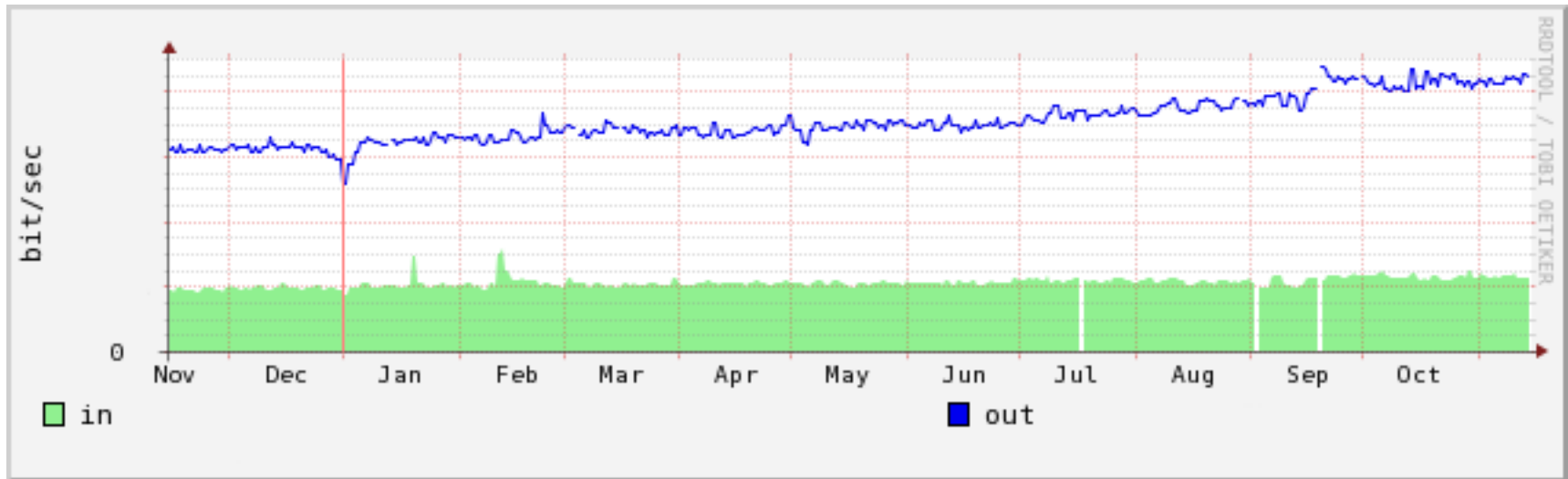# sync'ed clients and traffic trends

Matsuzaki 'maz' Yoshinobu
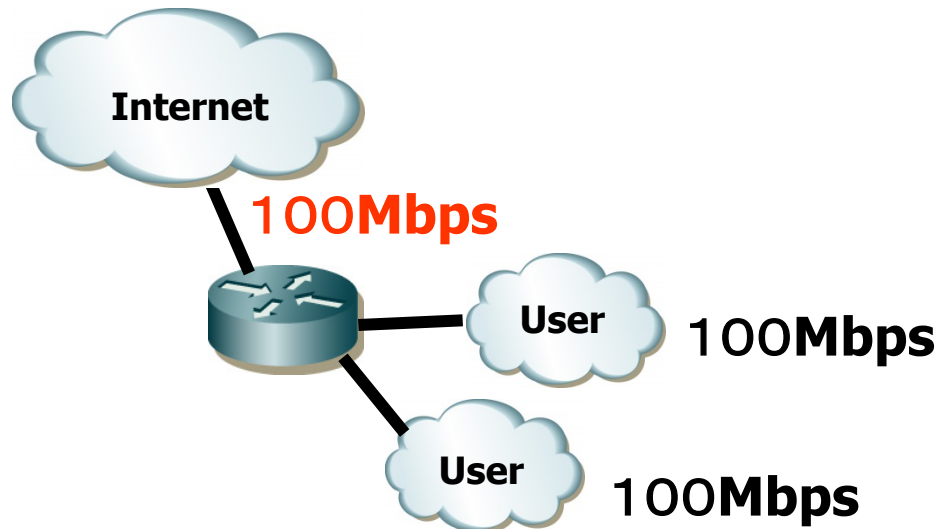
<maz@iij.ad.jp>

traffic and network design

- we plan upgrading based on traffic trend
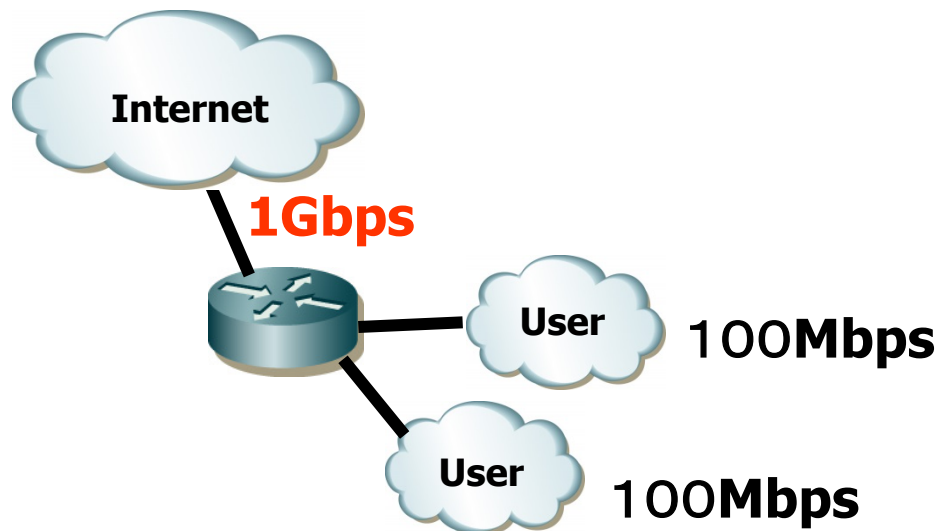 - to avoid congestions

network design #1

- over-subscription
  - only some of users uses the network at once
  - expecting statistical multiplexing effect
 - need to estimate utilization to avoid congestion

Internet

100**Mbps**

User   100**Mbps**

User   100**Mbps**

network design #2

- over-provisioning
  - provide more bandwidth than needed
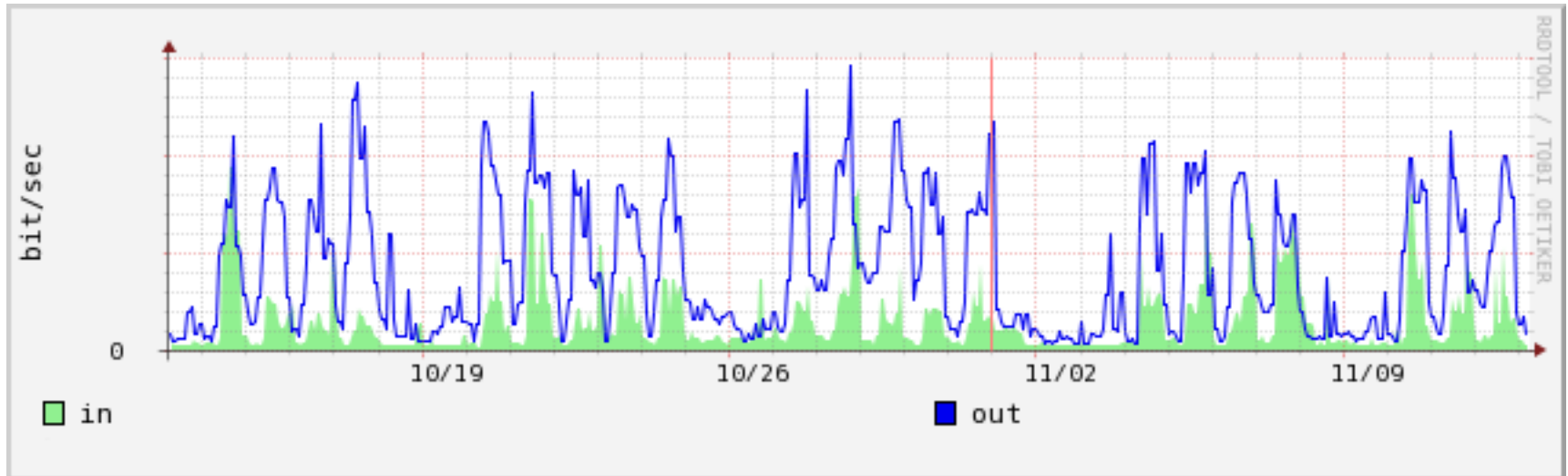
backbone network design

- based on over-subscription
  - we can expect more statistical multiplexing effect
  - cost effective
- over-provisioning to its utilization
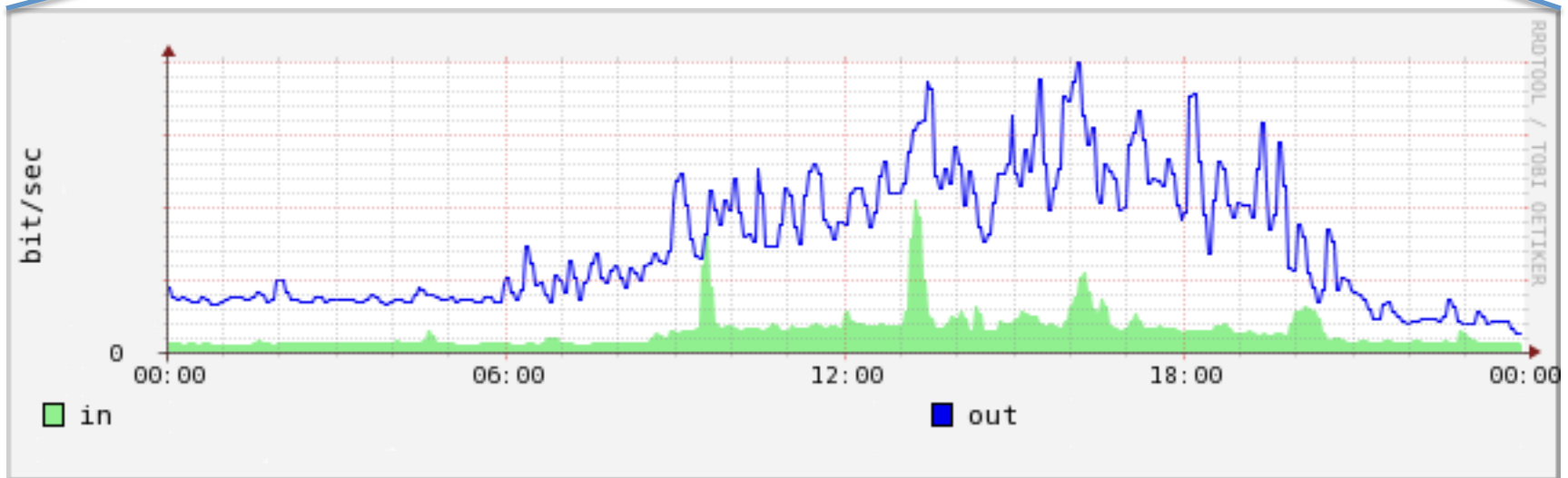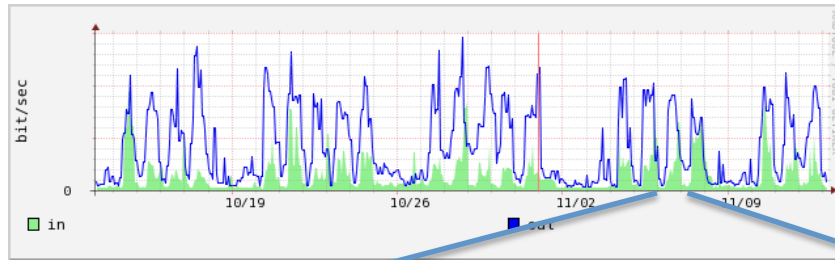 - for redundancy
  - low latency

Backbone

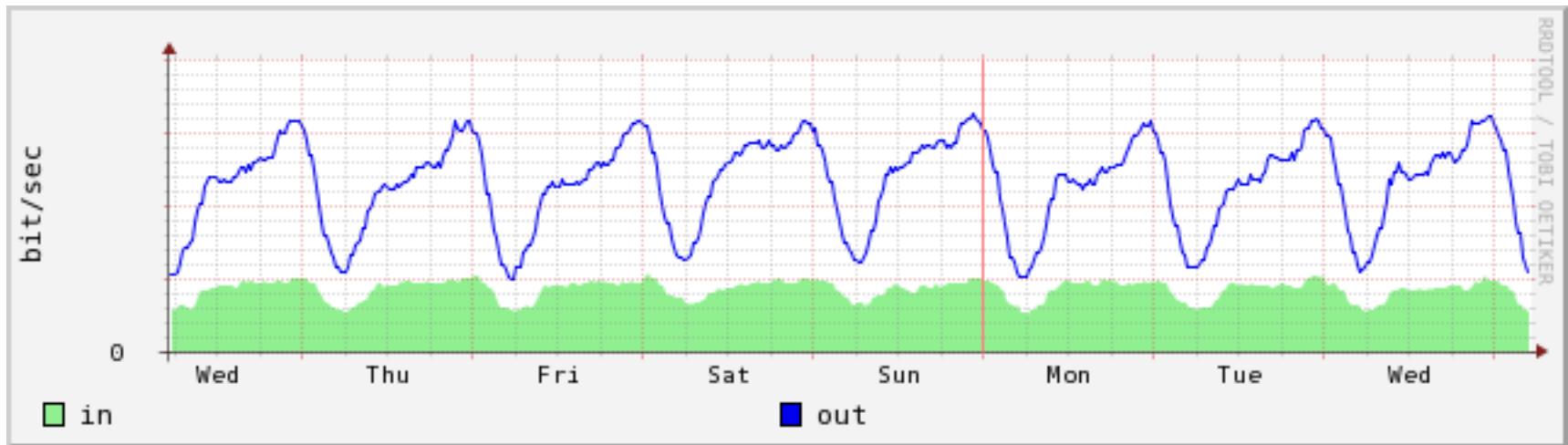statistical multiplexing effect

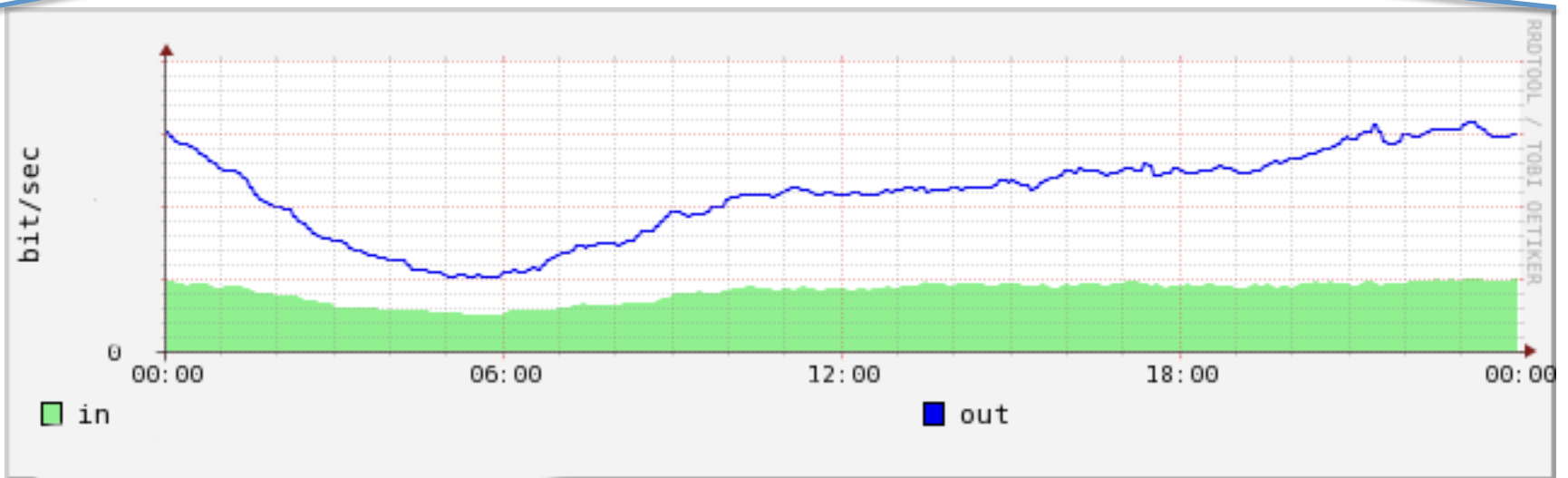maz@iij.ad.jp
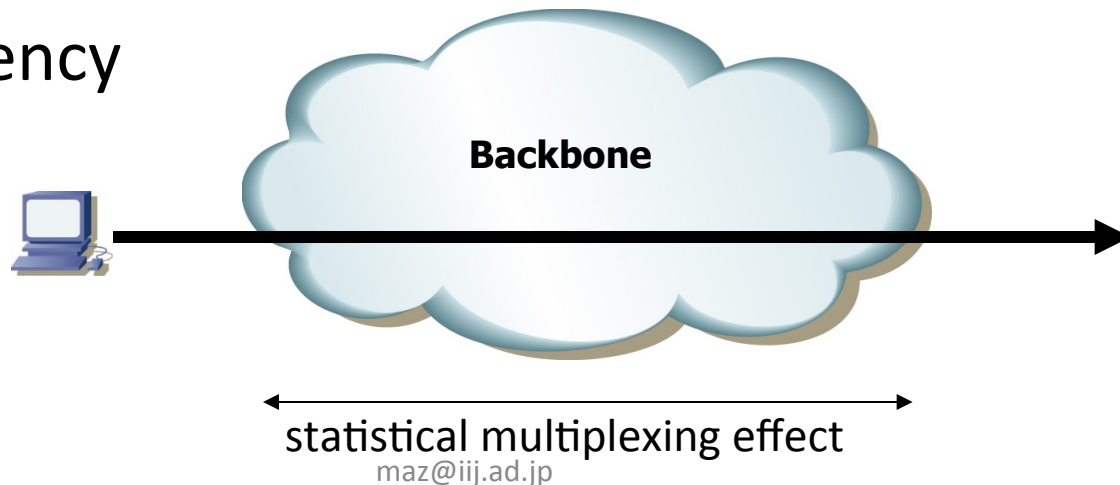
typical traffic

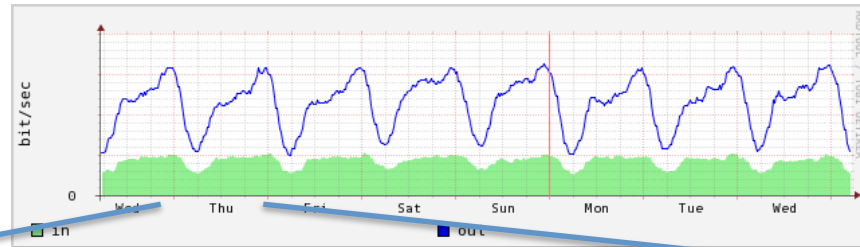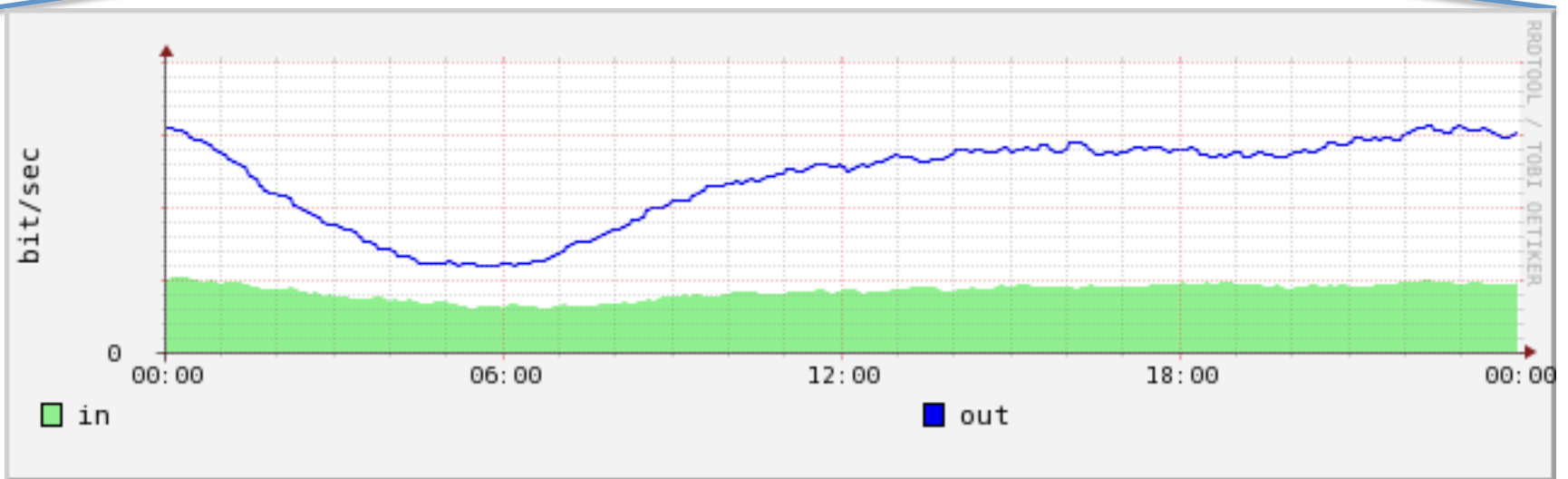- enterprises
- consumers
- CDN
- IX
- mobile

enterprise

enterprise weekday

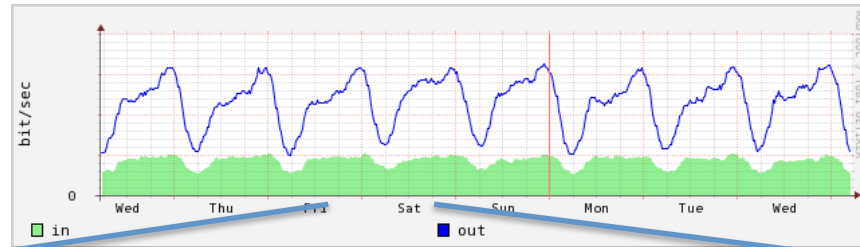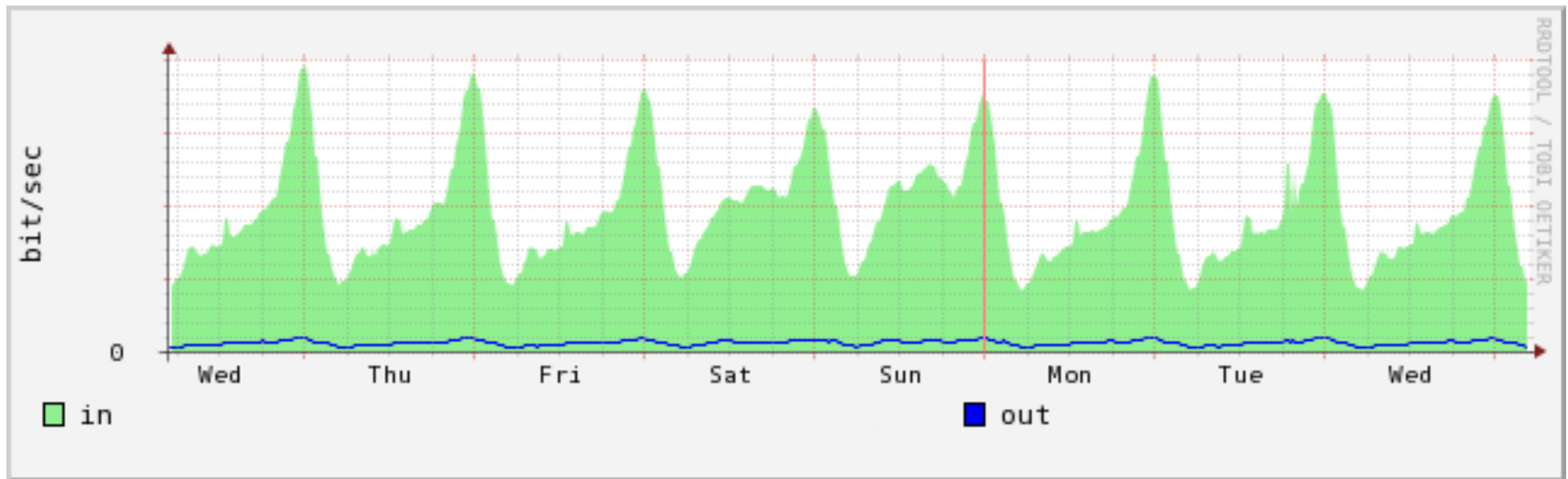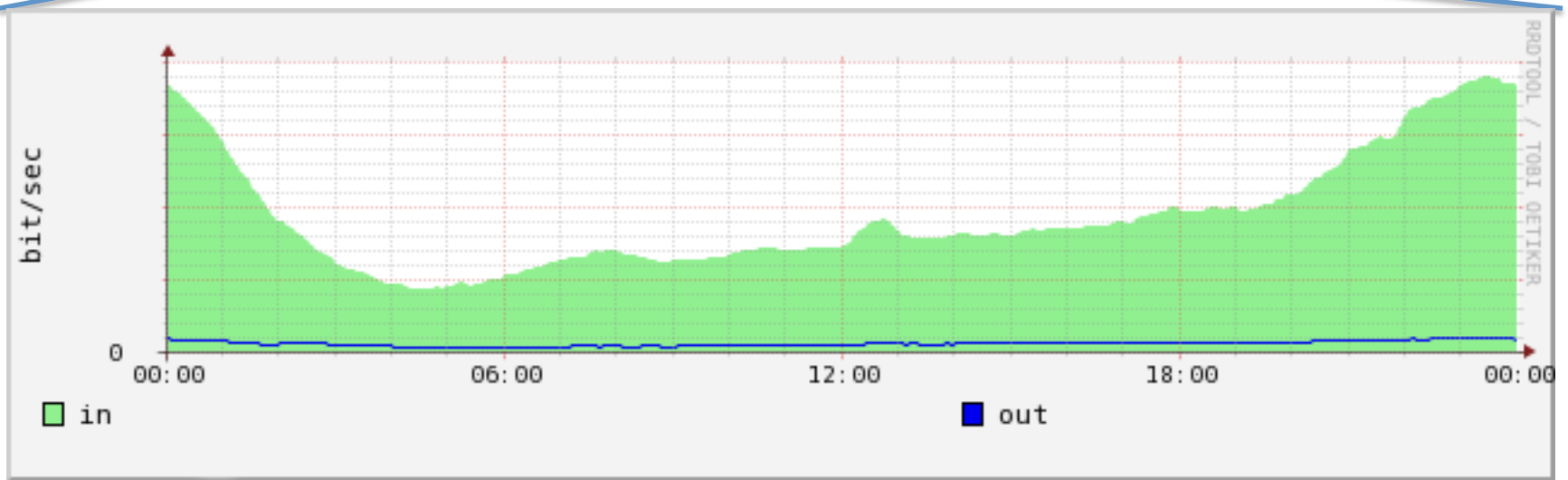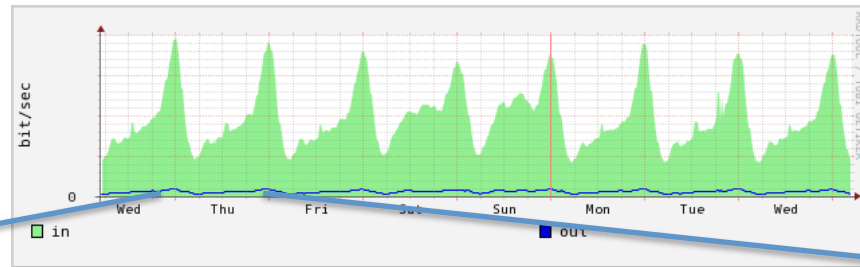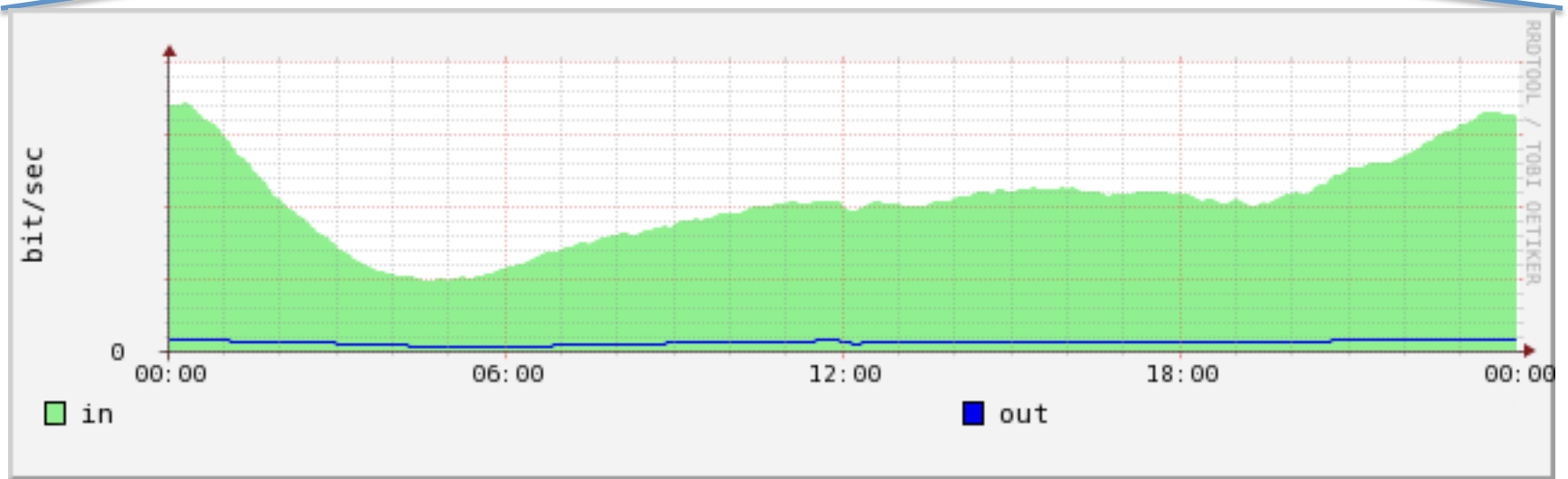# consumer (broadband)

consumer weekday

consumer weekend
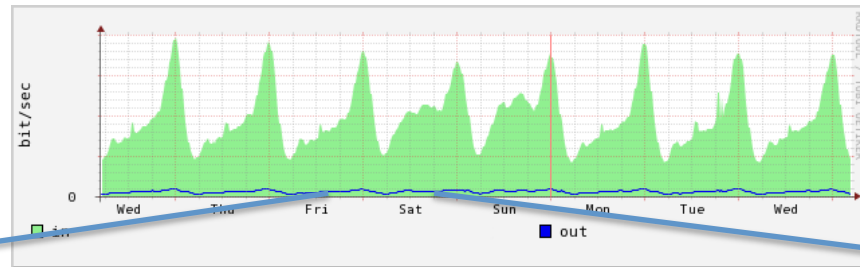
CDN (contents distribution network)

CDN weekday

CDN weekend

IX (Internet Exchange)
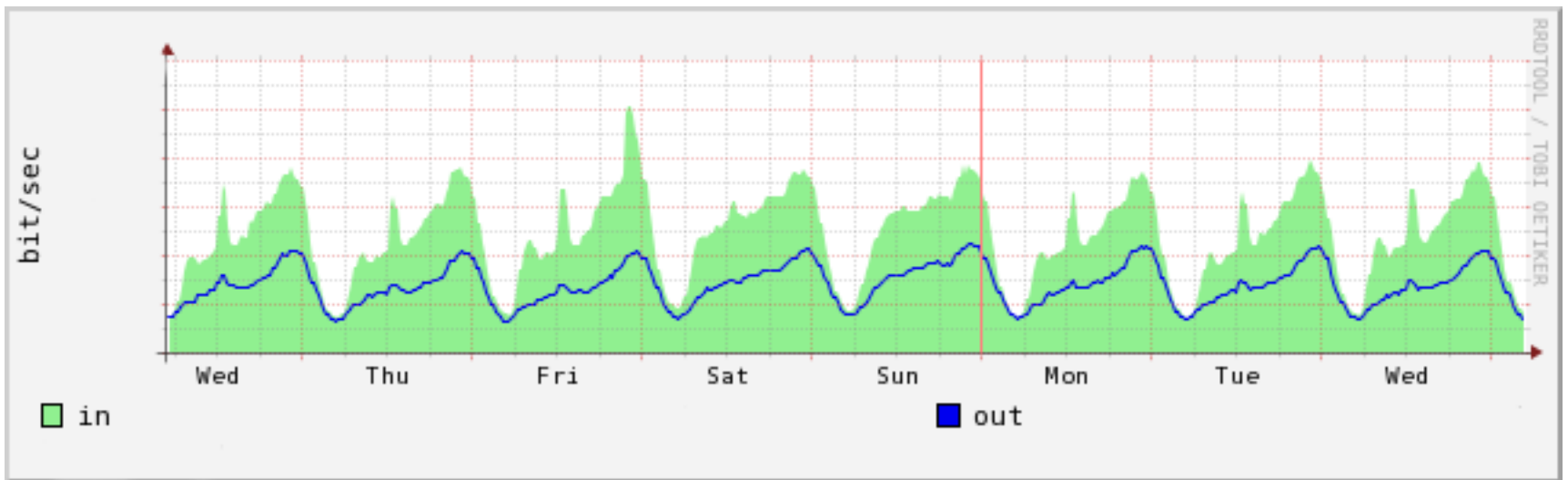
IX weekday
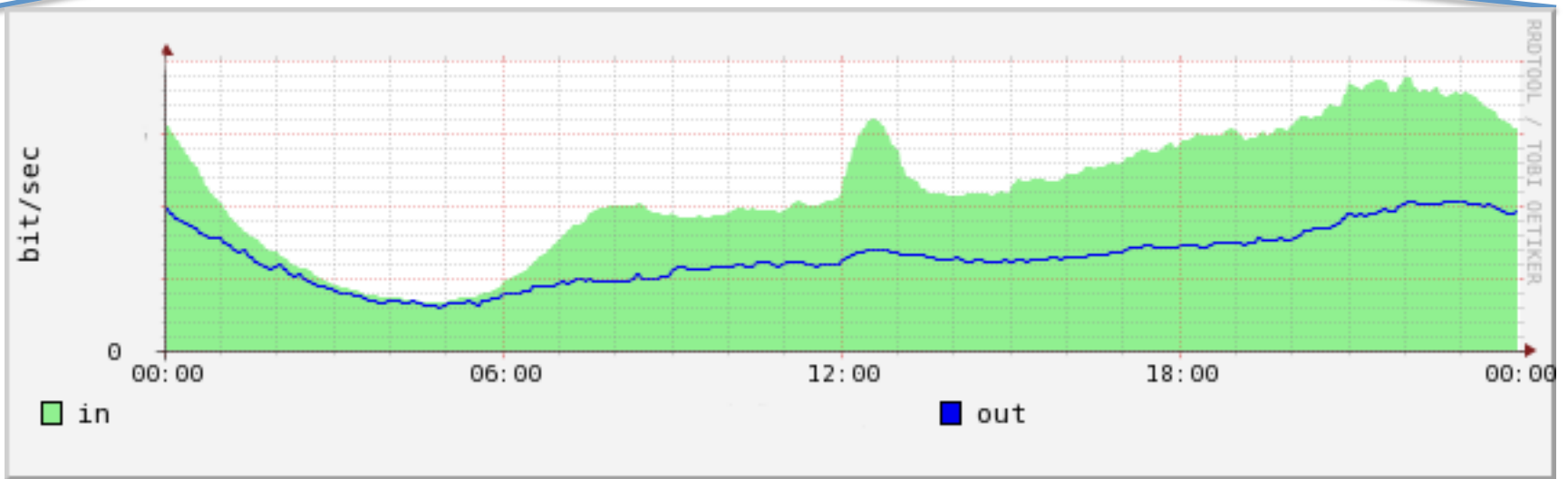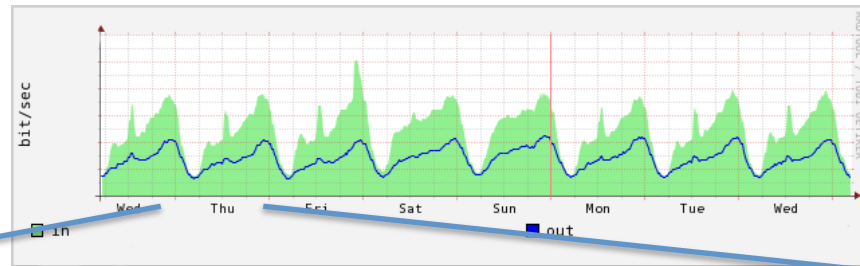
IX weekend
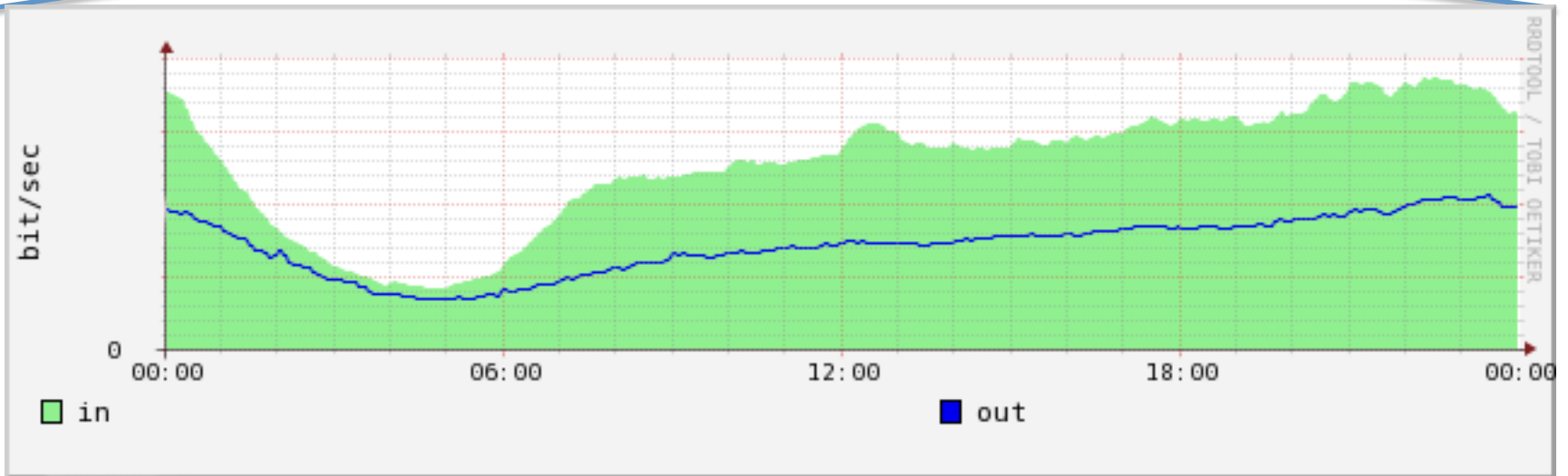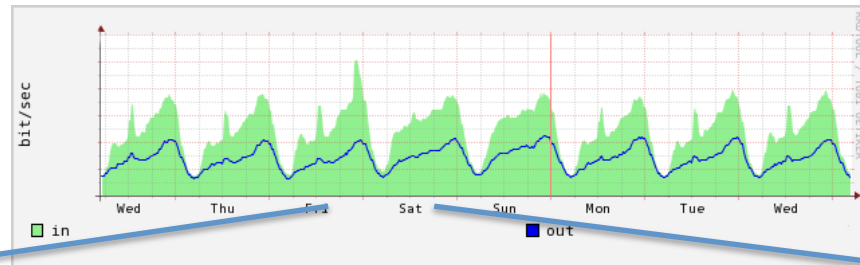
mobile

mobile weekday

maz@iij.ad.jp
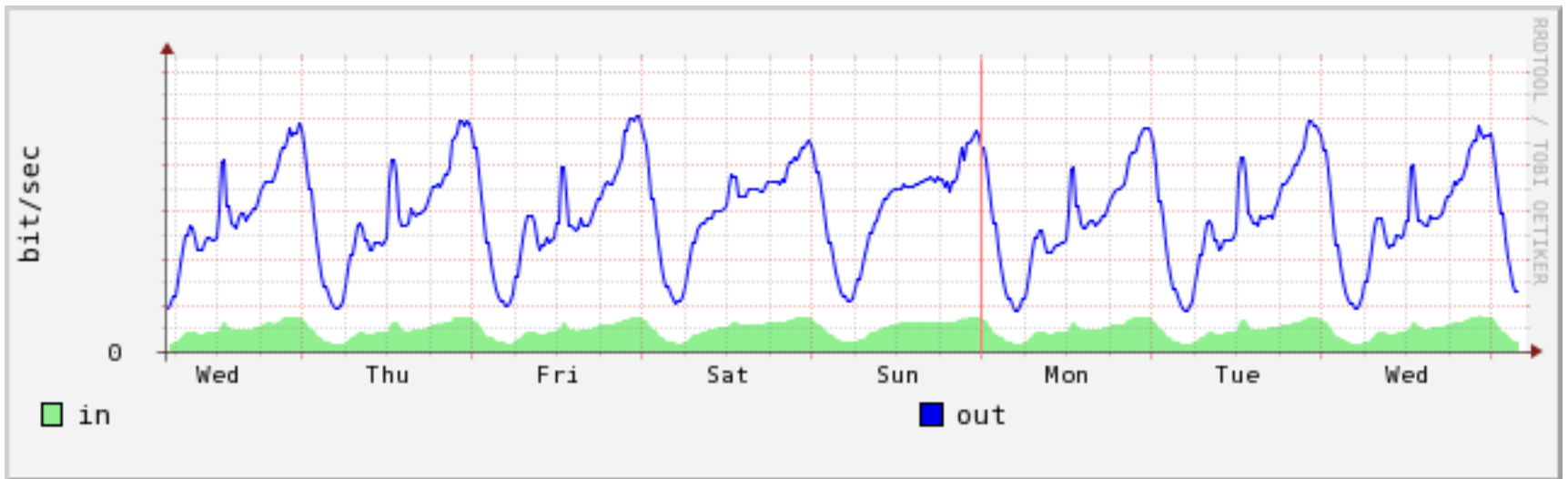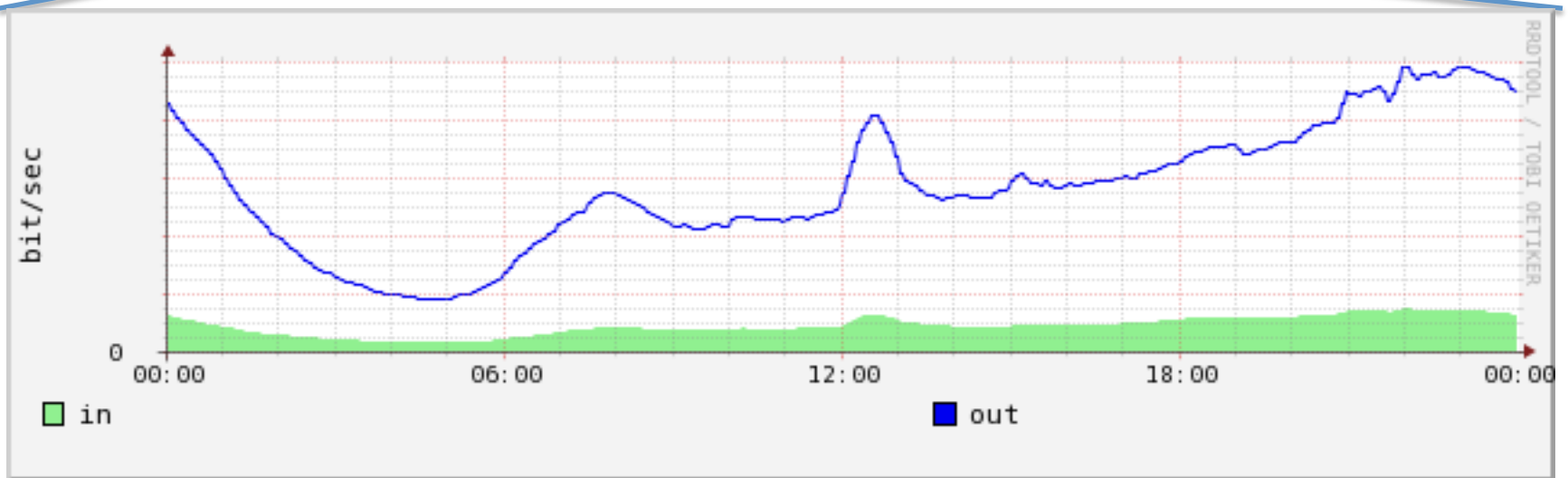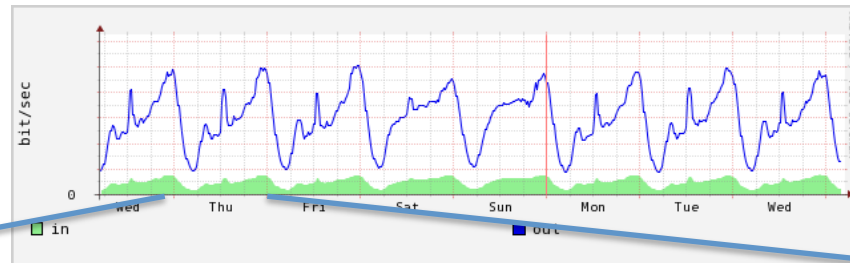
mobile weekend
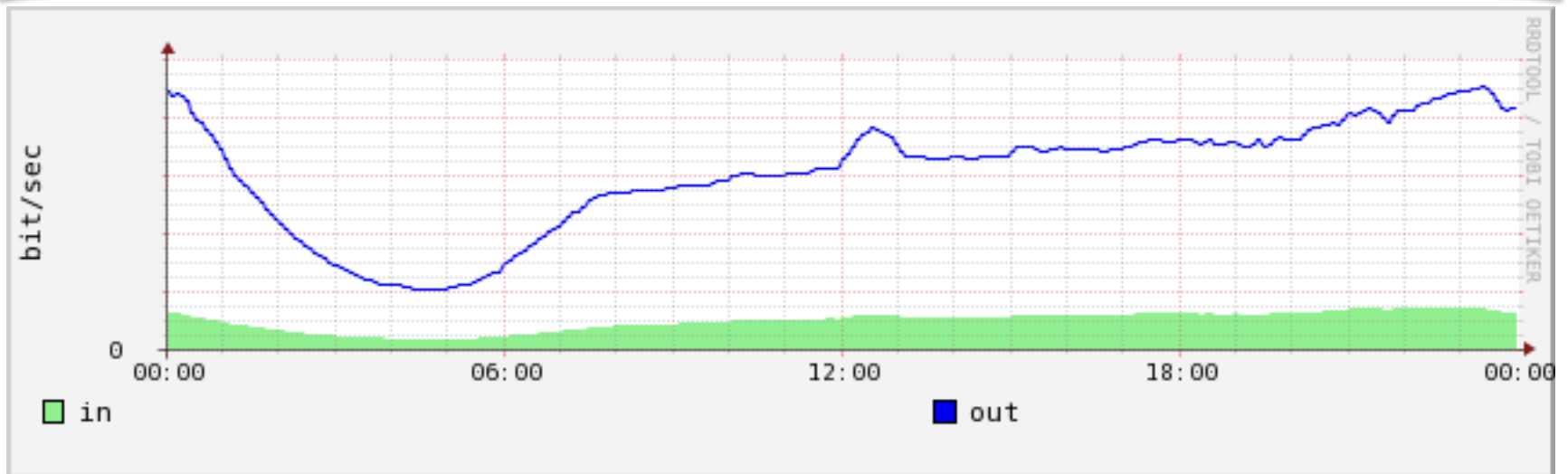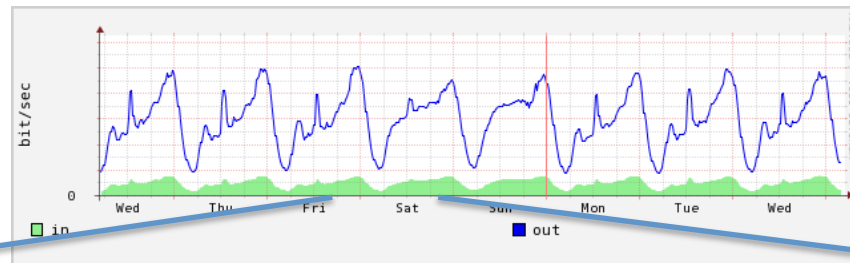
traffic trend

- we can upgrade based on that
  - important!
- know your customer
  - how they are using network

traffic concentration

- it sometimes happens
- 'statistical multiplexing effect' is reduced
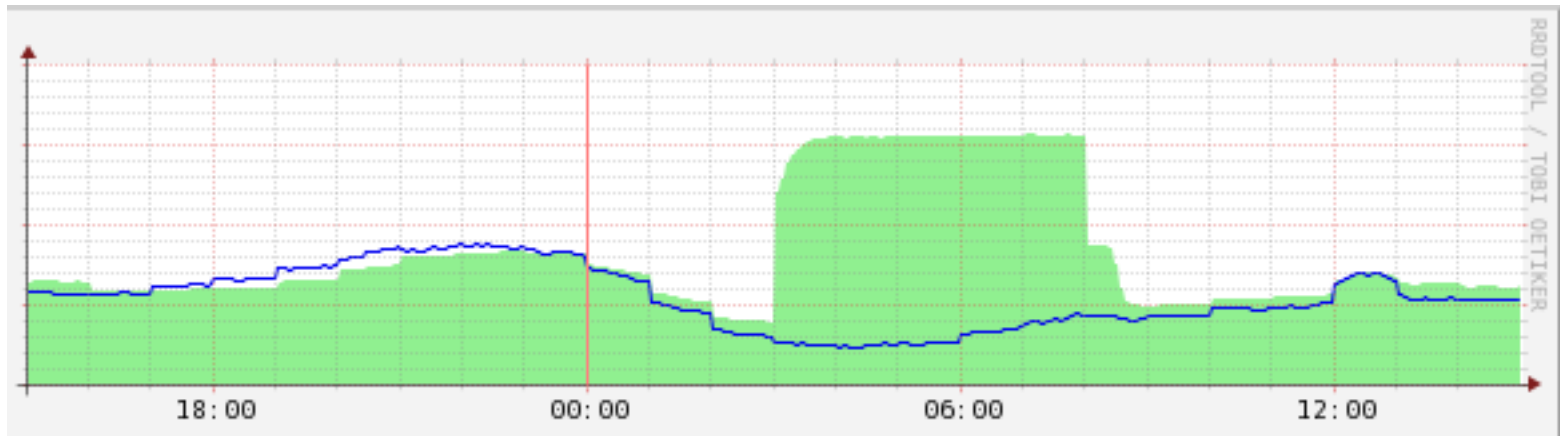
how to deal with concentrations

- upgrade
  - more bandwidth
  - cost +
- wait and see
  - congestion
  - customer experience -
- something else
  - ??

new year greetings

- January 1st 00:00-02:00
  - phone call
  - SMS
  - e-mail
  - SNS
- about 7 times more messages than usual
- mobile operators have asked users to avoid such messages during the peak time

software/data distribution

- Windows Update
- iOS/MacOS Update
- game update
- karaoke update

- several giga byte data
- at the same time
- many clients

iOS8

- it seems Apple introduced some kinds of queuing mechanism
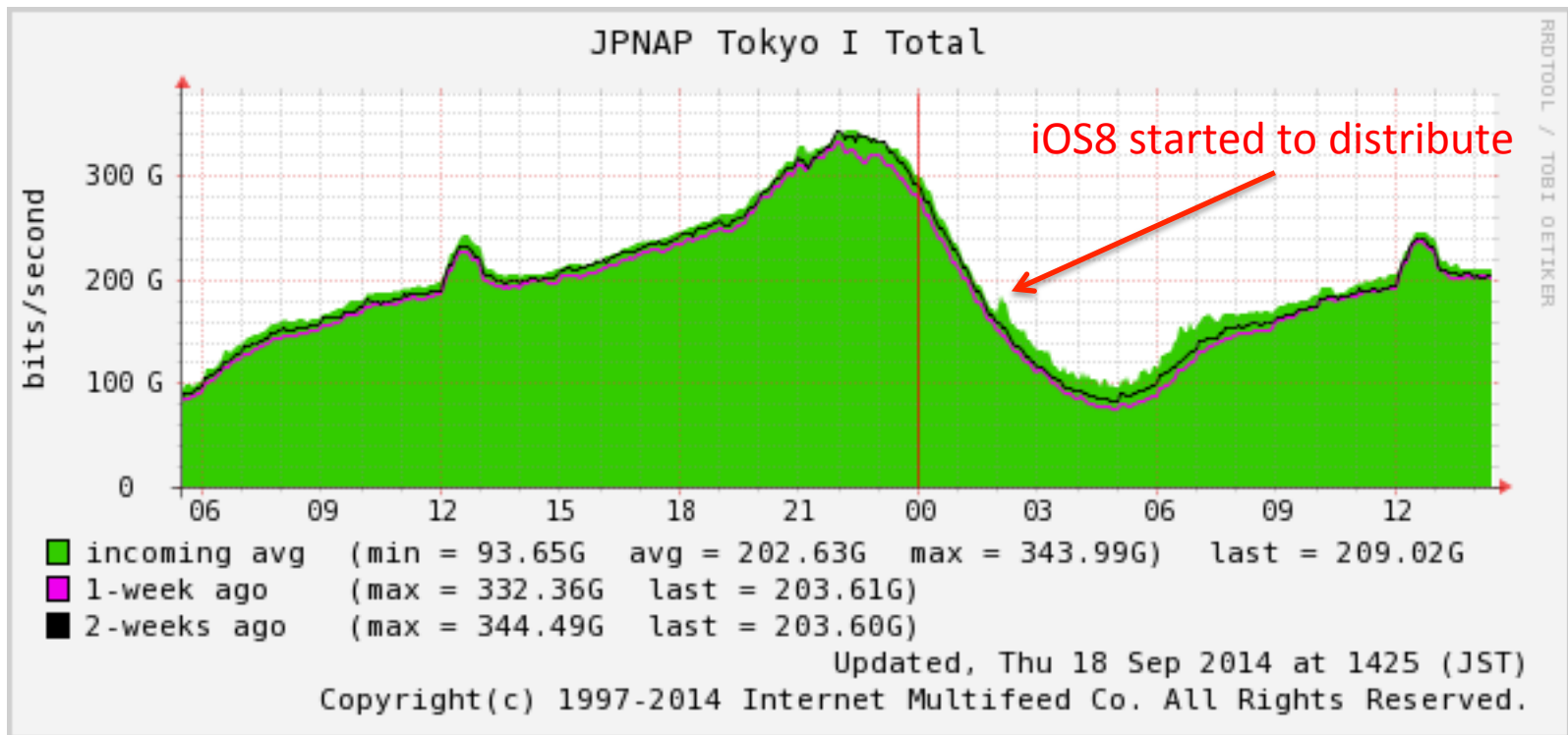
mobile device

- people bring it always
  - they can use it anytime
- it changed traffic pattern
  - commuting and lunch time
- commuting is a challenge for mobile in tokyo
  - about 3000 persons per train
  - 47 trains per hour
  - somehow you need to do handover ☹

mobile devices and alarm clock

- clock on mobile devices is well synced
  - you can use mobile as a clock
- mobile devices 'sleep' to reduce battery usage
  - and once wakeup, it starts to communicate

- mobile operators see high traffic peek at
  - 6:30, 7:00, 7:30….
  - very short period traffic

summary

- 'Statistical multiplexing effect' is a key of backbone network design
- There could be concentrations because of social and technical reasons
- Network operators should give feedback
  - to users, CDNs and application developers
  - to avoid concentrations where possible