

# Traffic Engineering

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# Internet Initiative Japan Inc.

## IJJ/AS2497



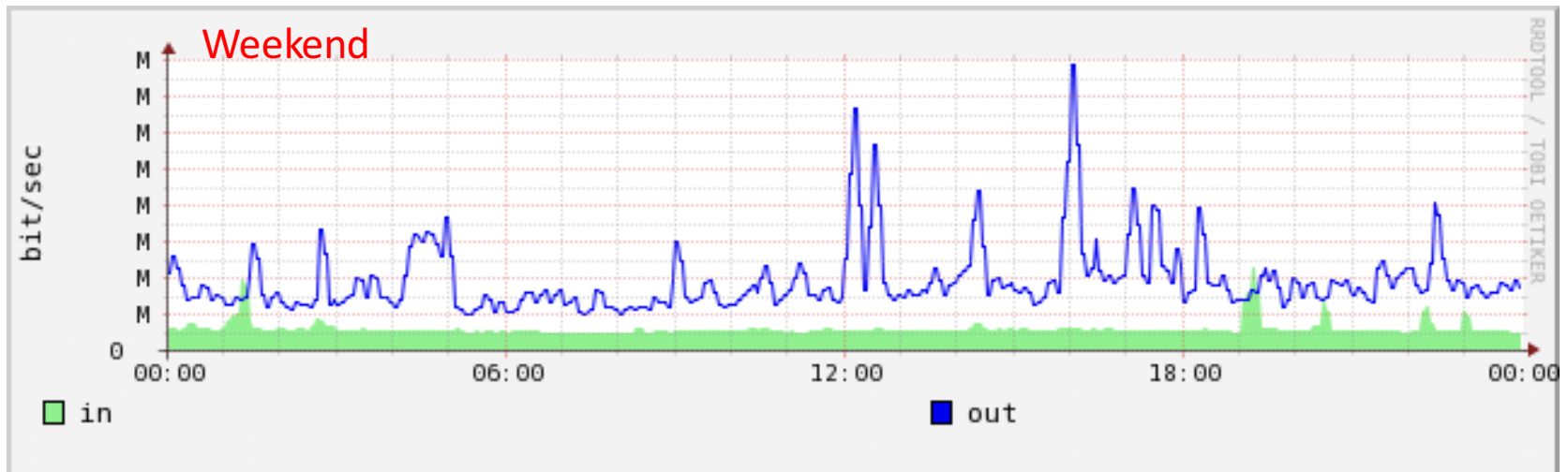
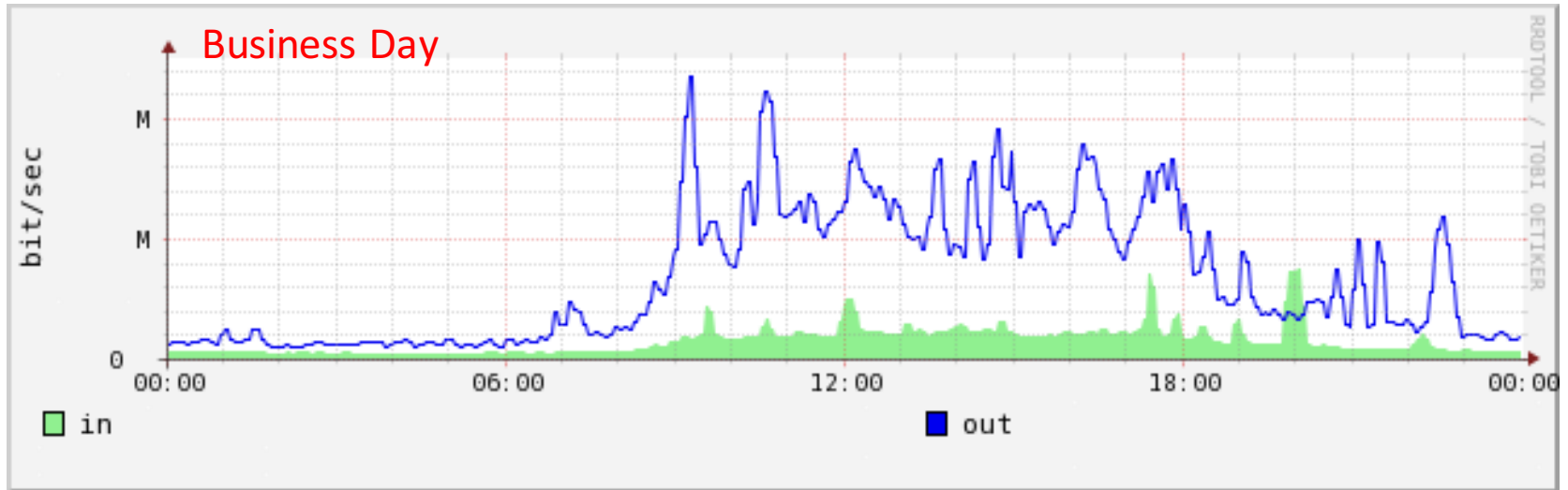
# IIJ/AS2497

- Very conservative about qualities
  - over provisioning
  - pretty straight-forward, nothing strange
- Techies
  - IPv6
  - DNSSEC
  - IRR & RPKI
  - Source Address Verification (BCP38/uRPF)

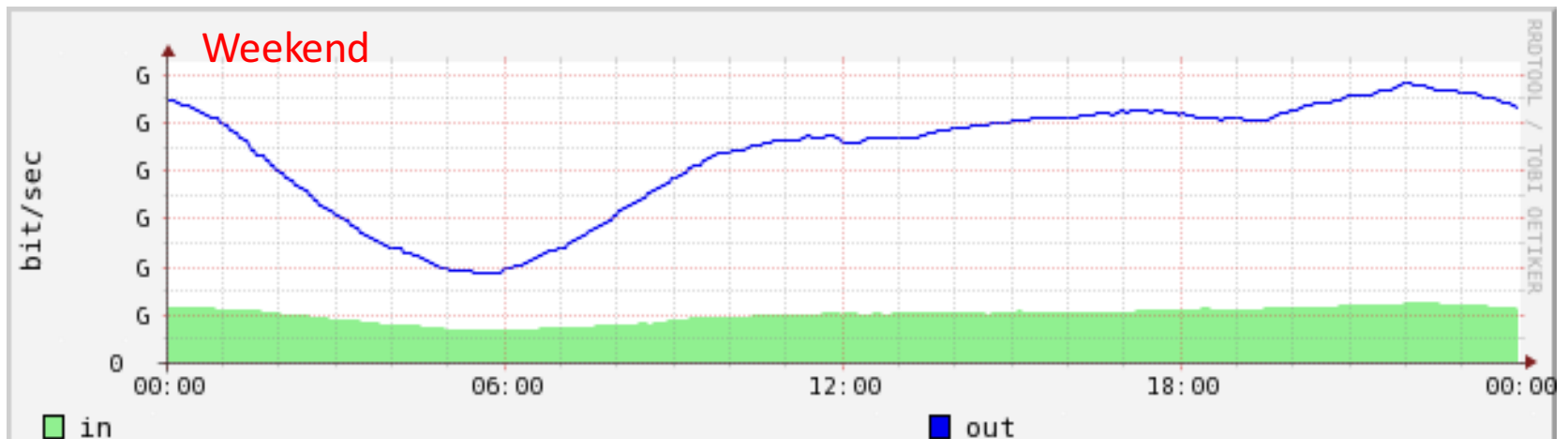
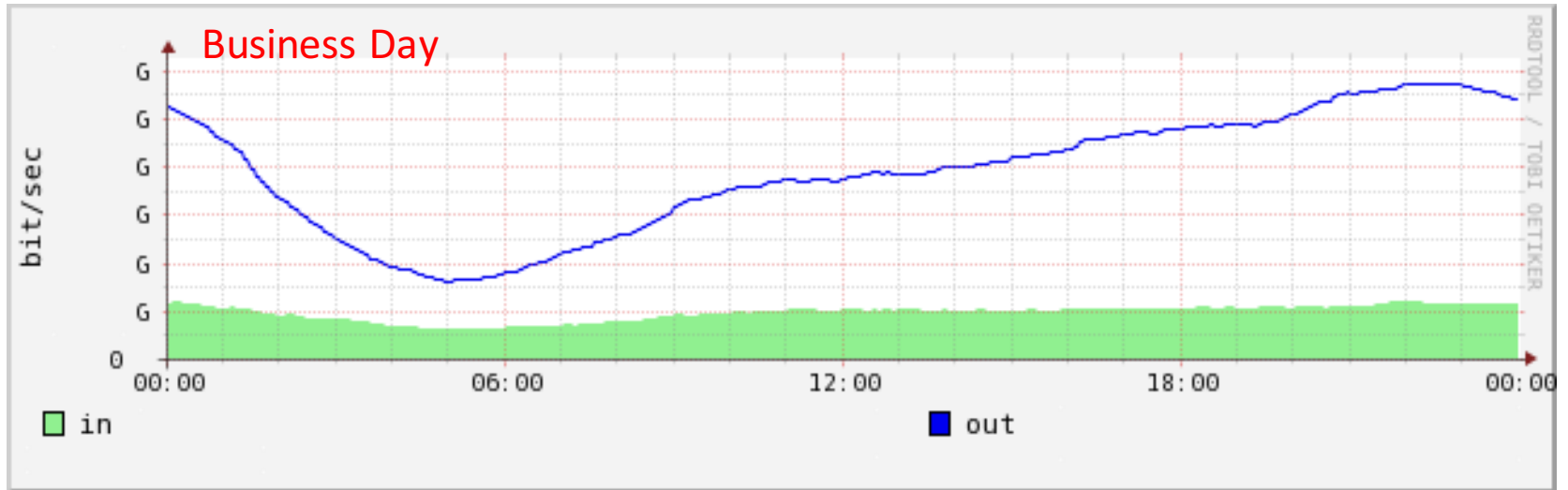
# Over The Top?

- IIJ does not care that much about contents
  - our most popular contents service would be...  
**ftp.ij.ad.jp** ;)
  - IIJ is just carrying IPv4/IPv6 packets
- As an ISP, we care about Volume, Traffic and Trends
  - to upgrade our network
  - most traffic are not much controllable anyway
- ISPs should be flexible and adjustable

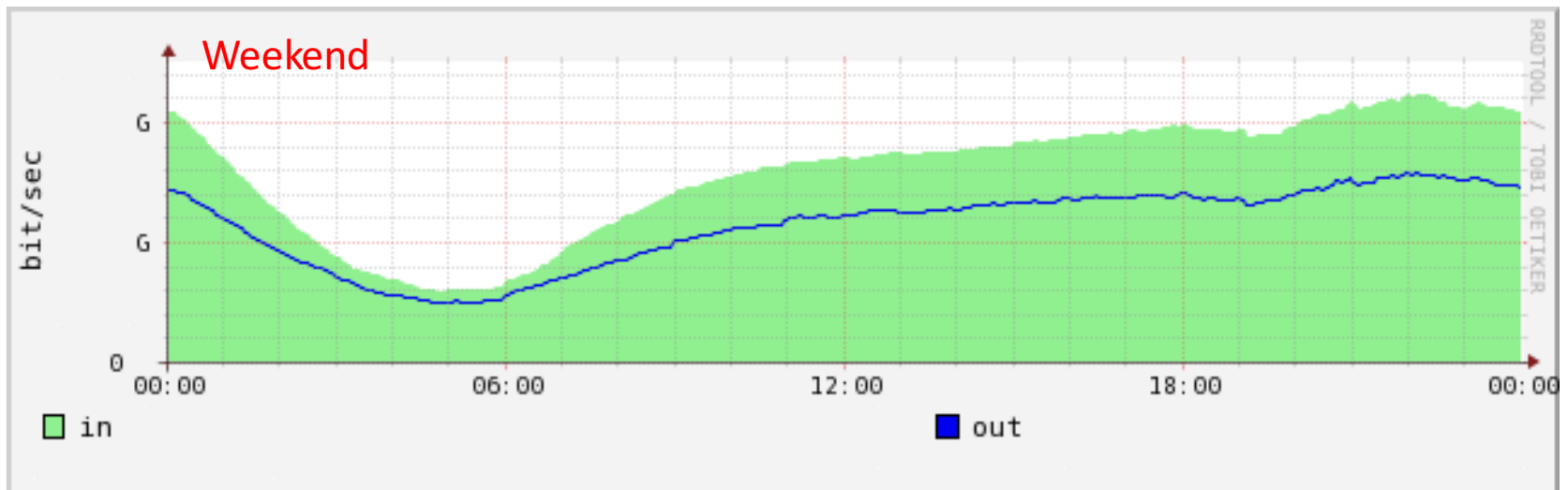
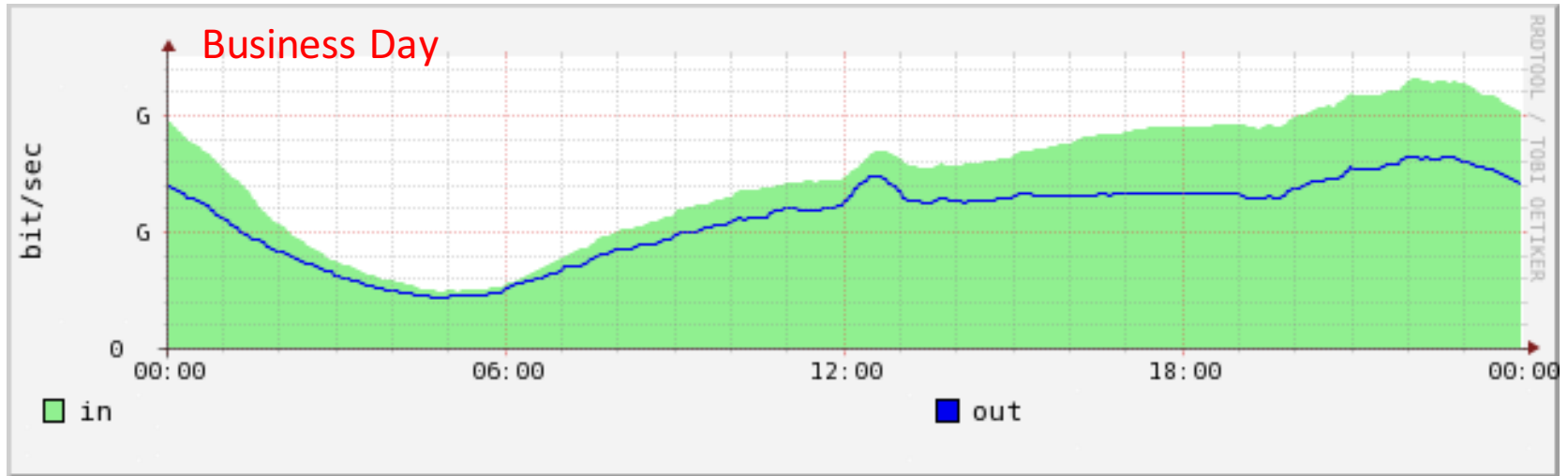
# An enterprise



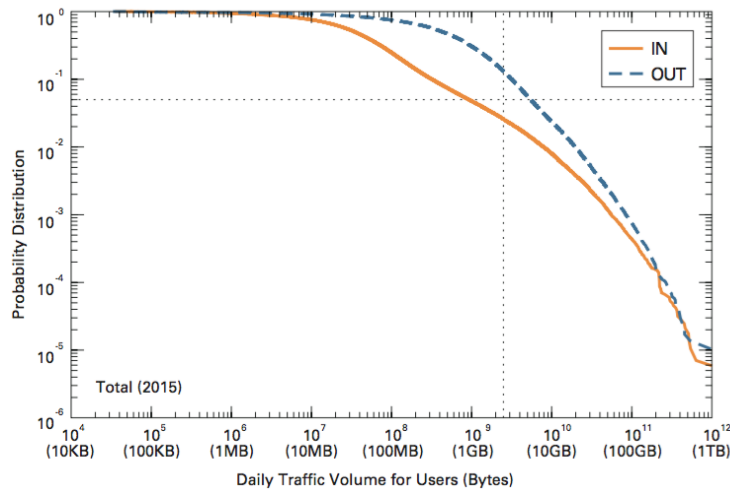
# broadband (aggregated)



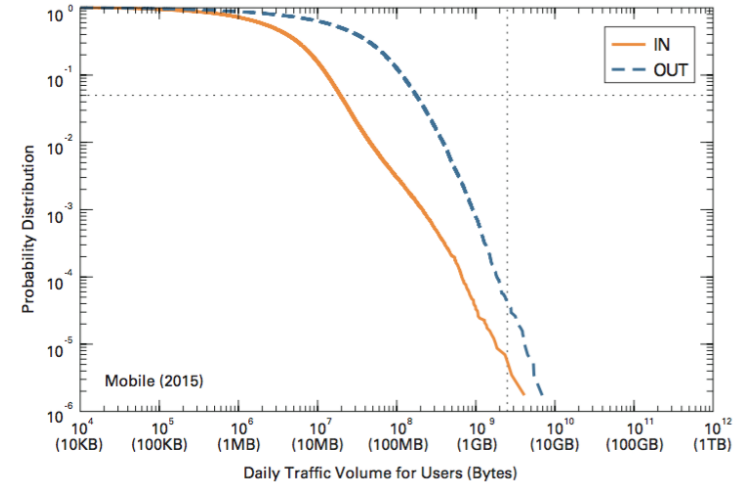
# peering traffic (aggregated)



# complementary cumulative distribution of the daily traffic volume for users



Broadband Users

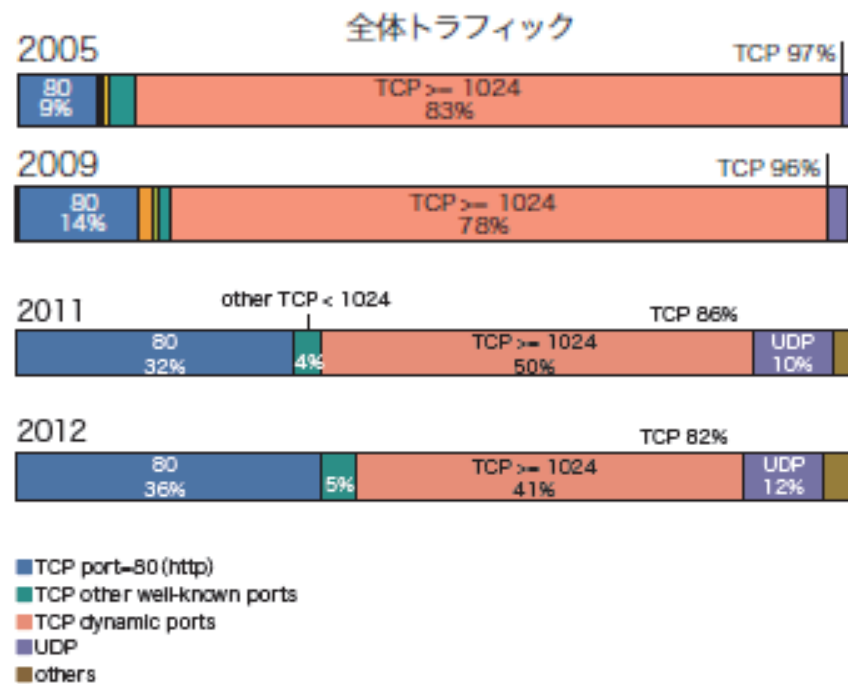


Mobile Users

[http://www.ij.ad.jp/en/company/development/iir/pdf/iir\\_vol28\\_report\\_EN.pdf](http://www.ij.ad.jp/en/company/development/iir/pdf/iir_vol28_report_EN.pdf)



# protocol number usage



# protocol number usages in 2015

	Broadband(%)	Mobile(%)
<b>TCP</b>	<b>80.8</b>	<b>93.8</b>
80(http)	37.9	52.5
443(https)	23.3	37.4
1935(rtmp)	1.8	0.5
81	0.5	0.5
<b>UDP</b>	<b>11.4</b>	<b>5.2</b>
443(https)	0.9	1.0
<b>ESP</b>	<b>7.4</b>	<b>0.7</b>
<b>GRE</b>	<b>0.2</b>	<b>0.3</b>

[http://www.ij.ad.jp/en/company/development/iir/pdf/iir\\_vol28\\_report\\_EN.pdf](http://www.ij.ad.jp/en/company/development/iir/pdf/iir_vol28_report_EN.pdf)

# Contents Distributers

## **port 443 heavy sources**

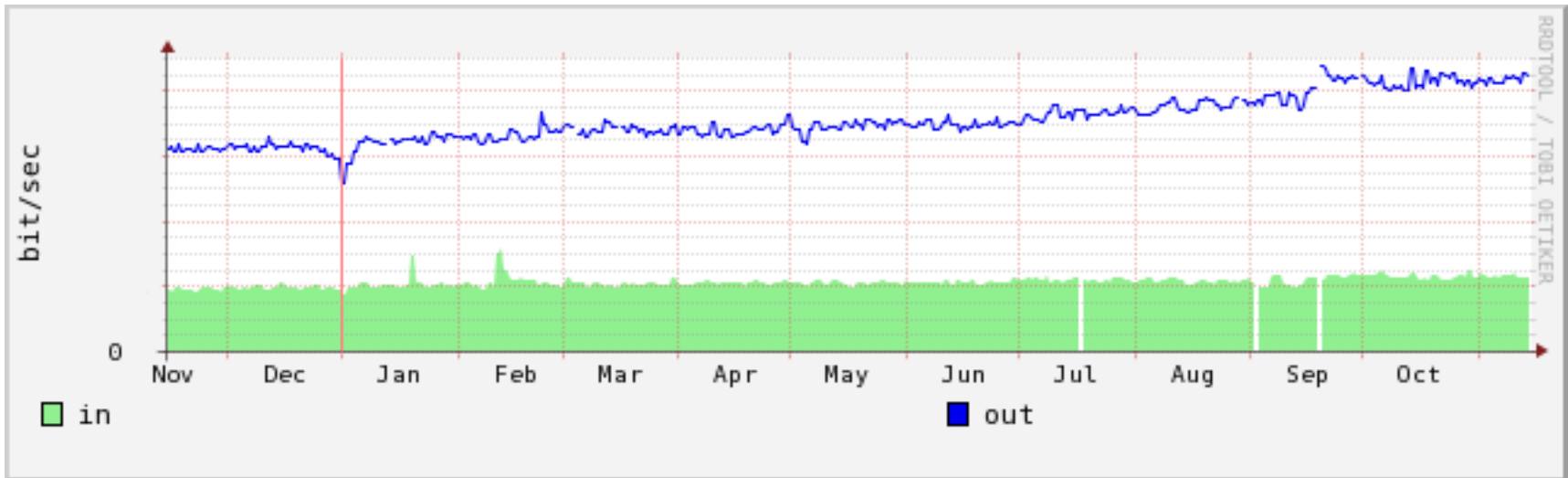
- Google
- Amazon
- Facebook
- Microsoft

## **port 80 heavy sources**

- Akamai
- Apple
- Limelight
- Netflix

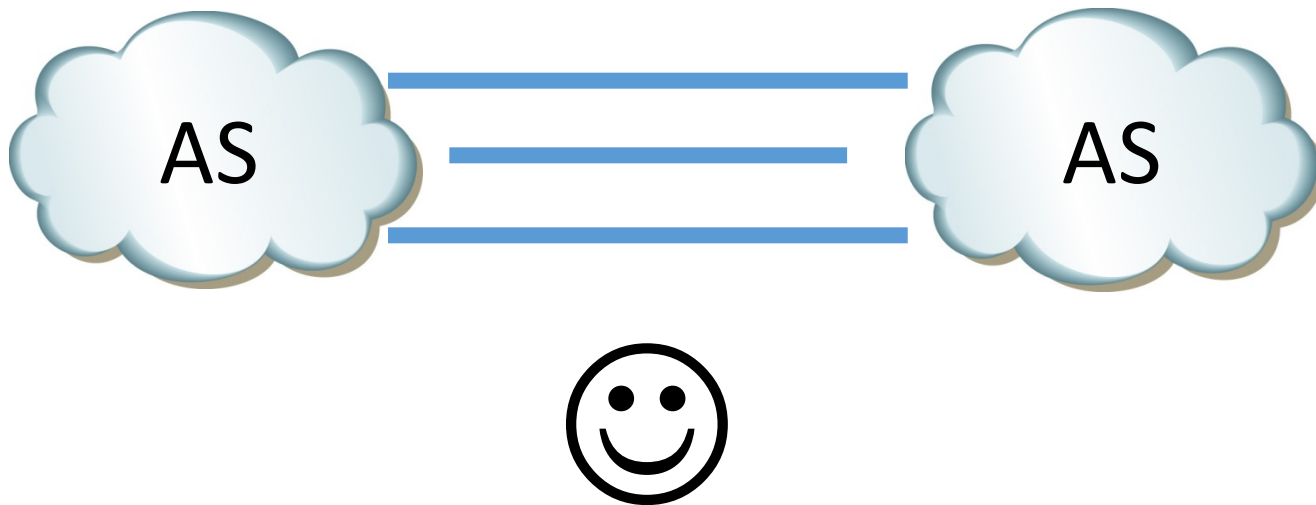
# thinking of upgrading

- more users
- more applications
- more bandwidth



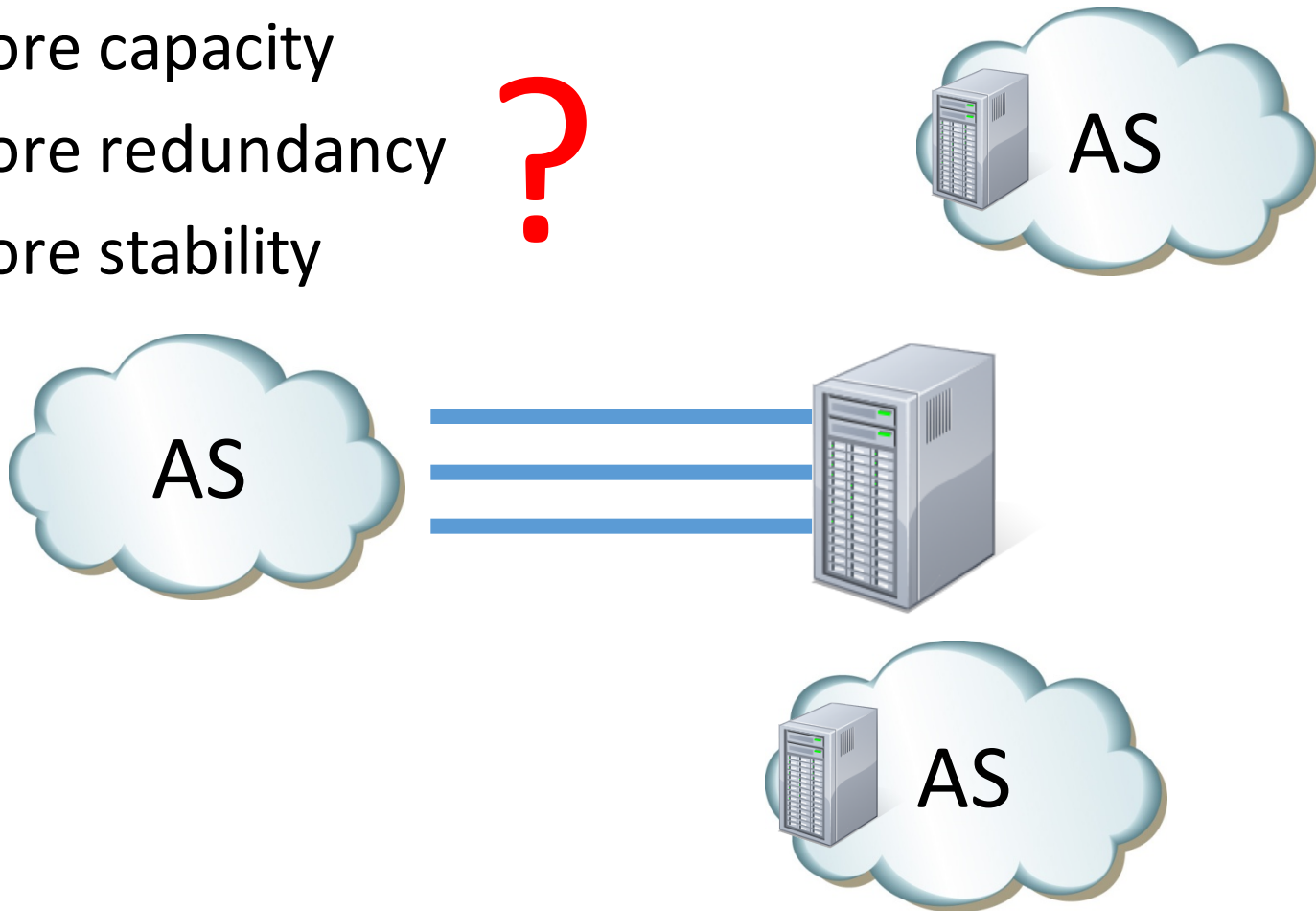
# Upgrading peering connections

- more capacity
- more redundancy
- more stability

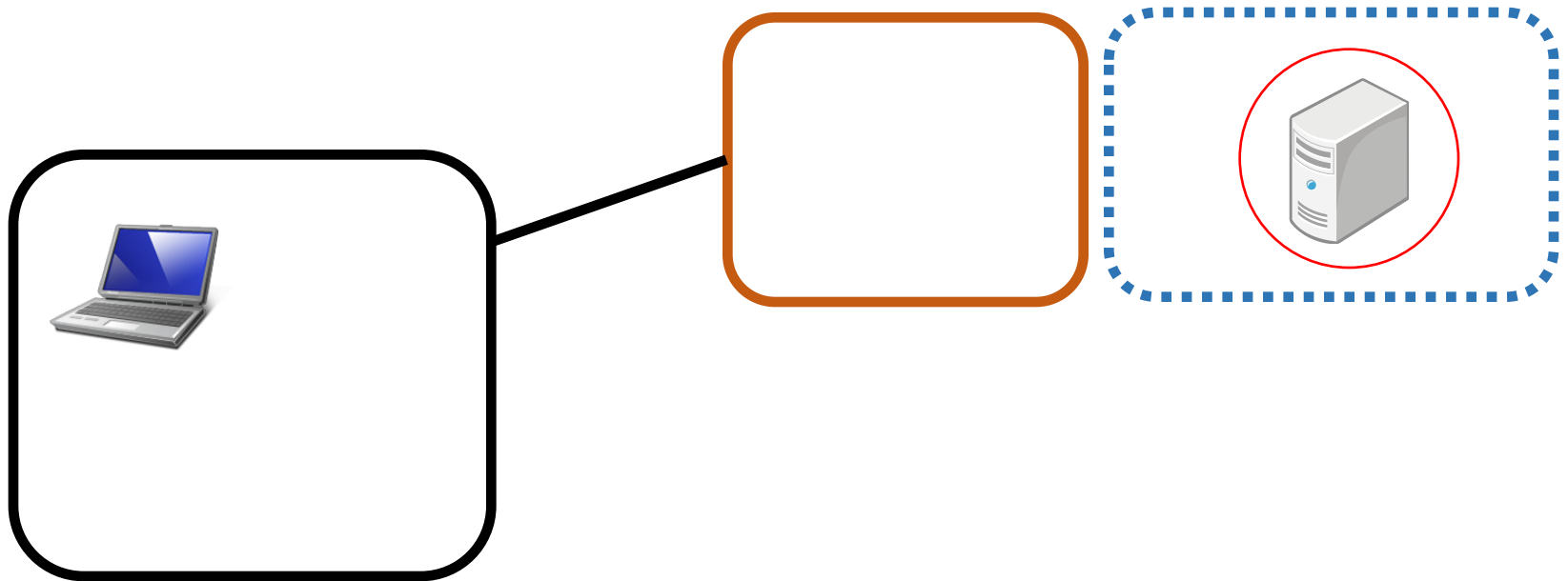


# Upgrading connections with CDNs

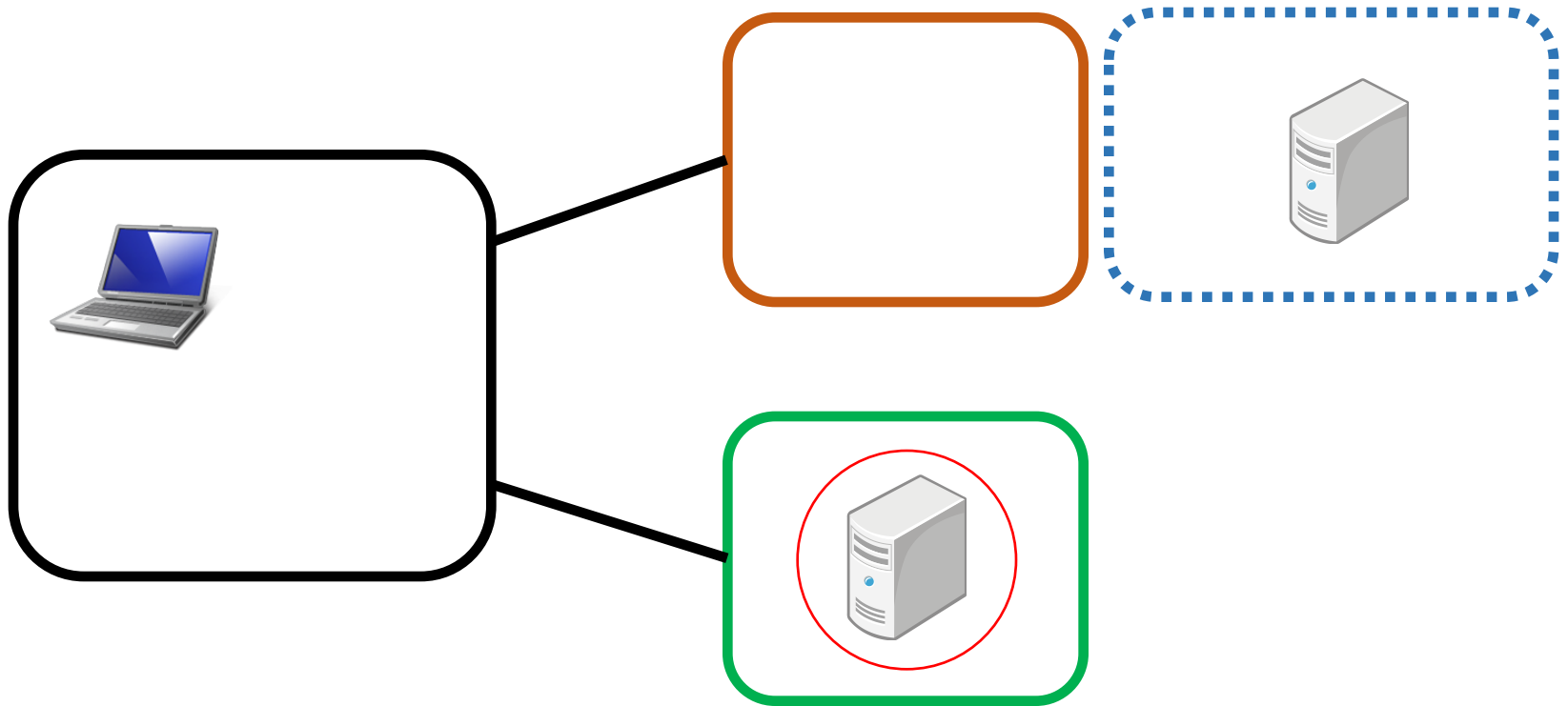
- more capacity
- more redundancy
- more stability



# Option 1: from your upstream

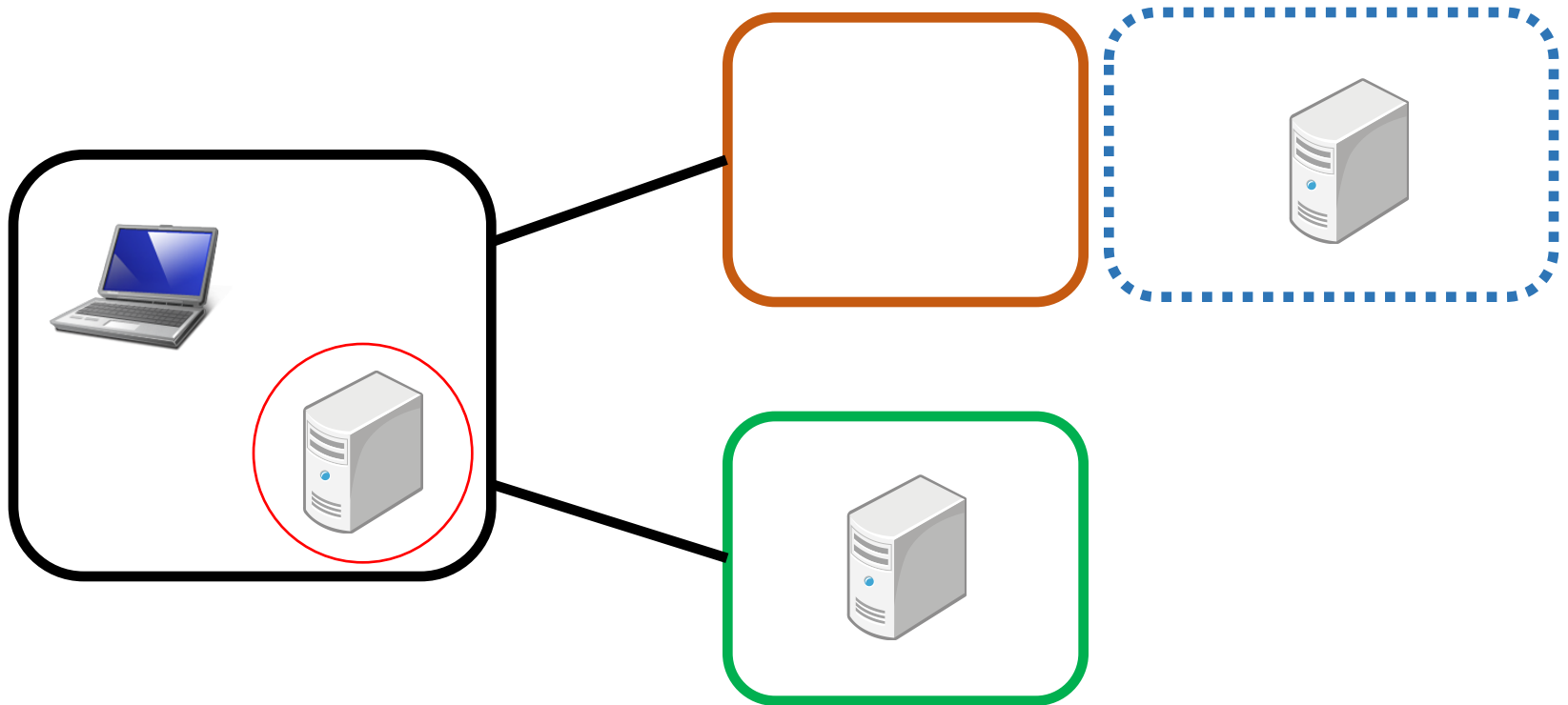


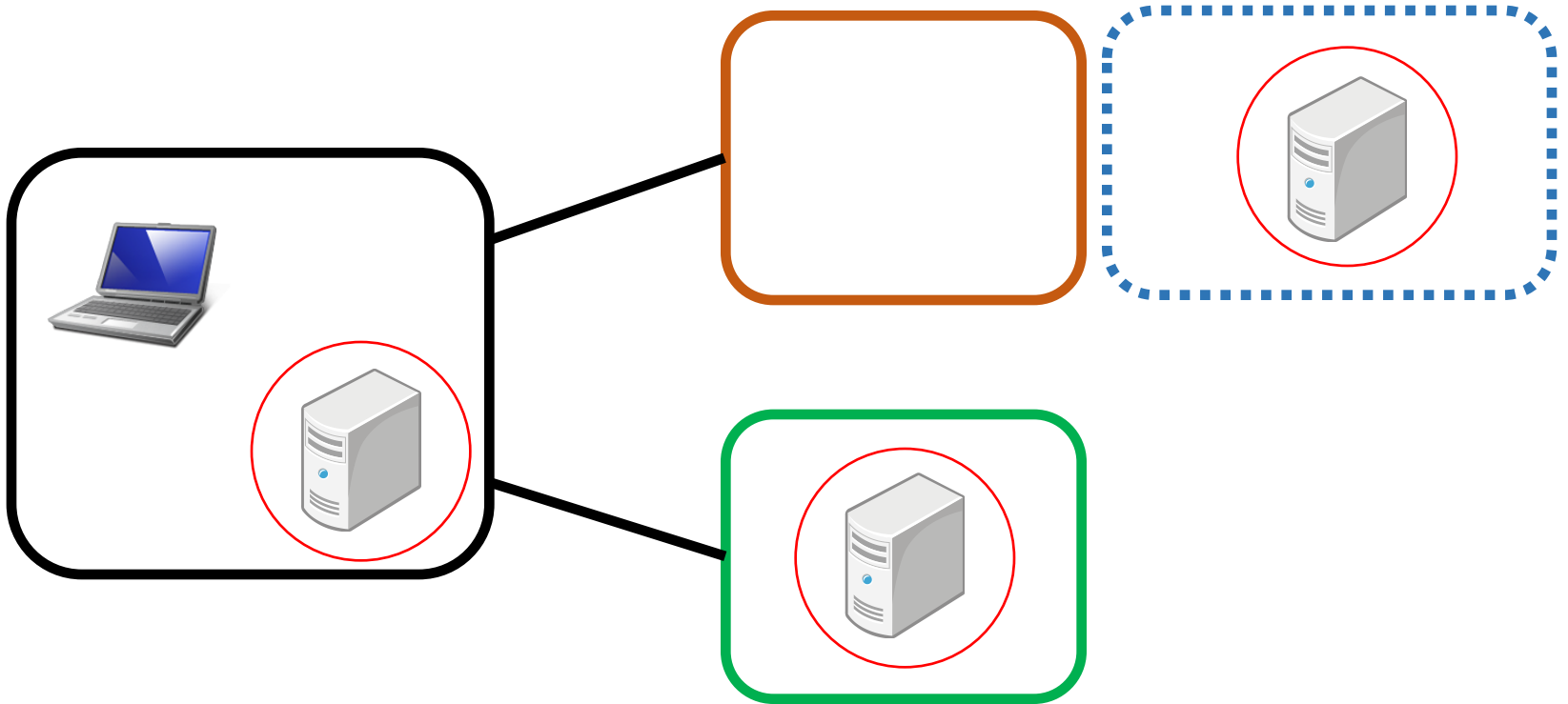
# Option 2: establish a peering





# Option 3: deploying a cache node in your network





# CDN

- CDN is getting more capabilities to distribute contents by deploying cache nodes in the internet
  - CDN can shift traffic over the AS
  - BGP is not able to do such a drastic traffic engineering
- ISPs lose control of traffic, CDNs are getting more
  - ISPs ask CDNs to control the traffic

# Peering and CDN cache

- totally different idea
- ‘peering’ relies on an equal relationship
  - prefer to adapt ‘closest exit’ policy
  - implicitly assuming gentle changes of traffic pattern
- ‘CDN cache’ enhances CDN’s capability
  - An ISP helps CDNs to optimize their distribution
  - In return, the ISP can reduce its transit cost

# considering the differences of upgrading...

- It will be of benefit to customers
  - more capacity 😊
- Only CDNs will increase capability of traffic engineering
  - more unbalance :P
  - Usually outbound traffic control is easier, and inbound traffic control is much harder
- **It's mutually beneficial, but risks are different**
  - You should be aware of the CDNs' traffic engineering in advance
  - But now you have a contact at CDN to negotiate traffic control unlike p2p traffic 😊

# Summary

- ISP does not have control of the Internet usages
  - End-nodes handle it
  - p2p, CDNs, multi TCP
- ISP should keep its network flexible and adjustable
  - ‘Keep it simple and stupid’
  - To constantly adapt ‘new’ usages
- Let’s openly share our operational policy with each others
  - Better understanding can bring better network designs and operations