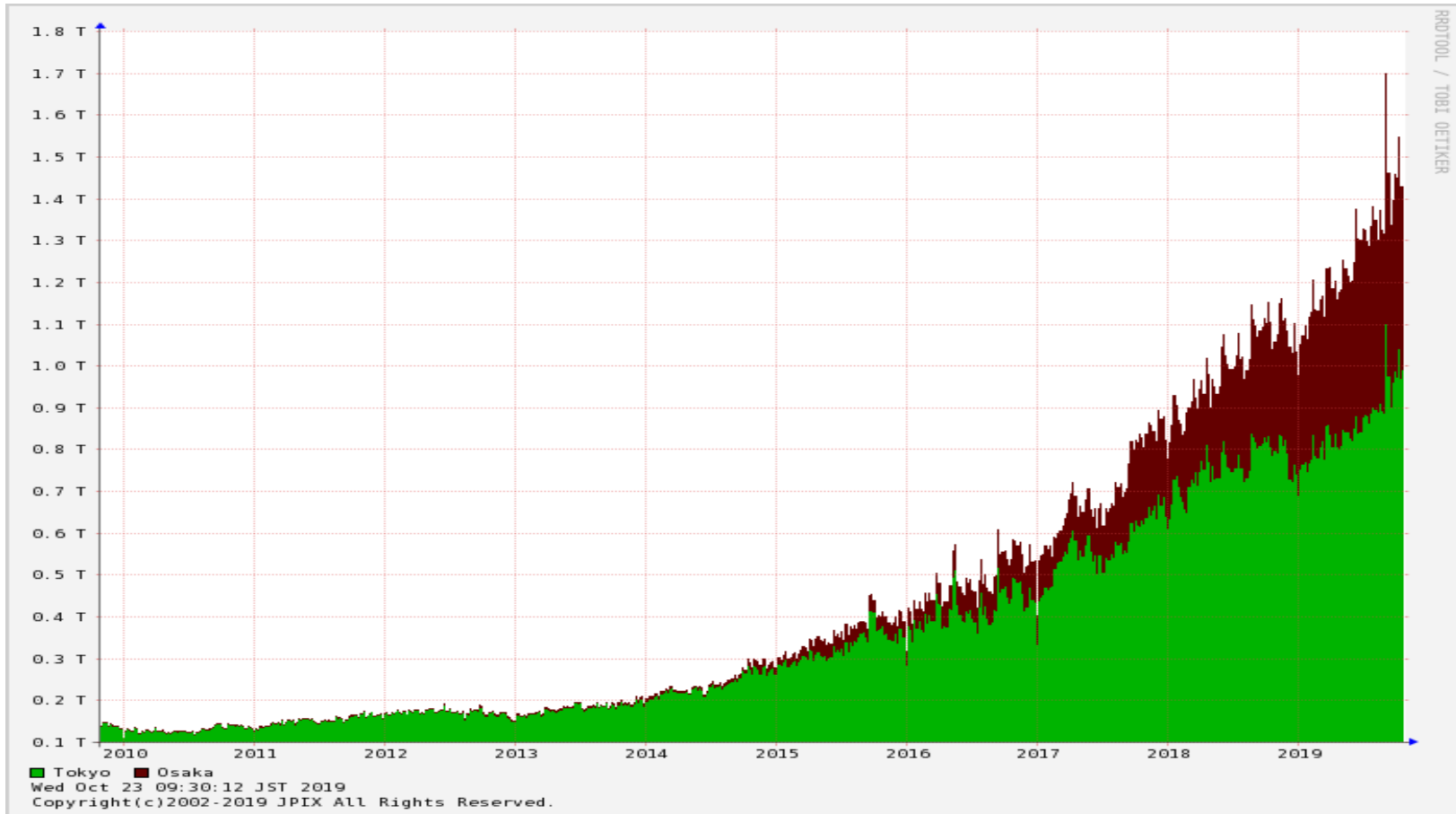
Green: Tokyo: Maximum 1.1Tbps
Brown: Osaka: Maximum 600Gbps

Figure #4

About JPIX – Interface type trend

■ Recent trend - 1G/10G/100G ratio

100G is growing

2017/Jul

6%
21%
73%

■ 100G ■ 10G ■ 1G

2018/Jul

9%
13%
78%

■ 100G ■ 10G ■ 1G

2019/Oct

21%
12%
67%

■ 100G ■ 10G ■ 1G

Figure #5

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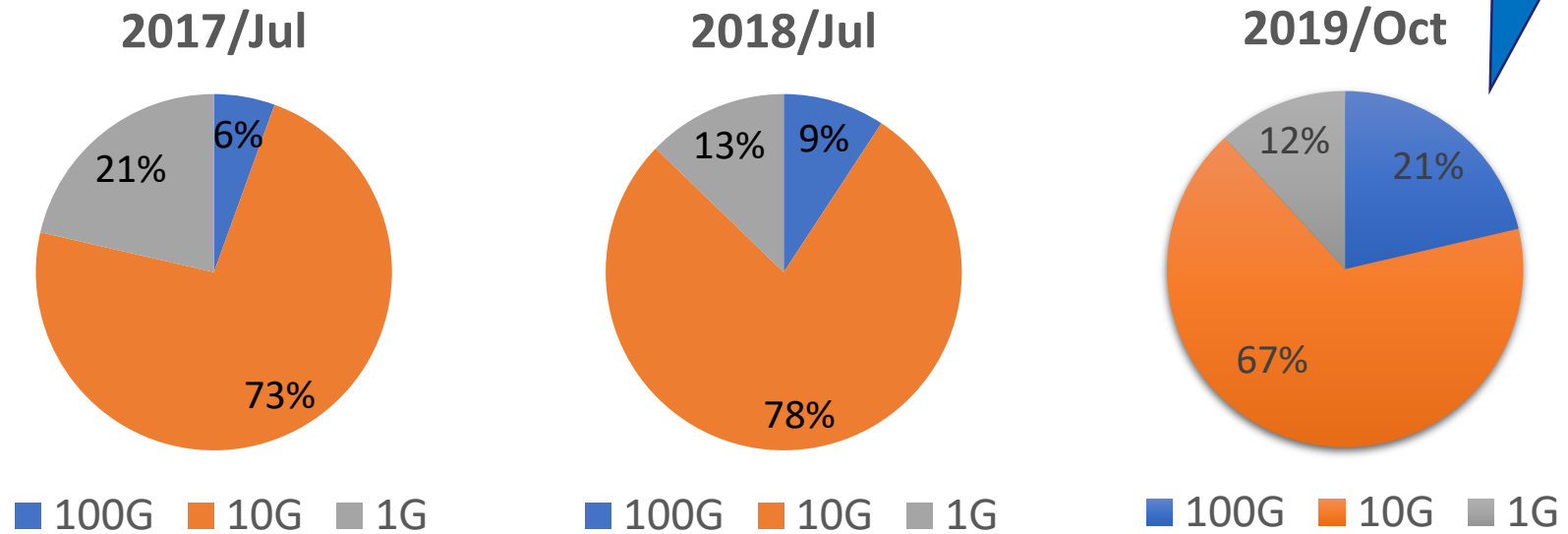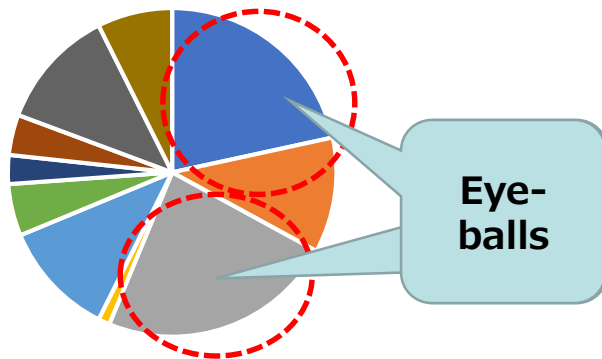
About JPIX – Feature (Strength)

1. High ratio of eyeballs
    customers who support consumers   - Figure #6
2. 32% of our customers only choose JPIX   - Figure #7
3. The number of customers

Industry Ratio

Exclusive / Inclusive

Eye-balls

■ Domestic ISP   ■ International, ISP

■ CATV   ■ Enterprise

■ DC   ■ Non-Commercial

■ Education   ■ CDN

■ Oversees contents   ■ Domestic contents

exclusive 32%

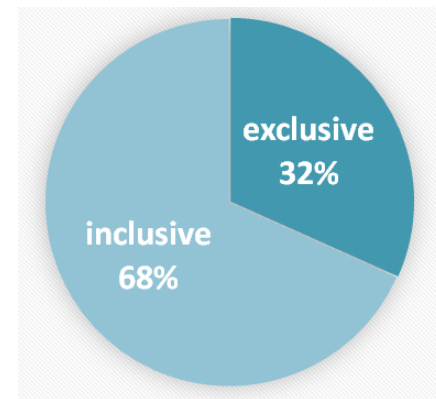inclusive 68%

Figure #6   Figure #7

About JPIX – Customer's countries

We have good performance in Japanese domestic market.
To become more globalized, we have begun to promote our IX in overseas market.
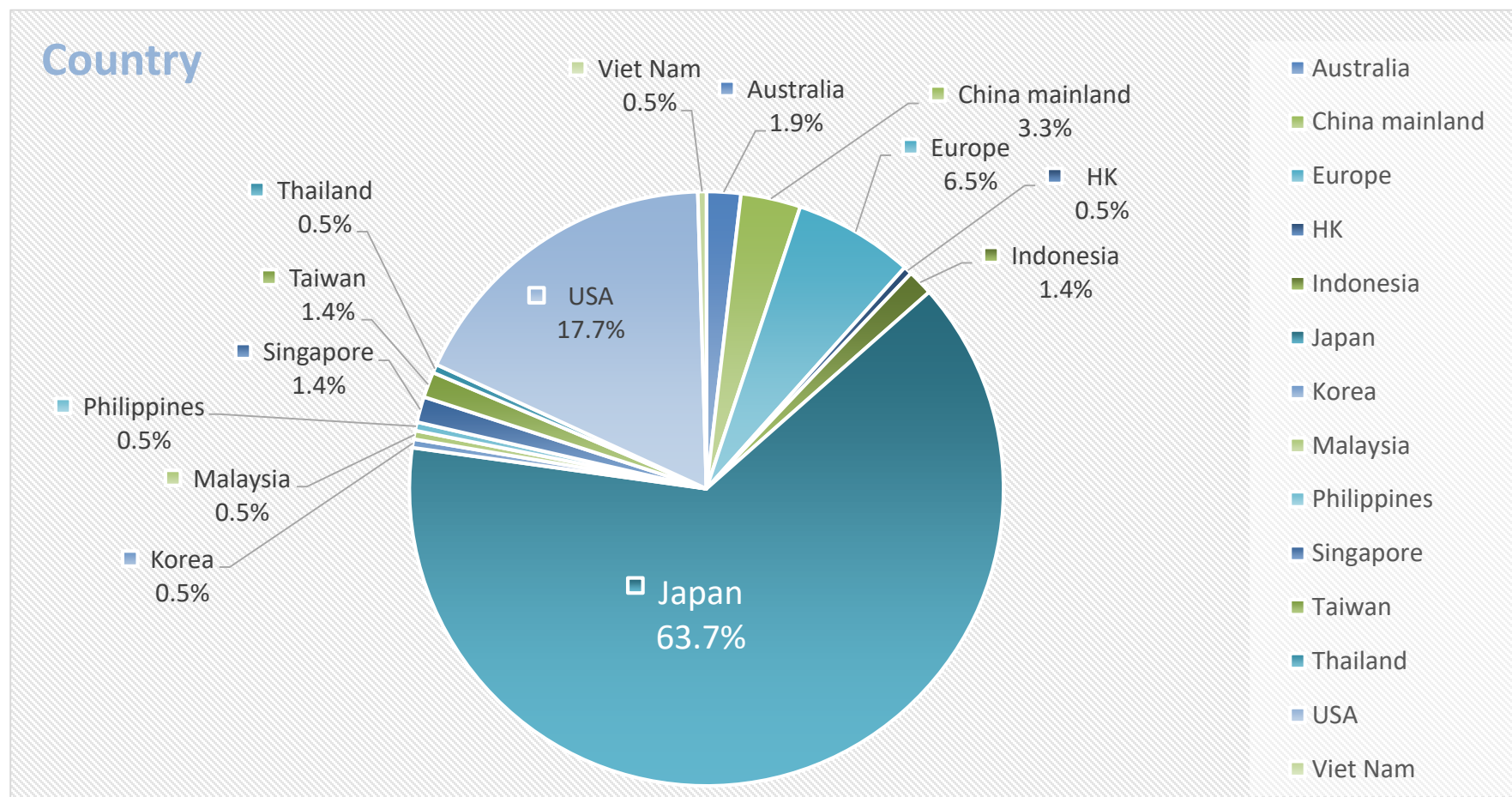

Figure #8

JPIX begun to provide Japanese customers the connectivity for overseas IXs.

We are going to expand connectivity for overseas customers to access JPIX through these circuits and reseller partners
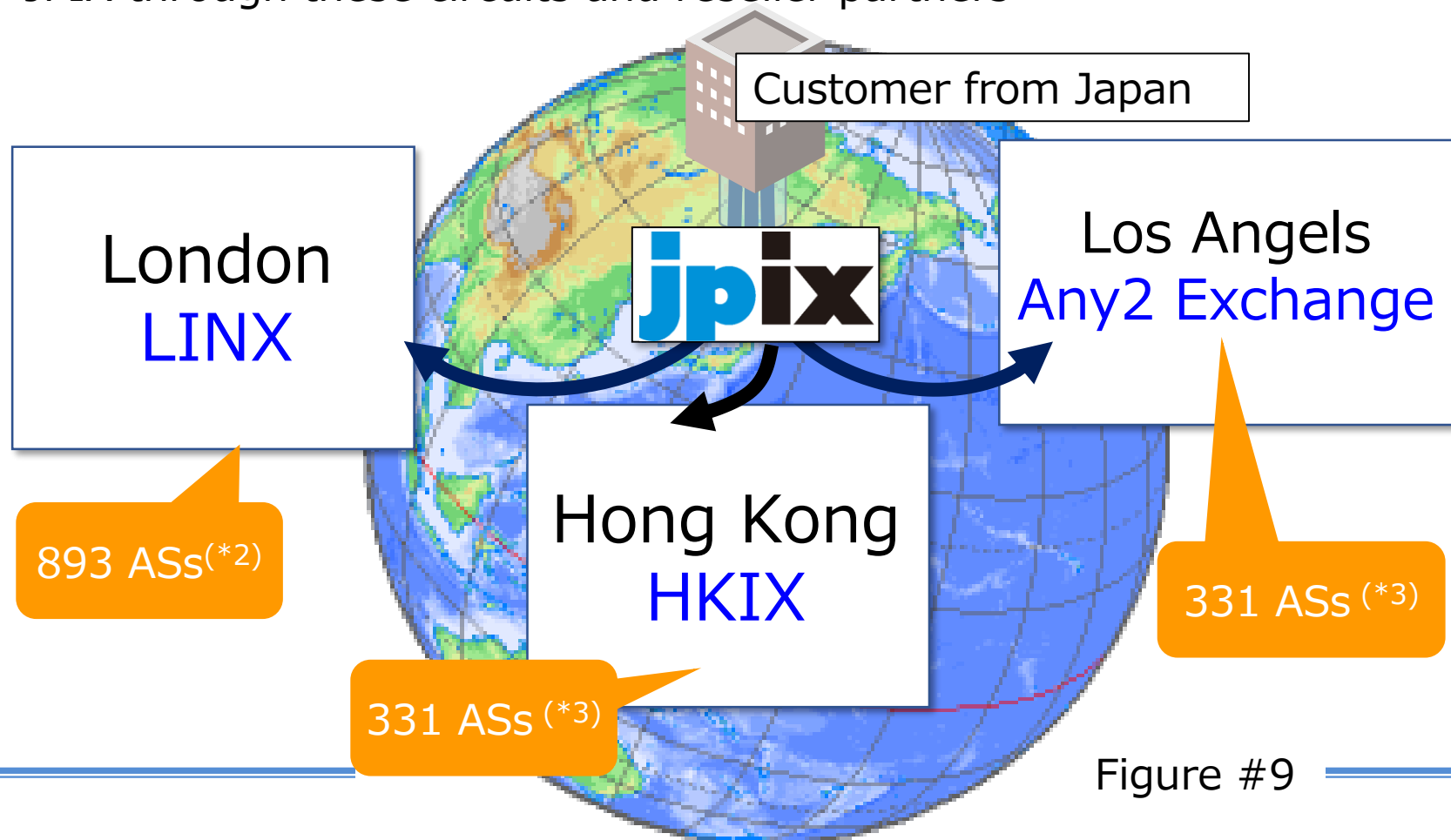
Customer from Japan

London
LINX

Los Angels
Any2 Exchange

Hong Kong
HKIX

893 ASs[*2]

331 ASs[*3]

331 ASs[*3]

Figure #9

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JPIX Kaizen

i)   Catching the sign before the interface goes down

ii) How to presume the customer side device status

Why don't you catch the signs before it goes down?

What are the benefits?

1. You don't need to hurry
   You can make a time for preparation
   - Prepare necessary items, procedures and co-workers
   - You can arrange the suitable timing with customer before it
     goes down.
     -> This may improve the customer satisfaction ☺

2. Able to reduce risk
   - Emergency action has a tendency to increase the risk. If
     you have enough time for preparation, you can reduce it.

i) How to catch the sign of the linkdown?

### 1. Basic measurement – CRC

1) Daily counter diff check
It was not efficient to detect an incremental error before the interface goes down

2) Hourly and every 10 mins polling check
It became very efficient to detect an increasing error timely when it started and how it's soaring. You should be able to contact customer and shutdown the interface before it goes down.
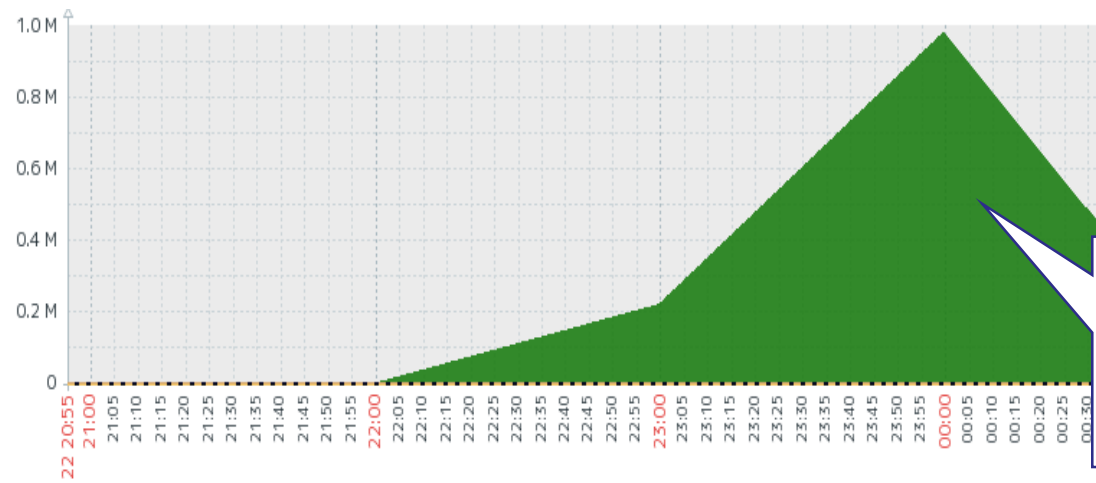
3) Implementing graphs
It make things much better. even the #1) daily counter diff check would be worth with combining the graph.

Kaizen - from reactive to proactive troubleshooting
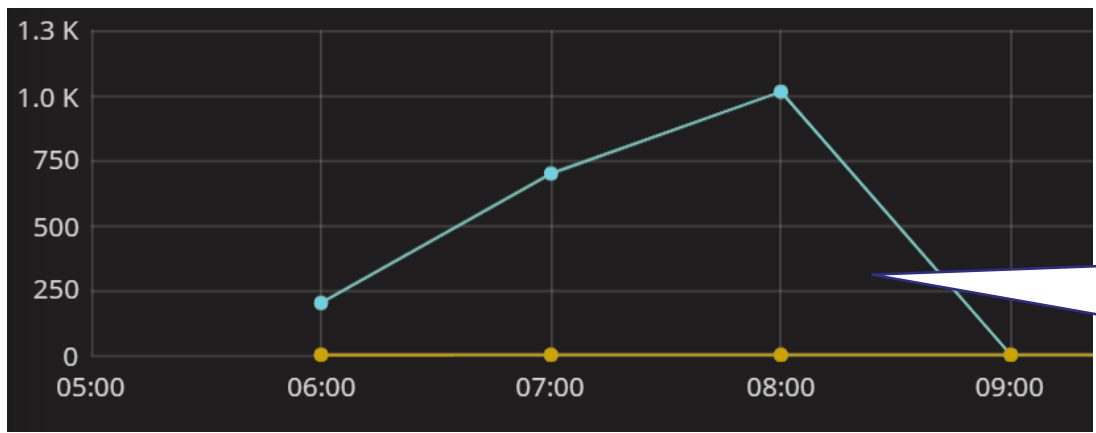
Figure #10

Hourly polling check with alarm notice

We could shutdown the port before it goes down (internal use port)

Figure #11

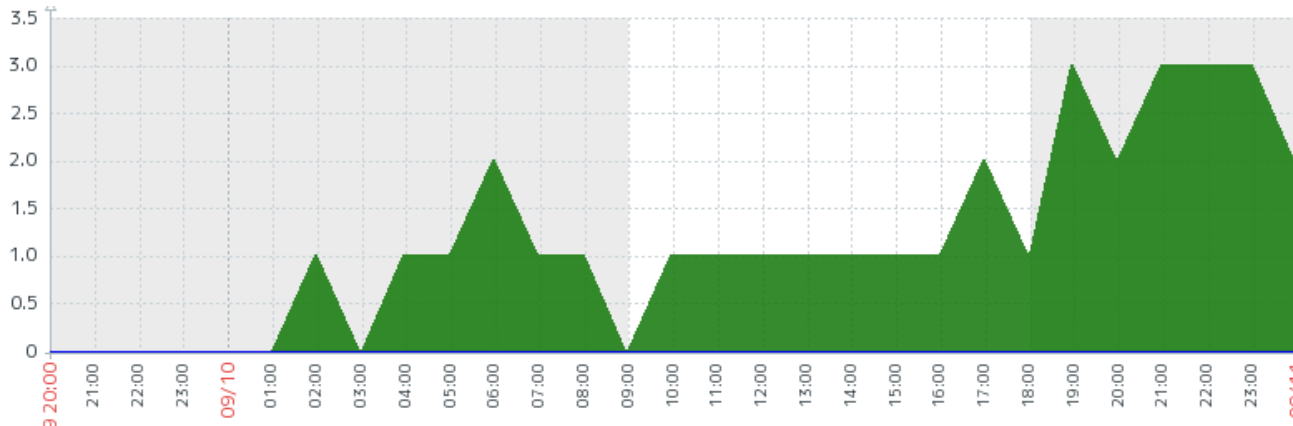**every 10 mins polling check with alarm notice**

We could notice customer before shutdown (customer port)

F.Y.I. – Current our threshold for the alarm notices are 100 CRC counts

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Daily counter diff check

Without alarm notice

Figure #12

This case, there was no alarm notice as the error counter was less than threshold.
However we could find it by checking the daily counter diff, then check the graph when it started.

2. Enhanced approach – Optical Tx/Rx degrading check

Figure #13 (100G-LR4)

You can presume this will go down eventually.

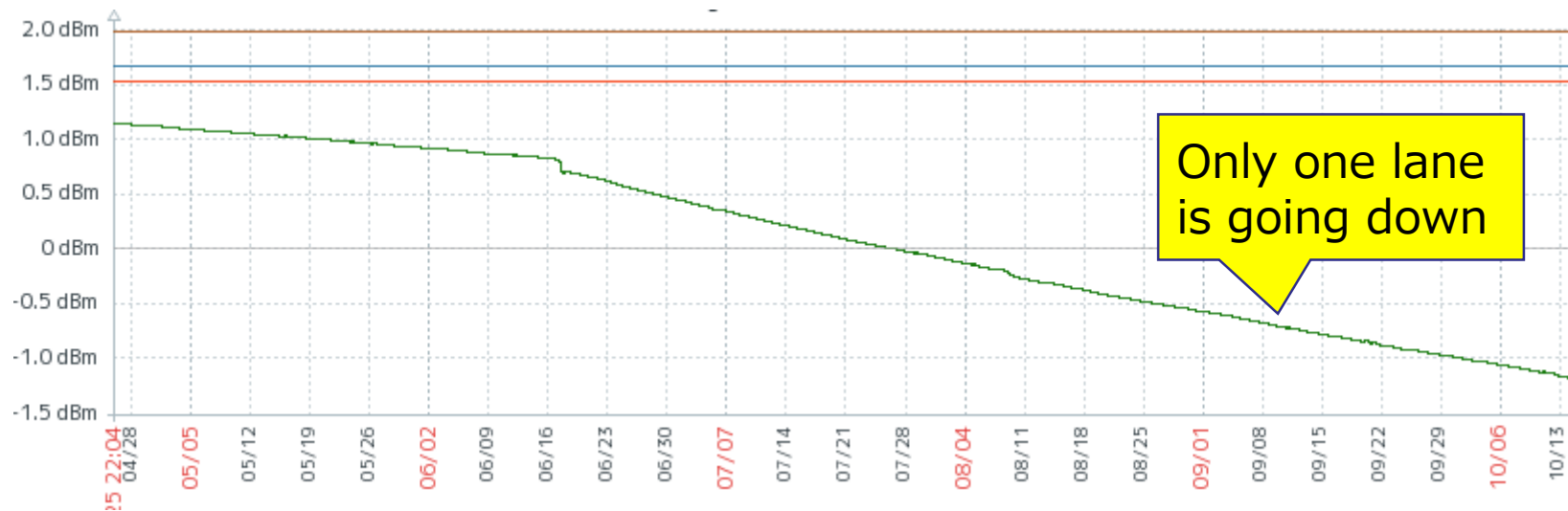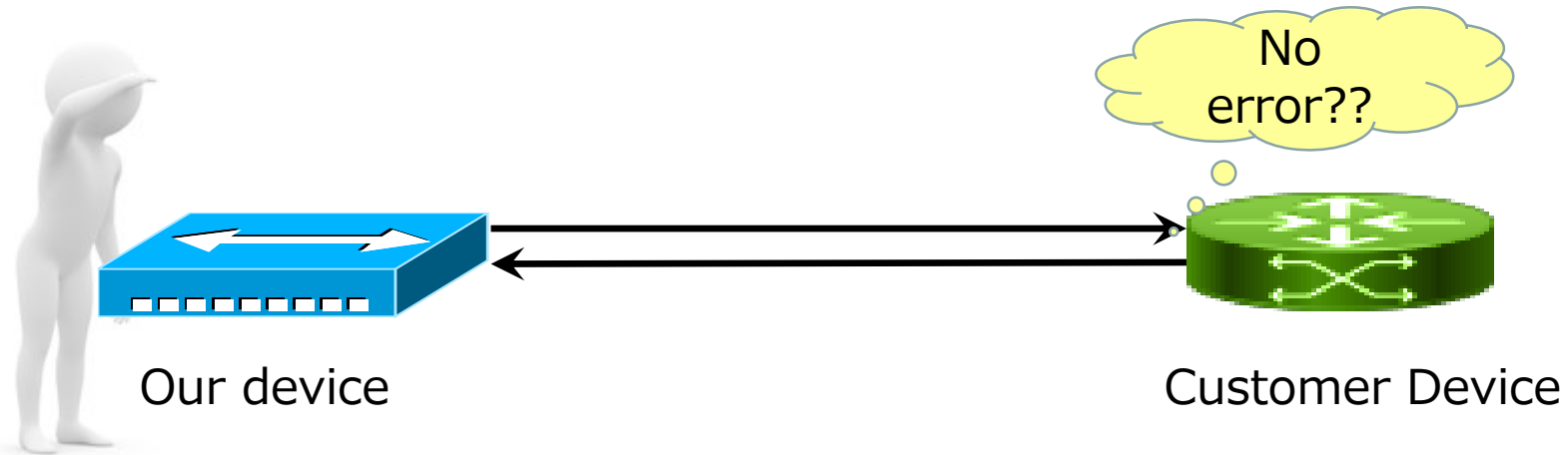## 3. Enhanced approach – 4 lanes difference level check

Figure #14 (100G-LR4)

While the aggregated optical level is fine and each lane levels are still within a spec, this trend shows it will cause the issue.

F.Y.I. – Current our threshold for the alarm notice is 3dBm difference between highest and lowest lanes.

ii) How to presume customer side status?

No error??
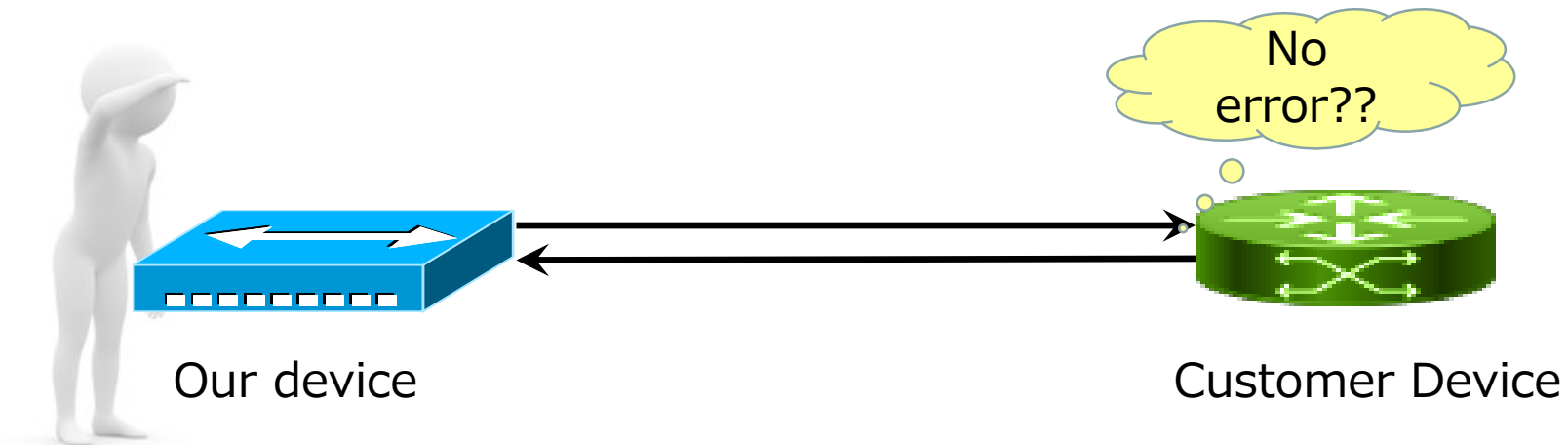
Our device

Customer Device

As you know, we can not see the customer side status how they receive error and optical level.
However, you may be able to presume them by following approaches

2. P16: Enhance approach – Optical **Tx**/Rx degrading
3. P17: 4 lanes difference **Tx** level check

In addition to them...

How to presume customer side status?

Our device

Customer Device

4. Enhanced approach – Ping Loss rate trend check

JPIX implemented the "trend check" about "ping loss rate" by comparing the current loss rate and the two hours ago loss rate.

If the loss rate getting worse while there is no error at our side, it may mean the error is happening at customer side.

How to presume customer side status?

LF ≒ LOS

RF

Our device   Customer Device
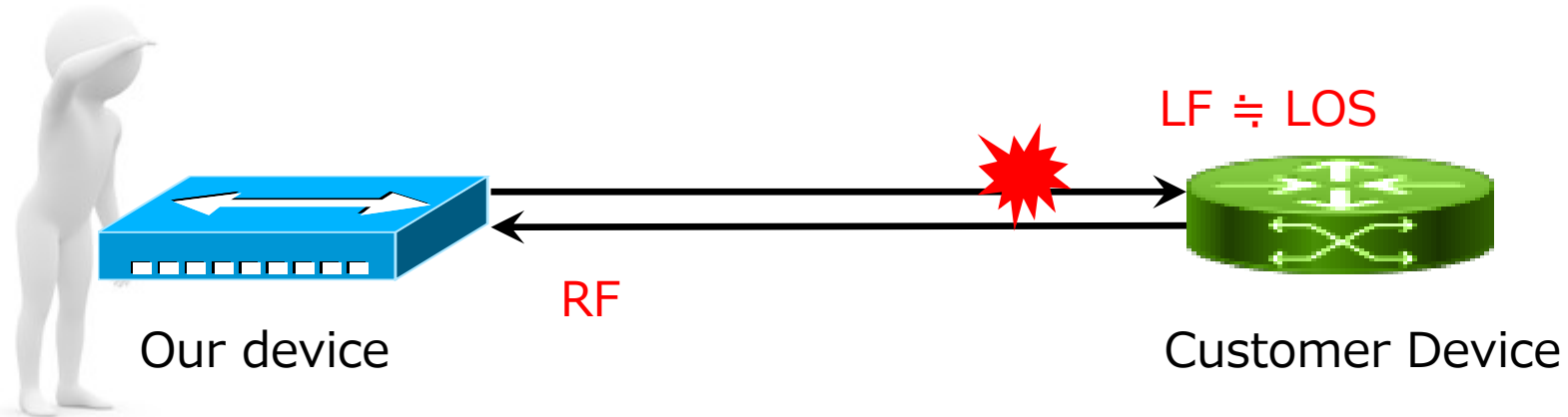
5. RF info (this is not proactive trouble shooting though)

This is an important information.
If we receive RF (Remote Fault) signal, that means the customer device recognizes the LF (Local Fault), which is usually caused by LOS (Loss of Signal = no optical power receiving) or getting CRC heavily.

It implies our device does not send out power properly or sending out significant CRC even if our device shows Tx is fine.

多謝