

Internet Landscape of Japan

HKNOG12.0

Katsuyasu Toyama

JPNAP / APIX

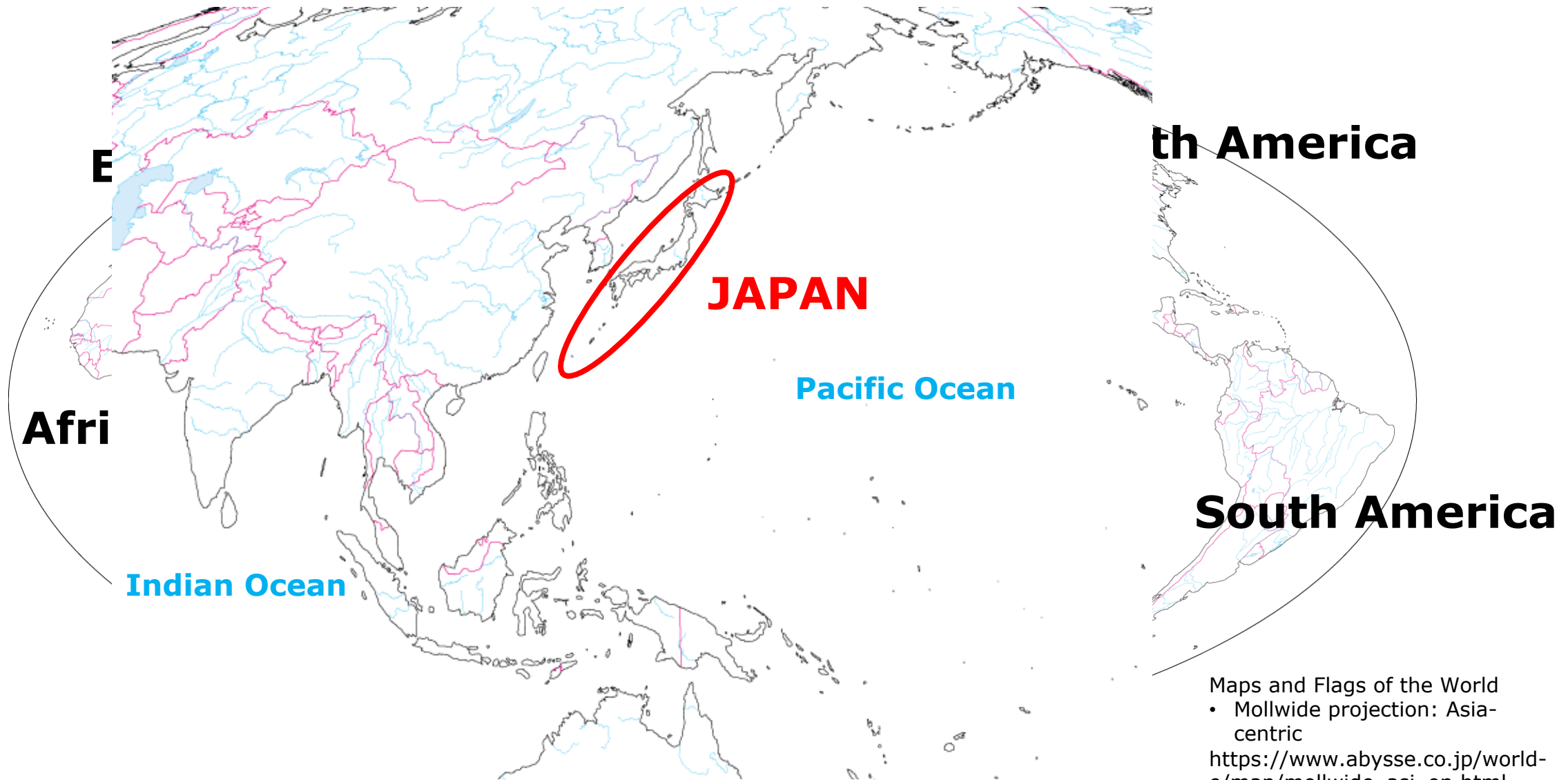
Self-introduction: Katsuyasu Toyama

- **JPNAP** (2001, 2007-2012, 2015-)
 - COO, Representative Director, and EVP
- Asia Pacific Internet Exchange (**APIX**) association
 - Chairperson (2010-2017, 2019-)
- **Peering Asia**
 - Peering Asia WG member (2017-)
- NTT Communications
 - SVP of Internet and Mobile Services (2012-2015)
 - AS2914(GIN), AS4713(OCN)



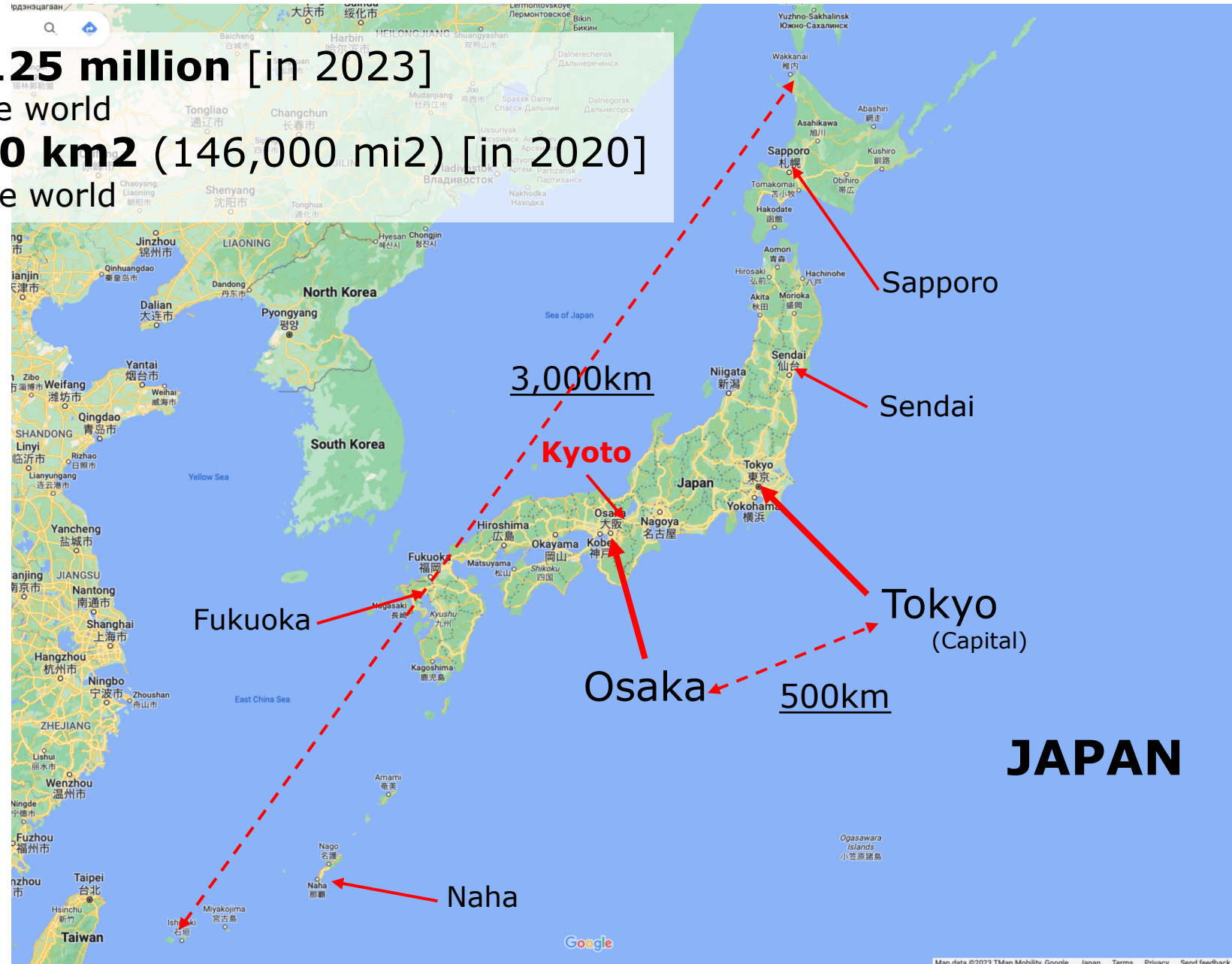
from JANOG52 official photos

Japan: the location



Maps and Flags of the World
• Mollwide projection: Asia-
centric
[https://www.abysse.co.jp/world-
e/map/mollwide_asi_on.html](https://www.abysse.co.jp/world-e/map/mollwide_asi_on.html)

- **Population: 125 million [in 2023]**
 - The 12th in the world
- **Area: 378,000 km² (146,000 mi²) [in 2020]**
 - The 62nd in the world



The Internet in Japan

- History
 - 1984 Started in academia (UUCP-based)
 - Keio University, Tokyo Institute of Technology, and Tokyo University
 - 1988 Connected via Internet Protocol (IP)
 - 1993 Commercial business started
 - AT&T Jeps and Internet Initiative (IIJ)
- In 2023
 - A few hundreds of Internet Service Providers (ISPs)
 - 4 mobile network operators (MNOs)
 - 4 (commercial) internet exchanges (IXPs)

	Company	Service name
1	Softbank	Softbank Hikari
2	NTT resonant	OCN
3	NTT docomo	Docomo Hikari
4	Sony Network Communications	So-net
5	Biglobe	Biglobe
6	Optage	eo Hikari
7	KDDI	au Hikari
8	Nifty	@Nifty

Top 8 Internet Service Providers (ISPs) on FTTH

	Company	Service name
1	NTT Docomo	docomo
2	KDDI	au
3	Softbank	Softbank Mobile
4	Rakuten Mobile	Rakuten Mobile

Mobile Network Operators (MNOs)

	Company	Year to start
1	JPIX	1997
2	JPNAP	2001
3	BBIX	2002
4	Equinix	2007

Internet Exchanges (IXPs)

Multi-Media Research Institute: [https://www.m2ri.jp/e/Press Release:
https://www.m2ri.jp/release/detail.html?id=579](https://www.m2ri.jp/e/Press%20Release%3Ahttps://www.m2ri.jp/release/detail.html?id=579) on 8 Jun 2023 (in Japanese)

Internet Penetration

- Internet usage rate (Individuals): **82.9%** [1]
- Nation-wide development rate of optical fibers: **99.3%** [1]
- Number of broadband subscribers: **43.8 million** [2]
 - ISP (FTTH): 36.6 million
 - CATV (HFC+FTTH): 6.5 million
- Mobile broadband subscribers (4G/5G): **184 million** [2]

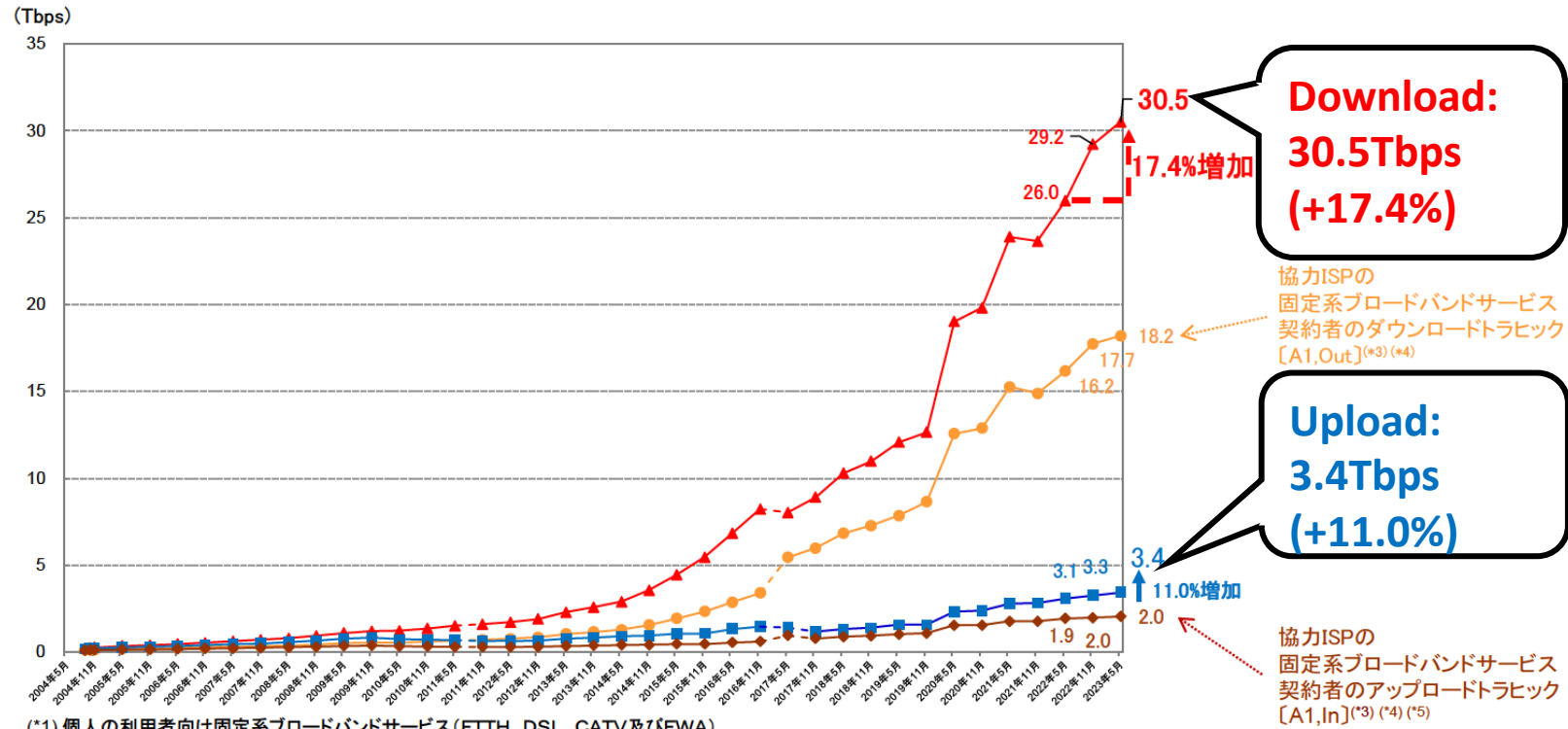
[1] White paper 2022, Information and Communications in Japan by MIC

[2] Press release by MIC:

https://www.soumu.go.jp/menu_news/s-news/01kiban04_02000220.html

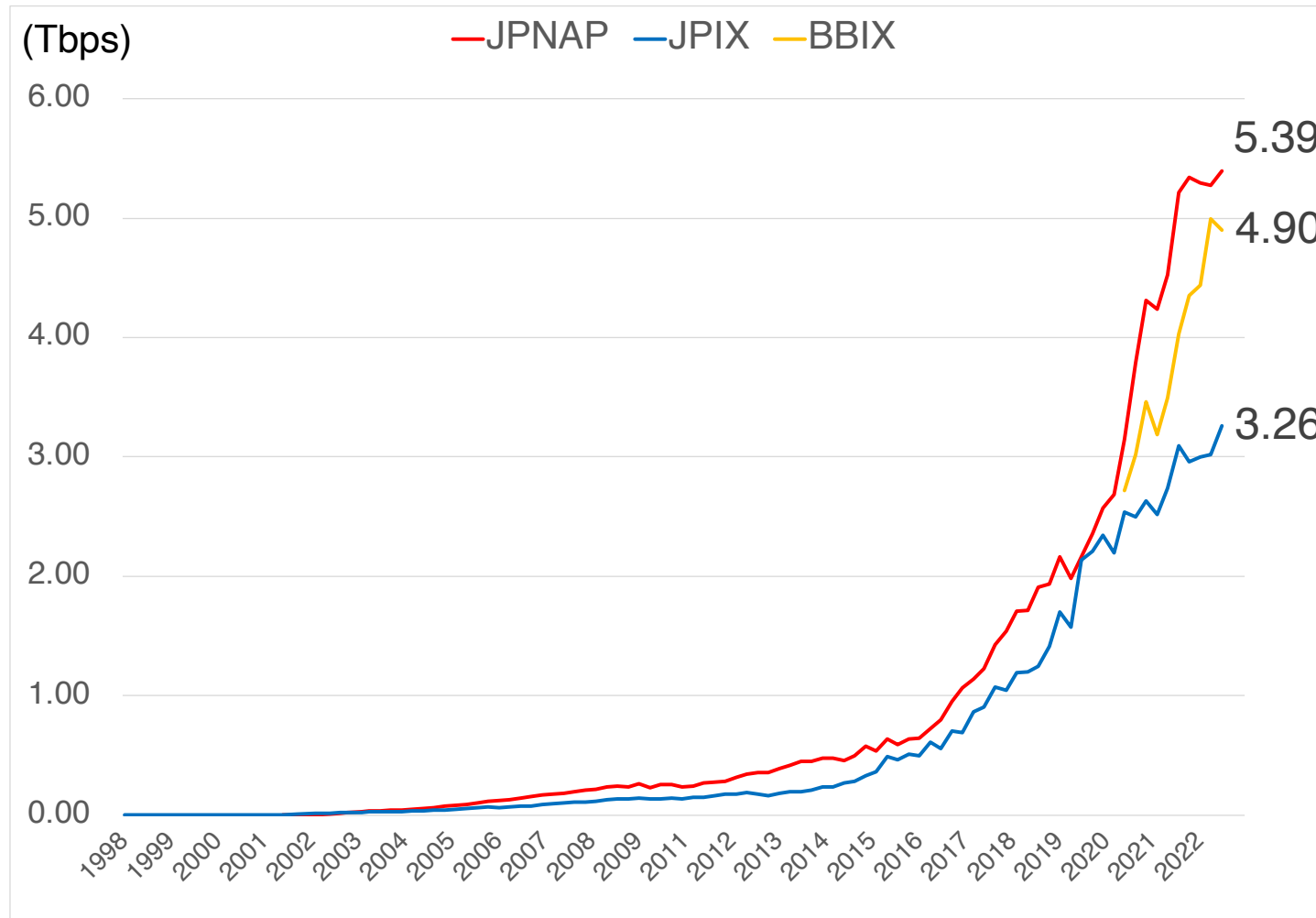
Estimated broadband Internet traffic in May 2023

- Download: **30.5Tbps, 17.4%** increase (YoY)
- Upload: **3.4Tbps, 11.0%** increase (YoY)



(*1) 個人の利用者向け固定系ブロードバンドサービス (FTTH、DSL、CATV及びFWA)
 (*2) 一部の法人契約者を含む

Traffic trend of 3 major IXPs in Japan



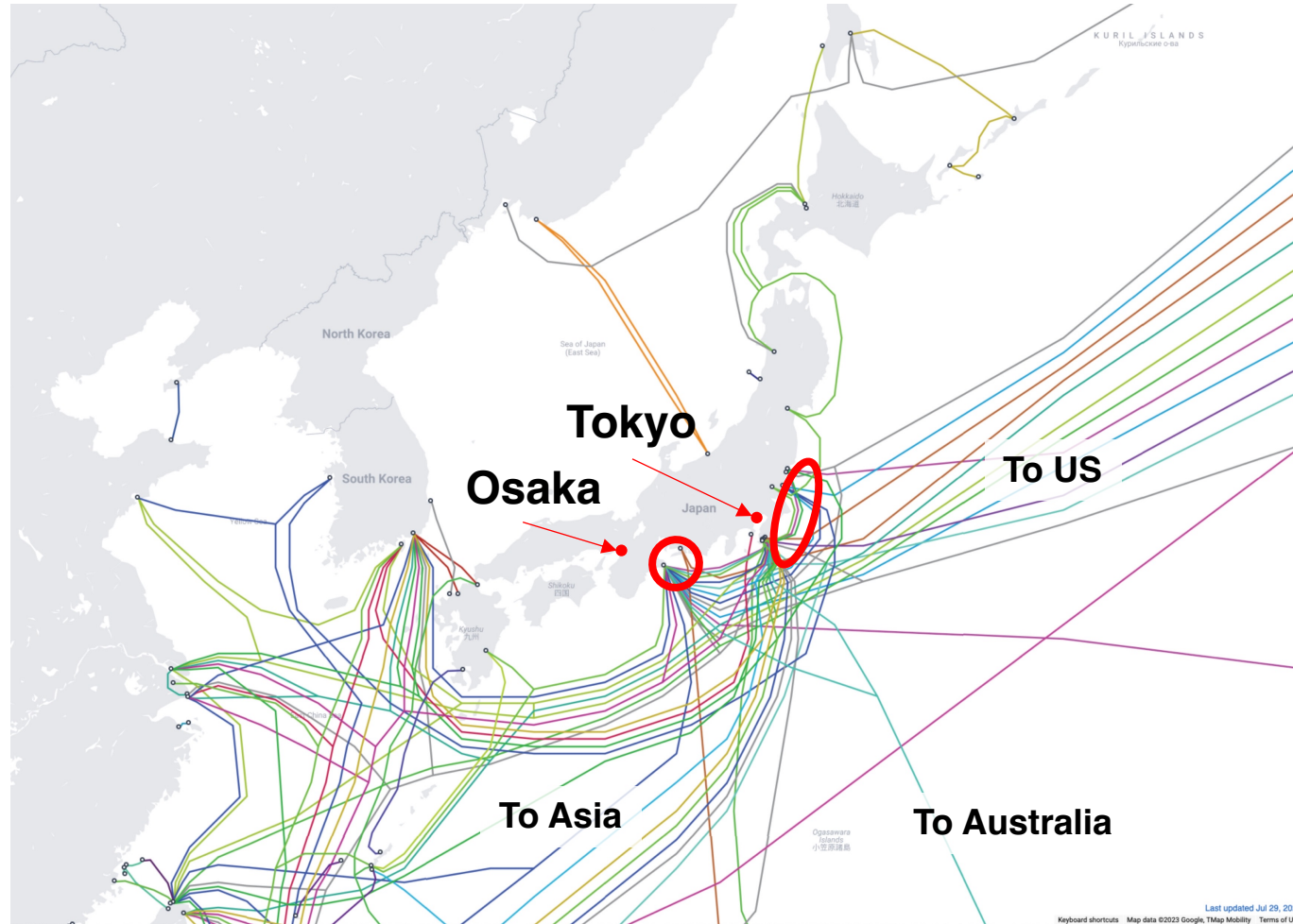
- Traffic data is collected by INTERNET MULTIFEED CO. from the web sites of each IXP
 - Traffic data of JPIX has been published since 1997, and JPNAP since 2001
 - BBIX started to publish traffic data since 2021 (Equinix does not publish so far)

Internet topologies



Map data ©2023 TMap Mobility, Google, Japan, Terms, Privacy, Send feedback

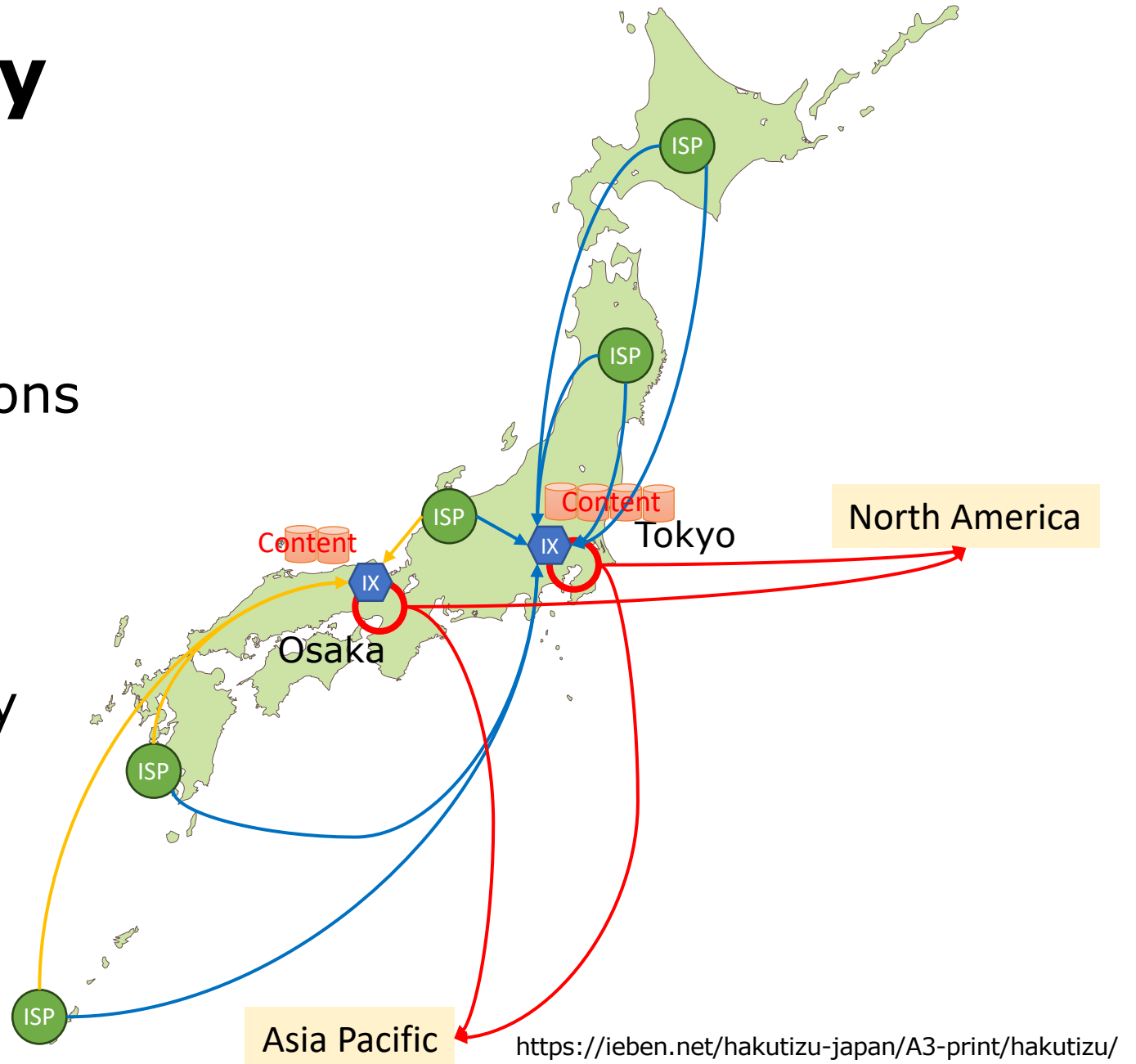
Submarine cable systems and their landing areas



<https://www.submarinecablemap.com>

Internet topology

- Tokyo & Osaka
 - Interconnection points
 - Gateways to other regions
 - Redundancy
- Concern
 - ISPs in east rely heavily on Tokyo, while ISPs in west/middle connect to both

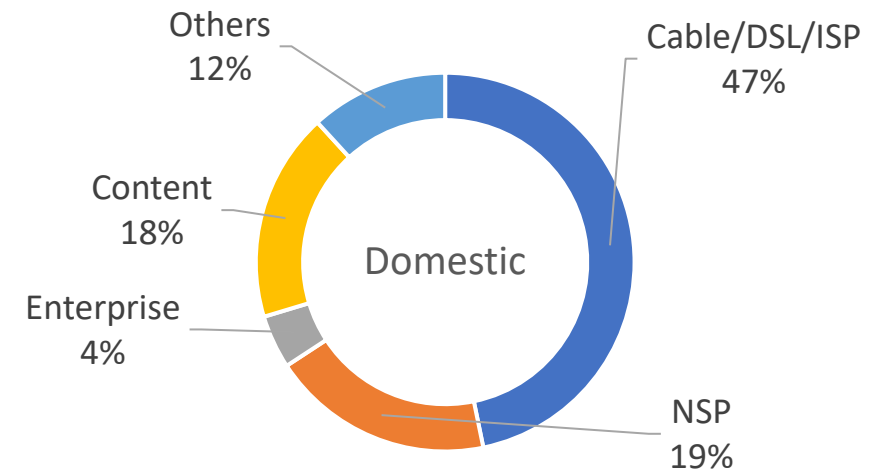
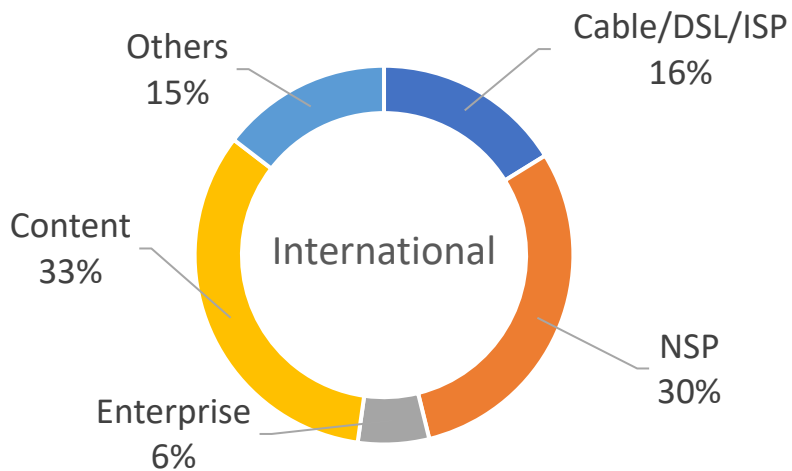
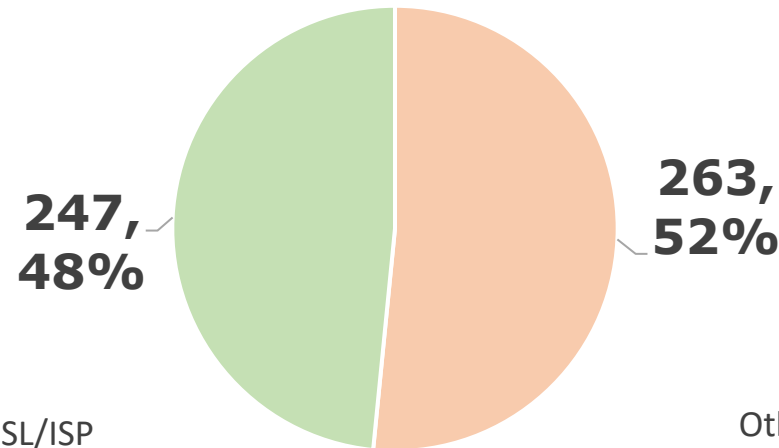


ASN ratio: domestic vs international

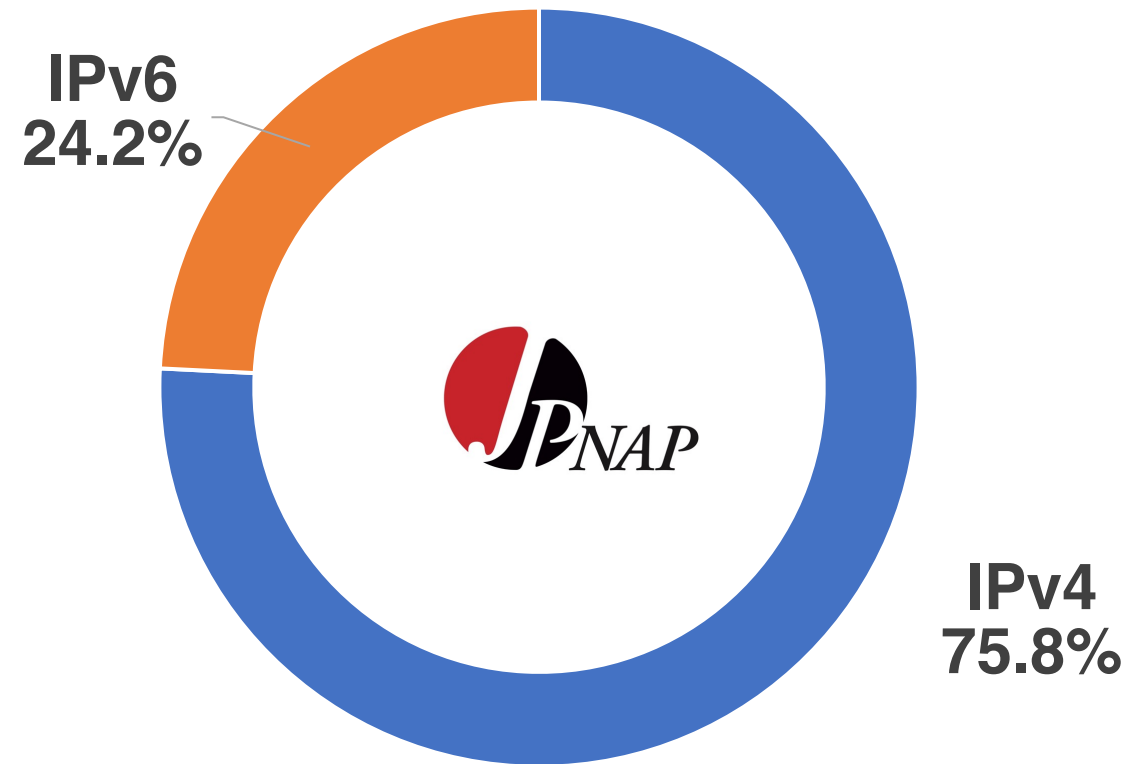
- **510 unique ASNs** are connected to BBIX/Equinix-JP/JPIX/JPNAP
 - referred to PeeringDB (29 Aug 2023)

International

Domestic



IPv6/IPv4 ratio at JPNAP



Comparing average bit/s

Peering policy

- Big ISPs are selective, some are very restrictive
- Small/Medium ISPs (eyeballs) are open
- Content, Cloud, and CDN are open
 - sometimes they behave like selective so that they could control traffic

Recent topics in Japan

- The rise of the live streaming traffic
- The third hub of Japan is growing

Recent topics in Japan

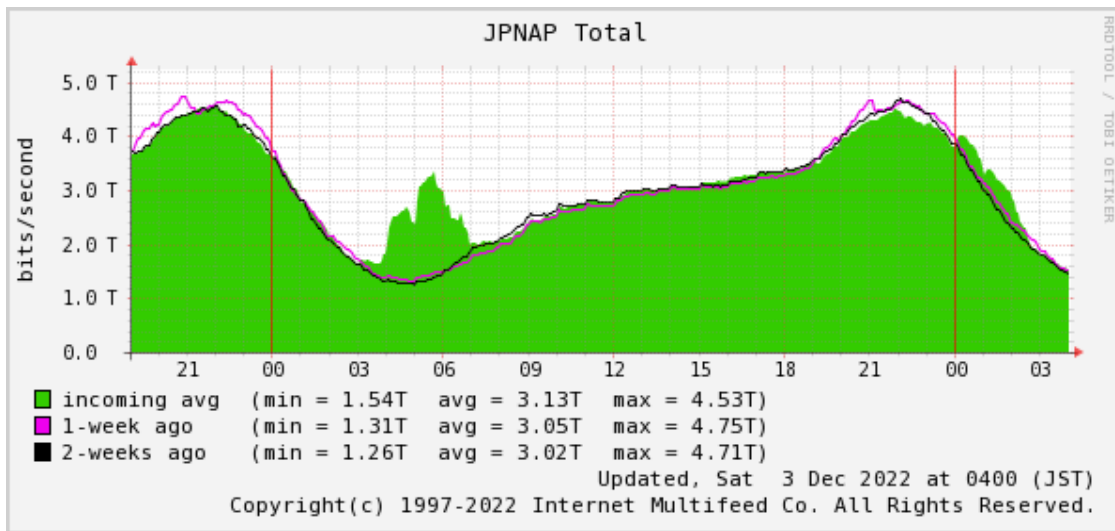
- The rise of the live streaming traffic
- The third hub of Japan is growing

The rise of the live streaming

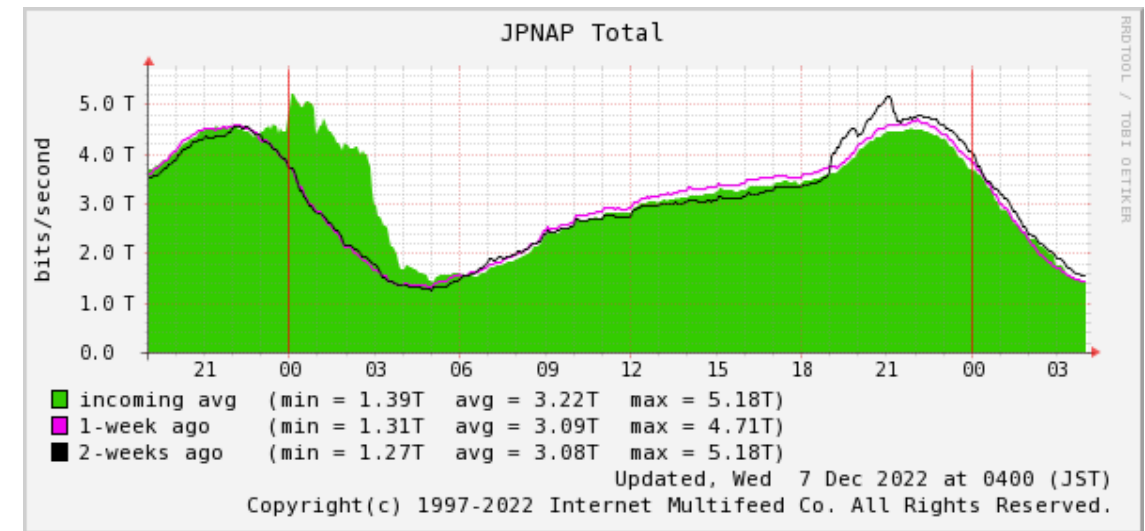
- Until recently, big live events were broadcast only on TV
- Some events began to stream via Internet
- A turning point was World Cup soccer game 2022

The rise of the live streaming

World cup soccer games 2022

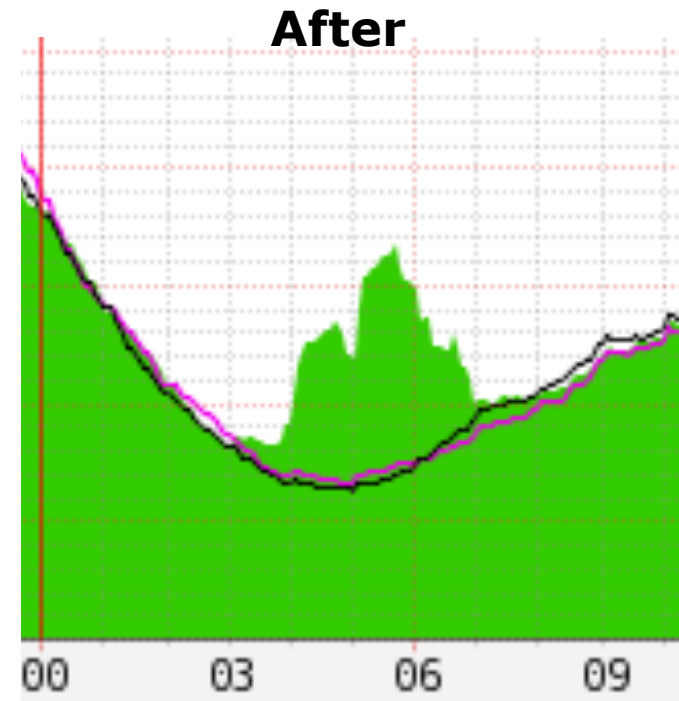
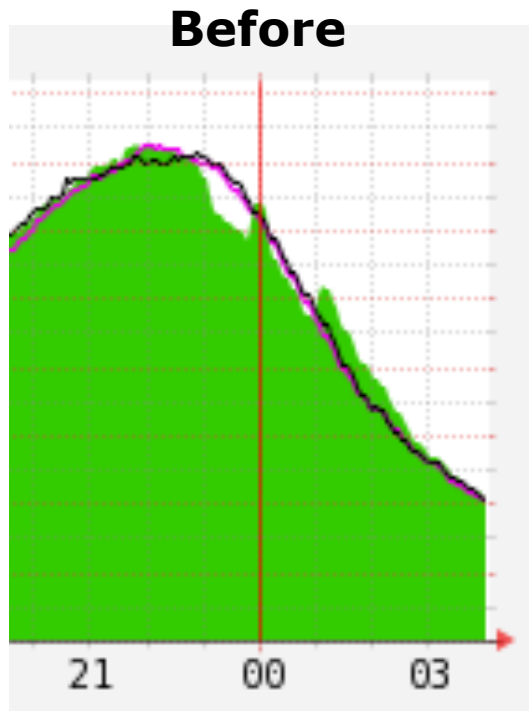


- Dec 3, 2022
 - World cup soccer game
 - Japan vs Spain



- Dec 6, 2022
 - World cup soccer game
 - Japan vs Croatia

The rise of the live streaming



- Jun 28, 2018
 - World cup soccer game
 - Japan vs Poland
 - Live was broadcasted on TV
 - Traffic decreased by 0.5Tbps

- Dec 3, 2022
 - World cup soccer game
 - Japan vs Spain
 - Live streaming on the internet
 - Traffic increased by 1.7Tbps

The rise of the live streaming

- Unique approach of Japan
 - “CONNECT” council
 - ISPs and Content providers/CDNs are regularly sharing the information
- Should special care about an event stream, which
 - is very popular
 - is free
 - doesn't require registration

Recent topics

- The rise of the live streaming traffic
- The third hub of Japan is growing

The third hub of Japan is growing

- Usually, it is very difficult to make another hub city other than Tokyo and Osaka

The third hub of Japan is growing

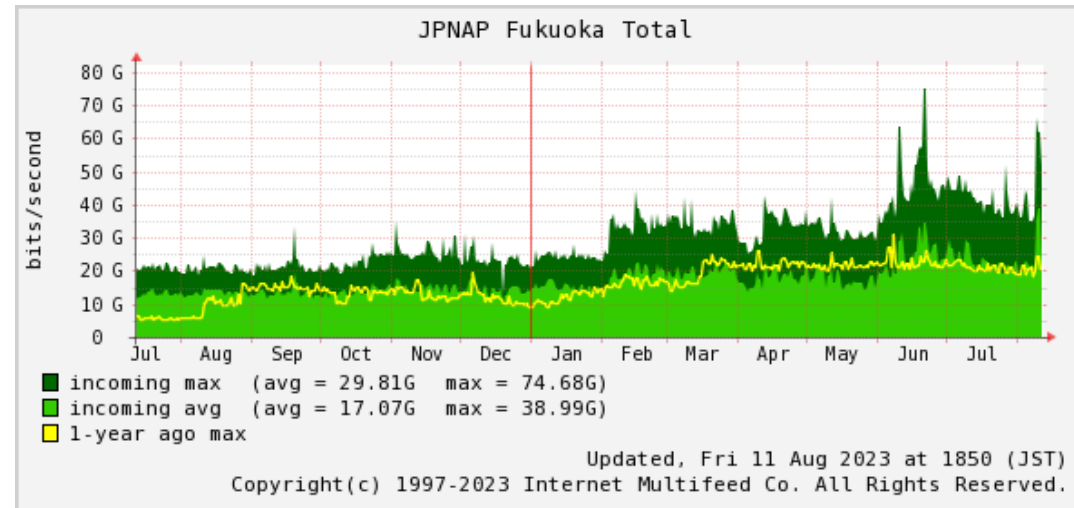
- Fukuoka
 - A major city of Kyushu Island
- Three commercial Internet exchanges were built there around 2021



Google Map

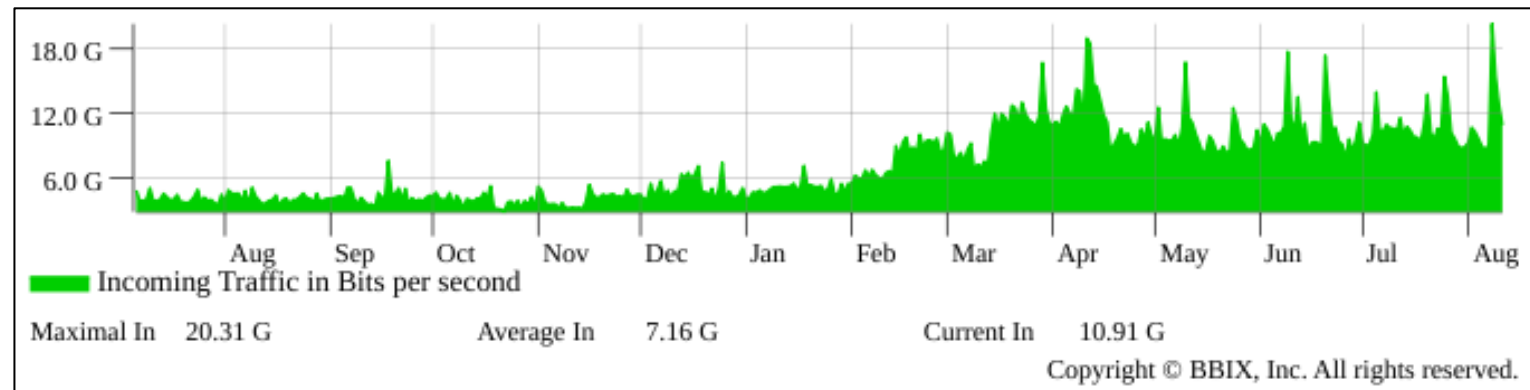
The third hub of Japan is growing

JPNAP Fukuoka



<https://www.jpnap.net/en/ix/traffic.html#jpnap-fukuoka-traffic>

BBIX Fukuoka



<https://www.bbix.net/en/service/ix/traffic-graph/> (Fukuka-zone)

The key success factors

- There are substantial number of eyeballs (ISP or CATV) in Kyushu Island
- CDN providers or their cache servers could be invited
- The access lines to Fukuoka become cheaper than before

My comments on Internet Community in japan

- Japanese people involved in Internet operations and business collaborate and self-regulate well.
- These characteristics, along with high aspirations, are working well to make the Internet better for all users.
- My hope is that these values will remain within our community and be extended to economies across the Asia Pacific region, and the whole world.

Thank you!
ありがとう!
(arigato!)

Any questions and comments?