

Careful planning is for introducing NAT

- Operational advice from real-world experience
-

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Aug 2009



- **Introduction**

- **Technical Issues for introducing LSN**

- **Summary**
 - **Operational Advice to provide LSN**

Introduction: My Job

■ Company

its communications Inc.
the biggest CATV operator in Japan

■ Service

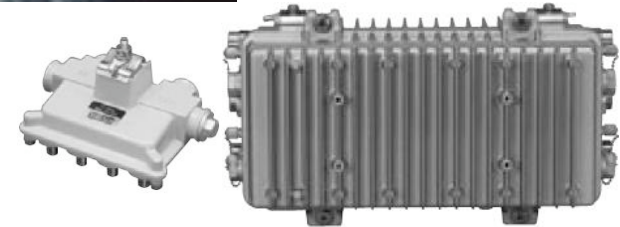
- TV Broadcast
- Internet Access
- Primary Phone

■ Jobs

- Access network & Backbone design /construction / operation

■ Recent Interests

- IPv6 deployment for CATV broadband access
- ISP network operation before & after IPv4 address exhaustion
- Evaluation of Internet reachability



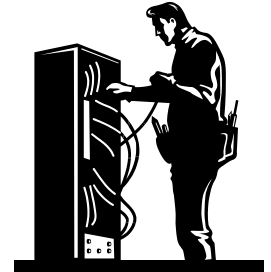
Service Areas



Why I'm talking about NAT?

- We have been providing NATed access service
 - since 1998 (before issued IPv4 assignment guideline)
 - over 50,000 customers are using NATed access

=> We have experience of operation of ten years

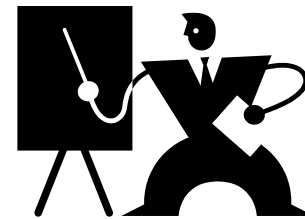


- Proposals about LSN, NAT444
- LSN = Large Scale NAT (CGN, MUN)

- JPOPM13, APNIC25
- IETF

draft-shirasaki-isp-shared-addr

draft-shirasaki-nat444-isp-shared-addr



- Many ISPs examine introduction of LSN
 - 40-50% of ISPs in Japan
 - for IPv4 address exhaustion

Scope of this presentation

■ Operational Advice of LSN from real-world experience

- Technical and quantitative knowledge
- Analysis actual equipment and traffic

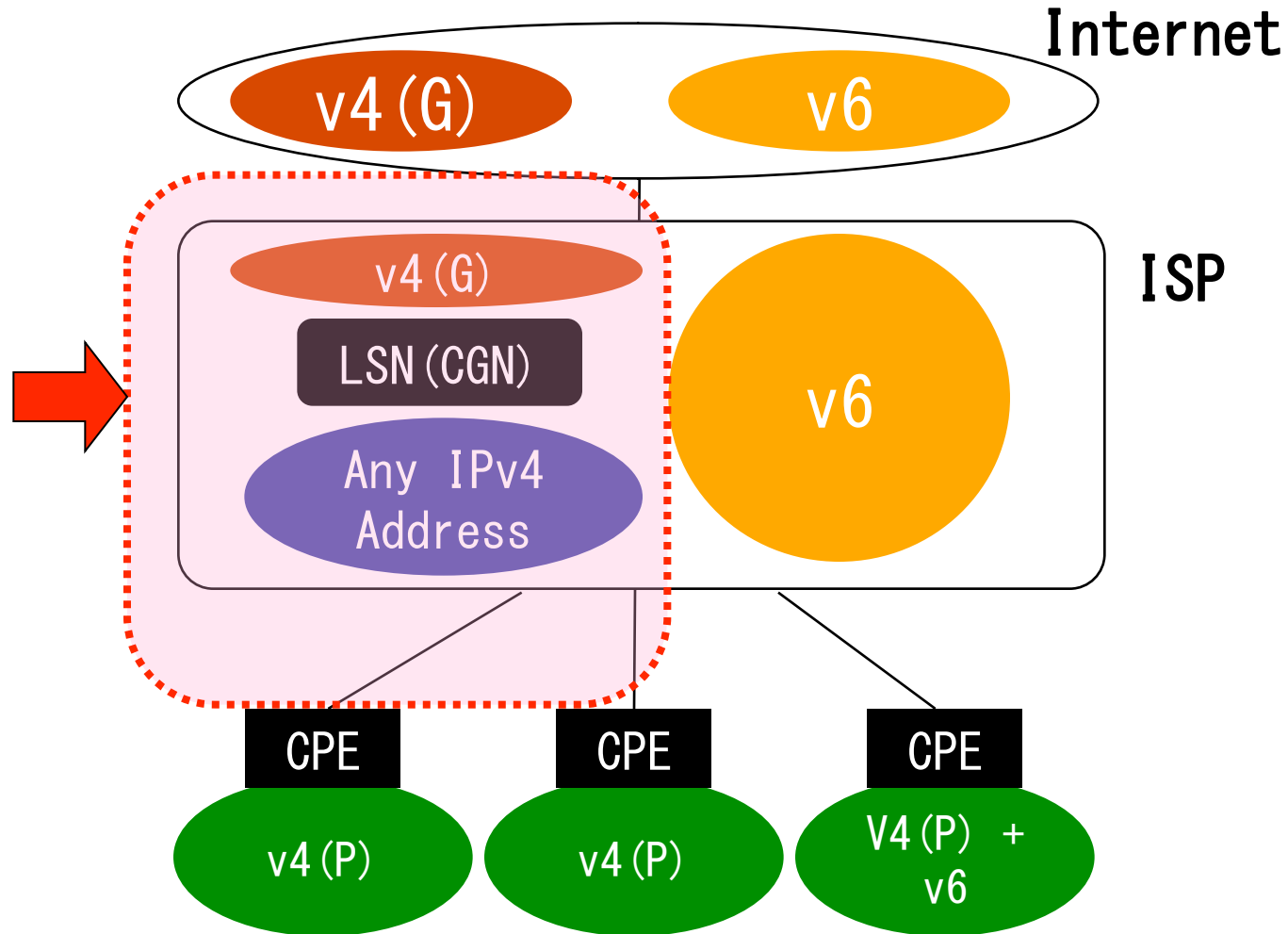
■ Contents

- Resource management (session number, size of storage)
- Network design & Routing
- Timing to deploy

■ Why?

- We (our customer) will share an IPv4 address in the future
- We will have provided our services with the enough quality
- 2 years after !!

Network model: NAT444

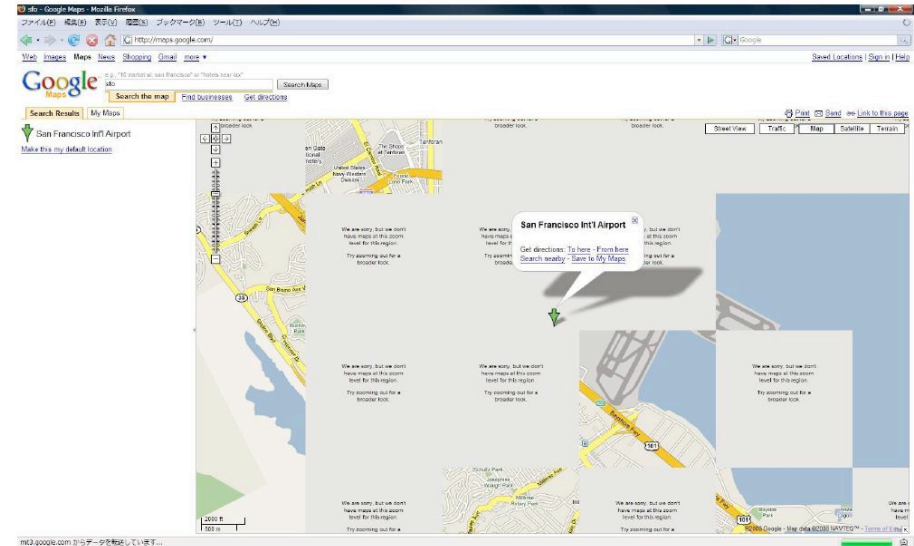
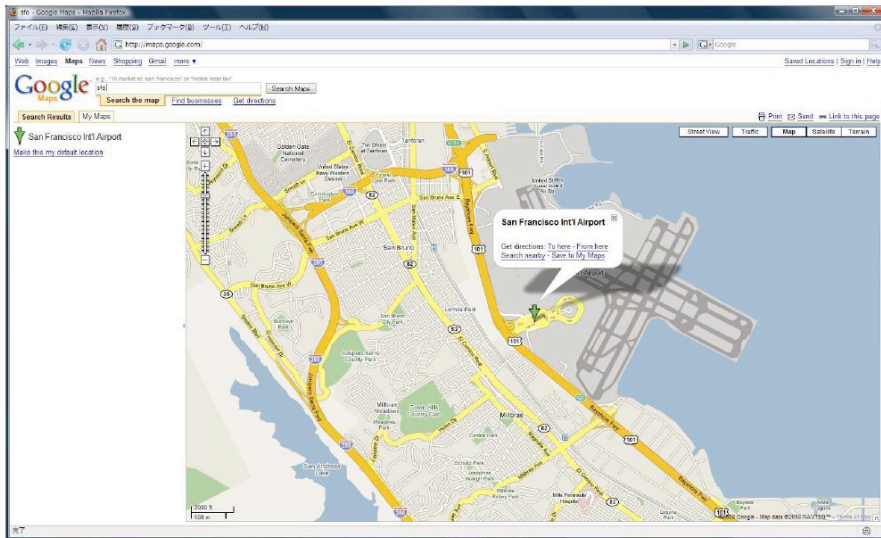


http://www.ietf.org/proceedings/09mar/slides/opsarea-2/opsarea-2_files/v3_document.htm

Technical Issue (1/5) port number

Max 30 Connections

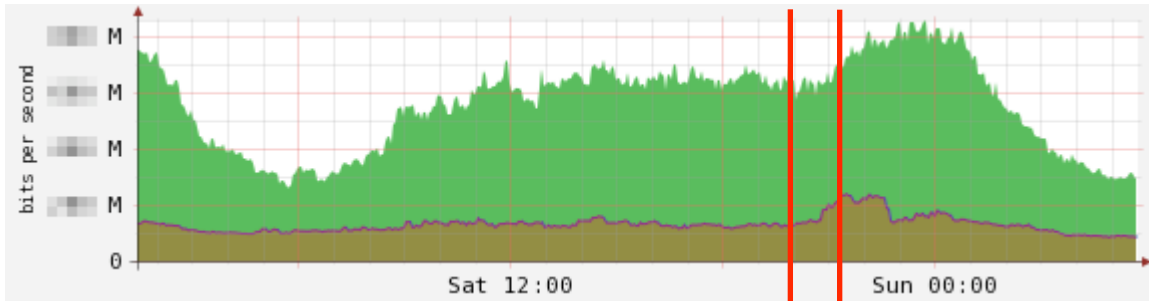
Max 15 Connections



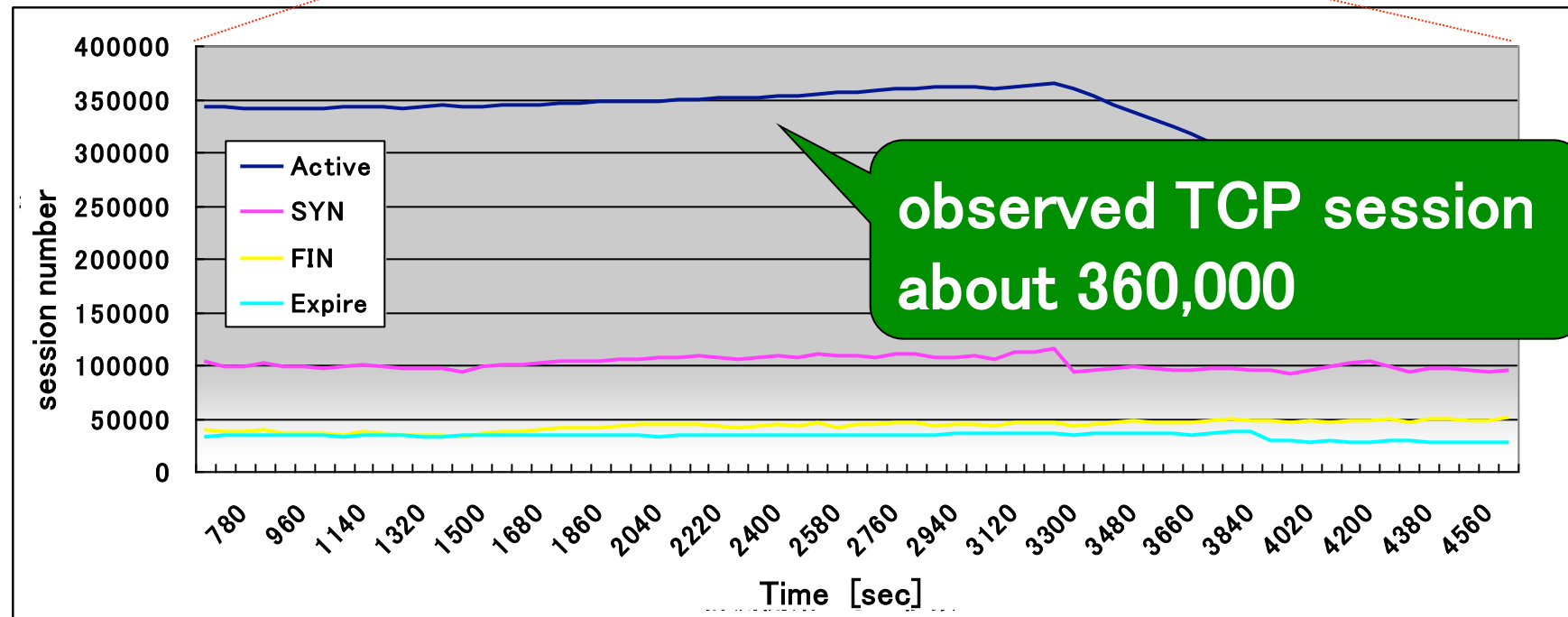
✂ <http://www.nttv6.jp/~miyakawa/IETF72/IETF-IAB-TECH-PLenary-NTT-miyakawa-extended.pdf>

How many sessions we should provide?

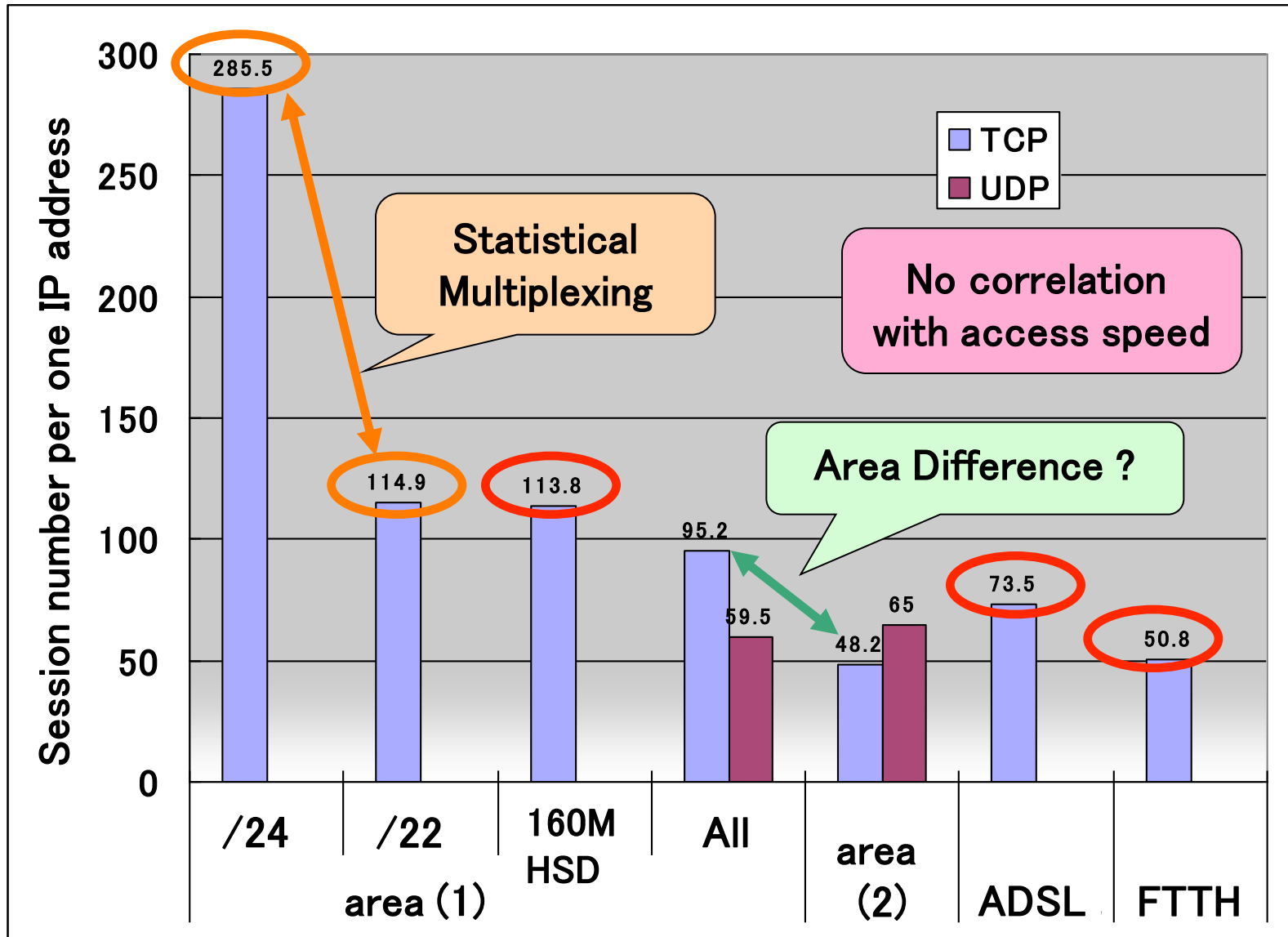
Session numbers in consumer broadband access



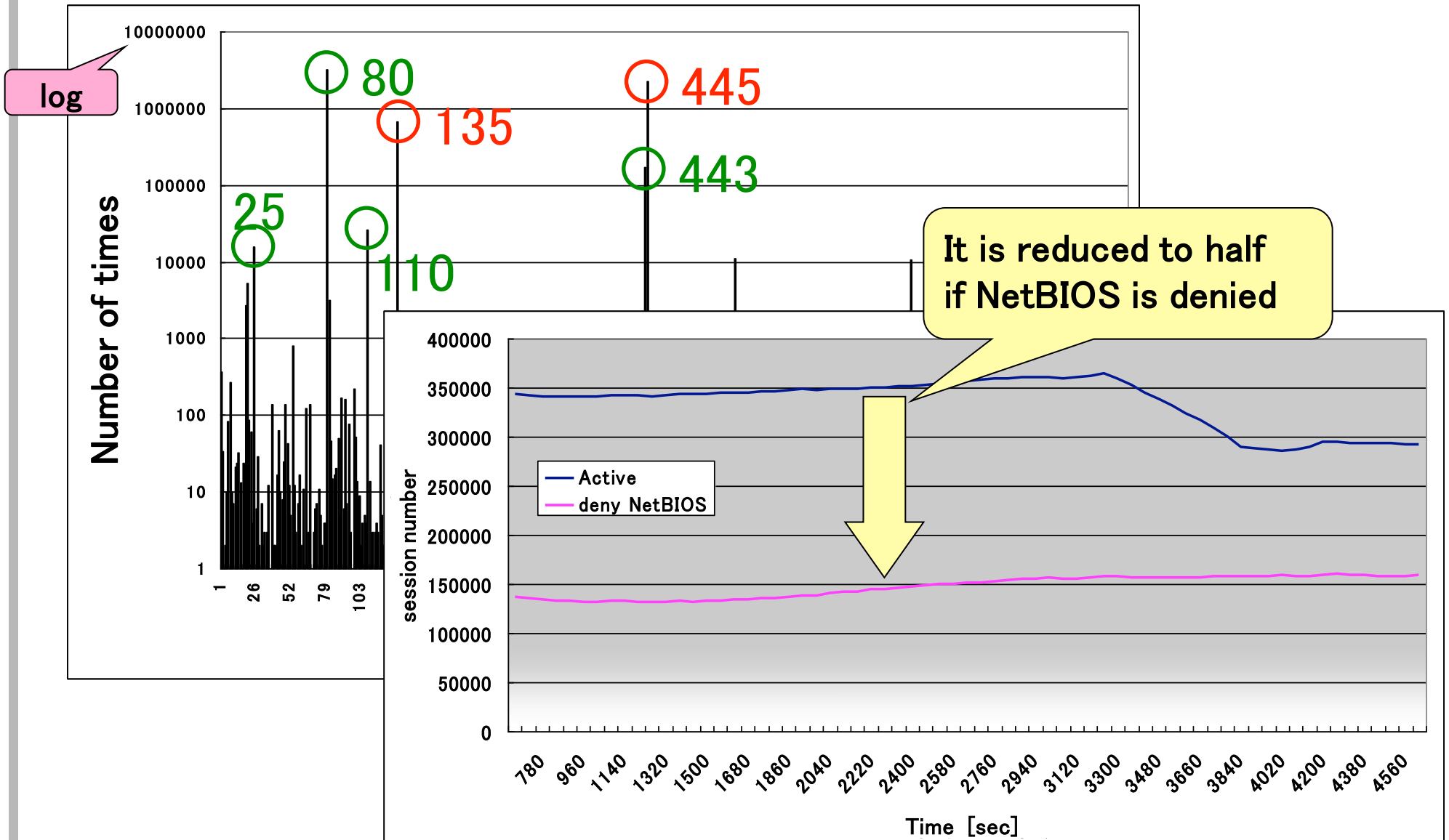
- Regional POP
- Night of the weekend
- Uniq addresses: 7,300



Analysis by network size, area and speed



Distribution of the port number (TCP)



Conclusion of port numbers

- **Average of 50–300 sessions per one user**
⇒ different by a condition (area, block size)
- If the block is small, there are many sessions per user
(Statistical Multiplexing)
- Difference by regions (the class of users?)
- No correlation with access speed
- It is reduced to half if NetBIOS is denied

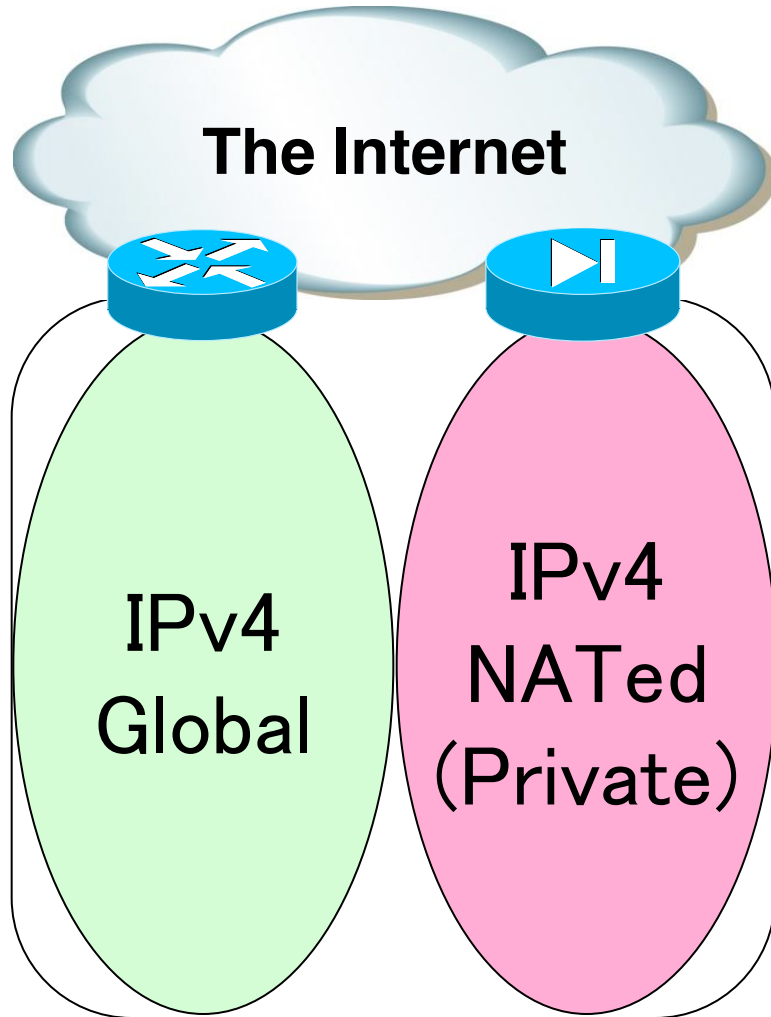
Technical Issue (2/5) Logging Storage

- Bit size per one session: about 48bytes
 - Source IP Address + Port : 48bit
 - Destination IP Address + Port : 48bit
 - Translated IP Address + Port : 48bit
 - Time stamp: 64bit
 - Other information(status, information of NAT box, etc)

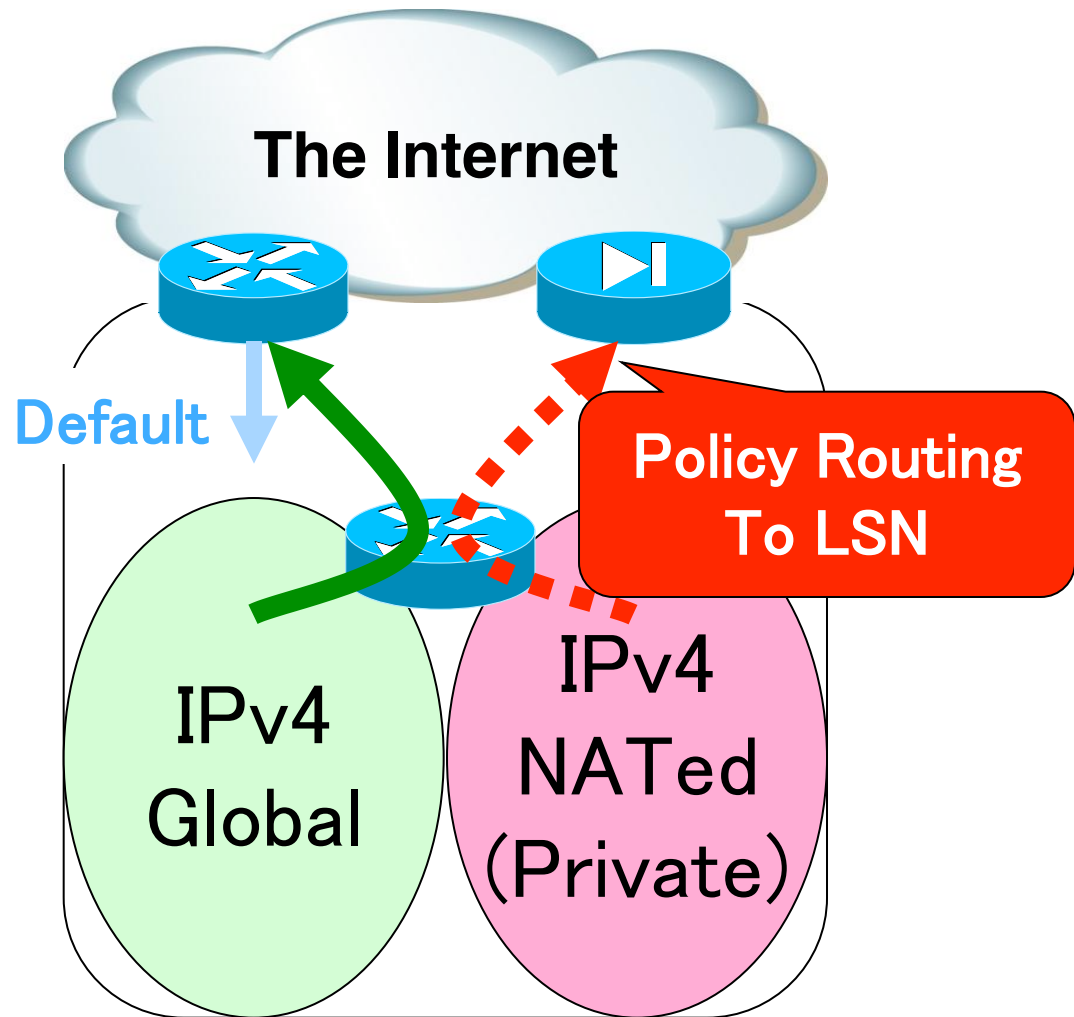
 - Actual observed flow(about 7,000 addresses)
 - TCP: 171,378 flows, UDP: 458,491 flows
- ⇒ about 40GB? / day
- ⇒ about 14TB? / year



Technical Issue (3/5) Routing

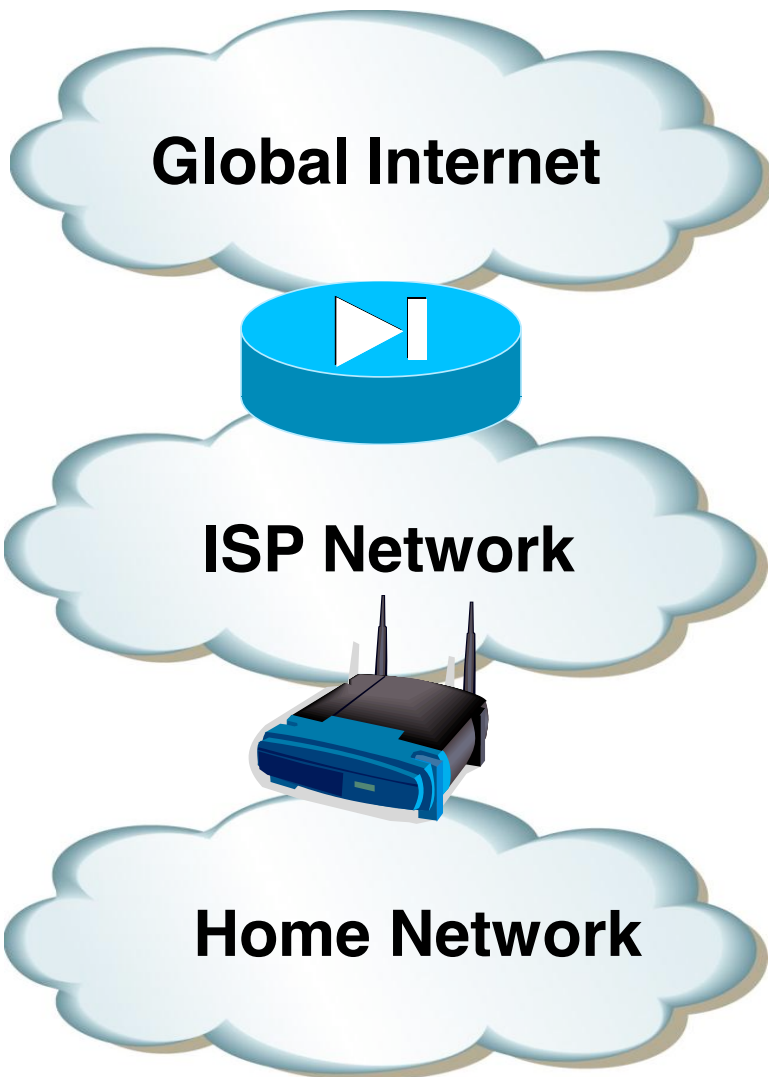


Separate



Mixed

Technical Issue (4/5) IP address



ISPs usually use 10/8

Default of most residential router is 192.168.x.x

10.x.x.x



192.168.x.x

10.x.x.x



10.x.x.x

Can ISPs use 10/8 for NAT?

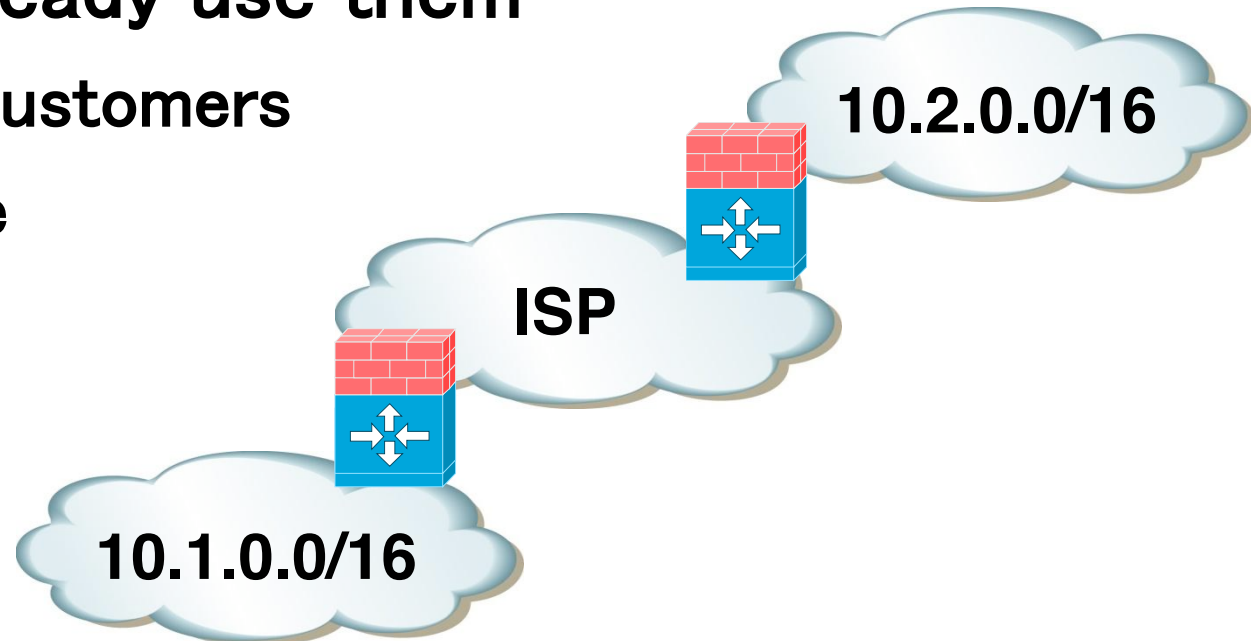
■ Reserved for infrastructure

- DOCSIS cable modems
- VoIP Terminals
- etc

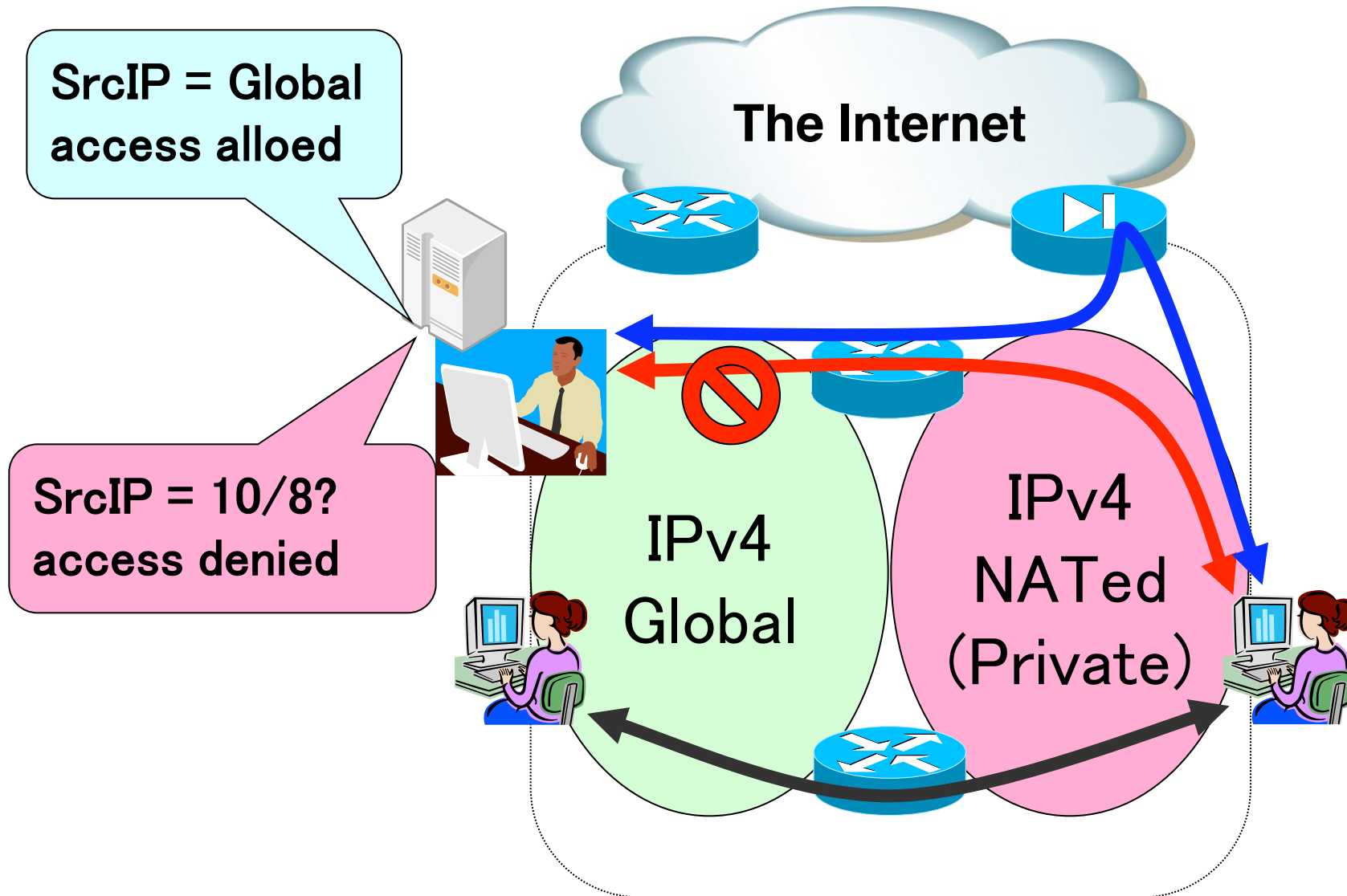


■ Customer already use them

- Enterprise customers
- VPN service



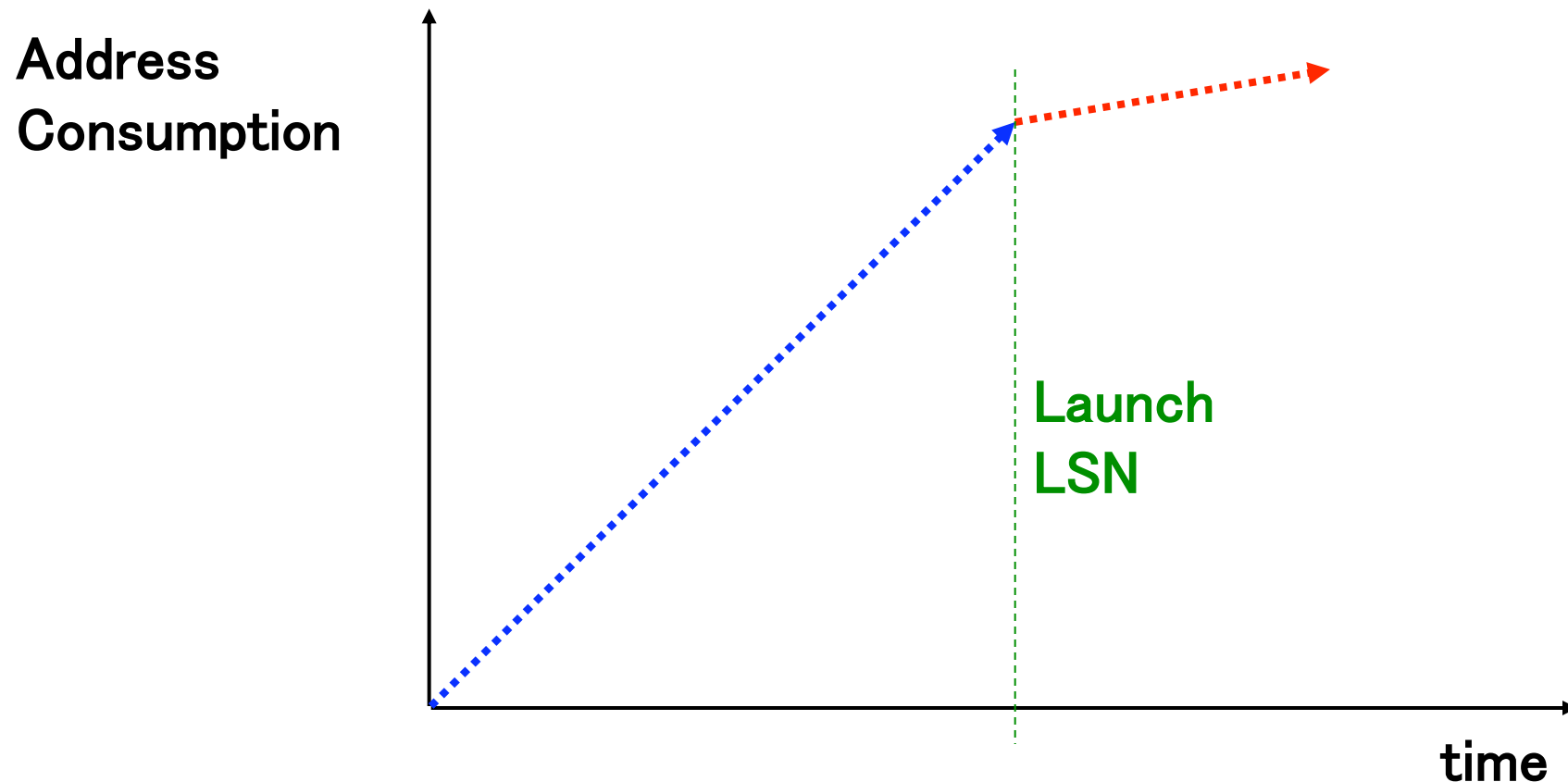
Communications between customers



Technical Issue (5/5) Time of Launch

ONE IPv4 address is shared by **N users** using LSN

⇒ Address consumption speed slows down **1/N**



Address pool and Launch Timing

- Current: 1,000 addresses / month
- After Launch LSN: 50 users share one address
⇒ 20 addresses / month

Available addresses	remain of NAT pool
/24 (256)	12 months
/22 (1024)	50 months
/21 (2048)	100 months



Do you degrade of the existing service?
Do you purchase the IP address?

■ Management port number

- We should focus on behavior of our customers
 - Hardly? Gently?
- Many users share a large block
 - Effectively statistical multiplexing

■ Routing

- Policy routing is used many depending on topology

■ IP address, Timing to deploy

- If you can use 10/8, you should understand that some problems may occur.
- You should reserve enough addresses for the translation.