QQ空间HTTP2加速实践

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个人介绍

#黄佳琳#

#QQ空间#

#前端开发#

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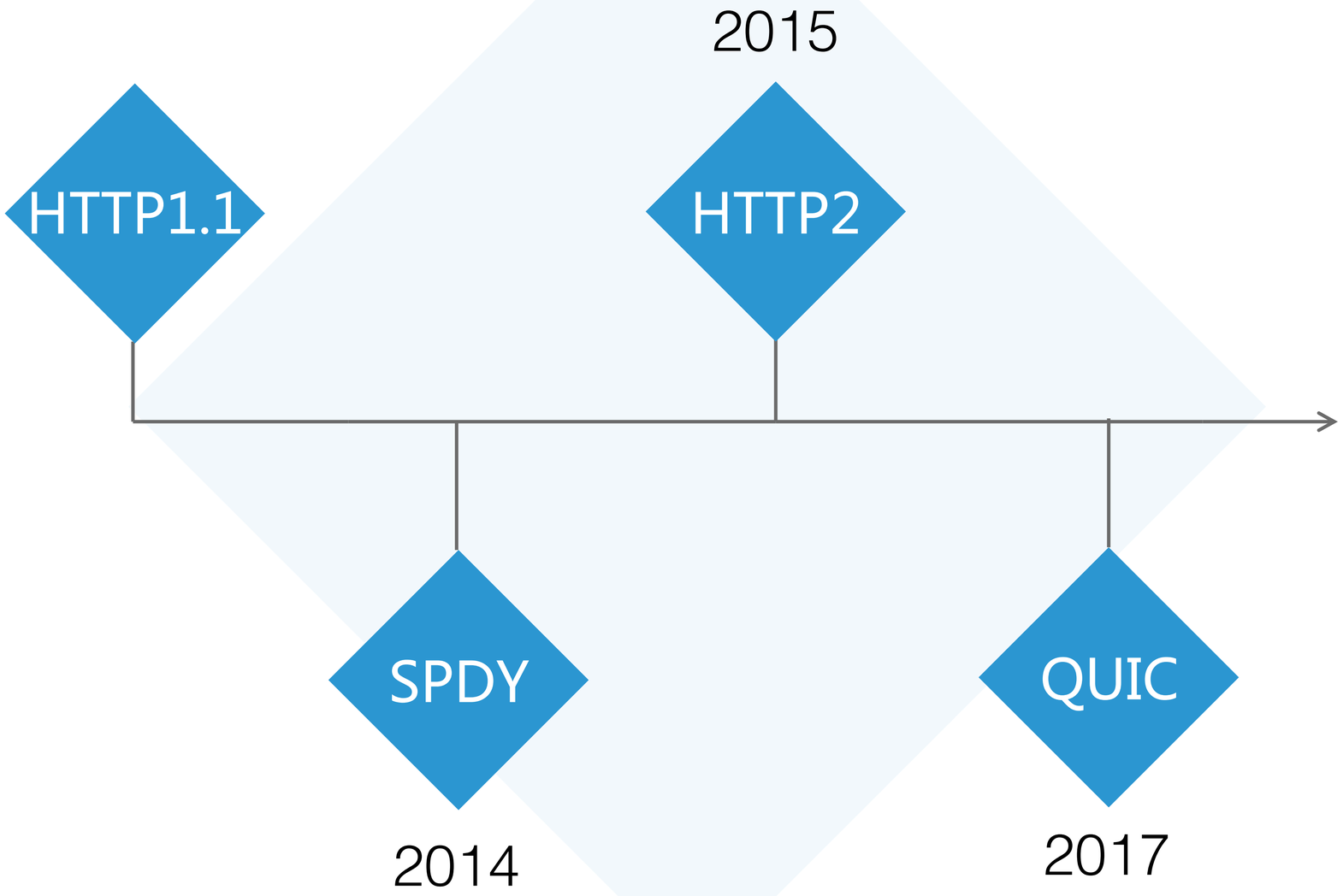
PART 1

协议演变

Web侧所使用的协议的演变过程

协议演变



协议演变

http://

http2://

NO !

https://

YES!

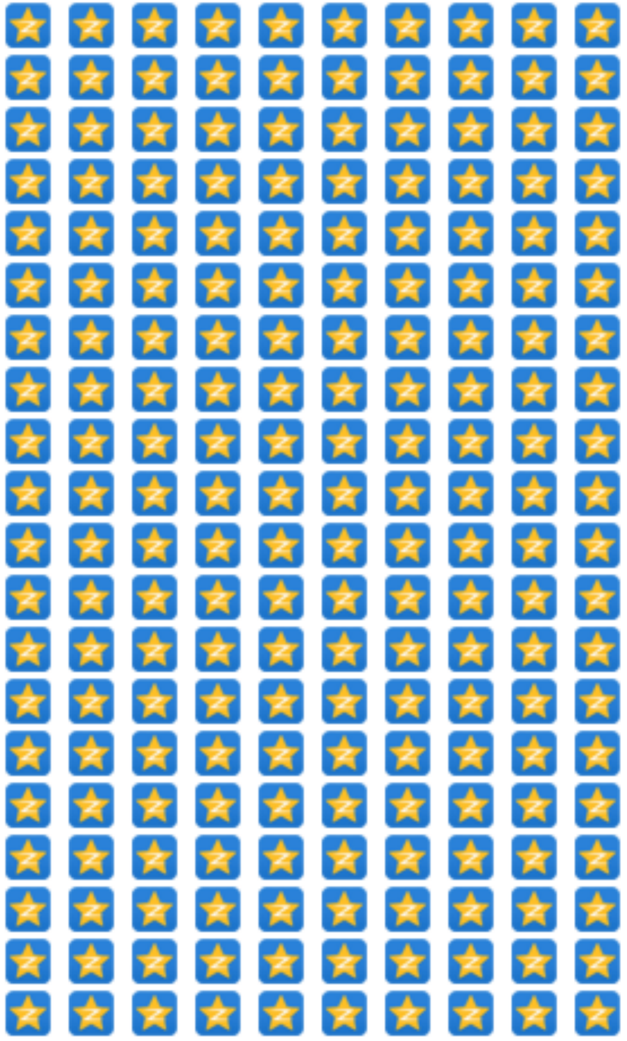
PART 2

协议原理

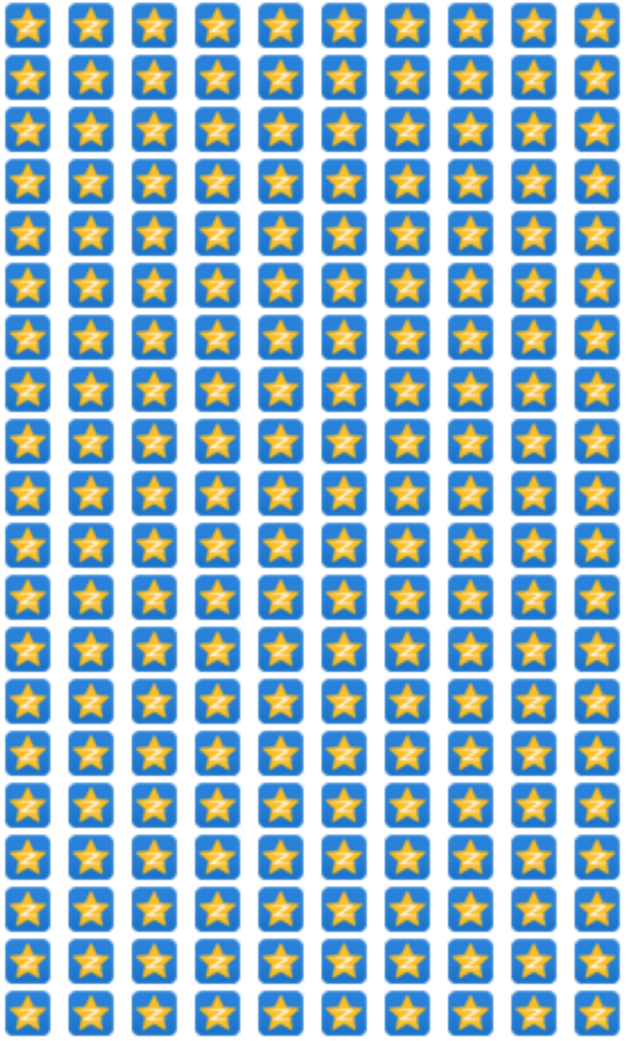
HTTP2相关原理介绍

协议原理

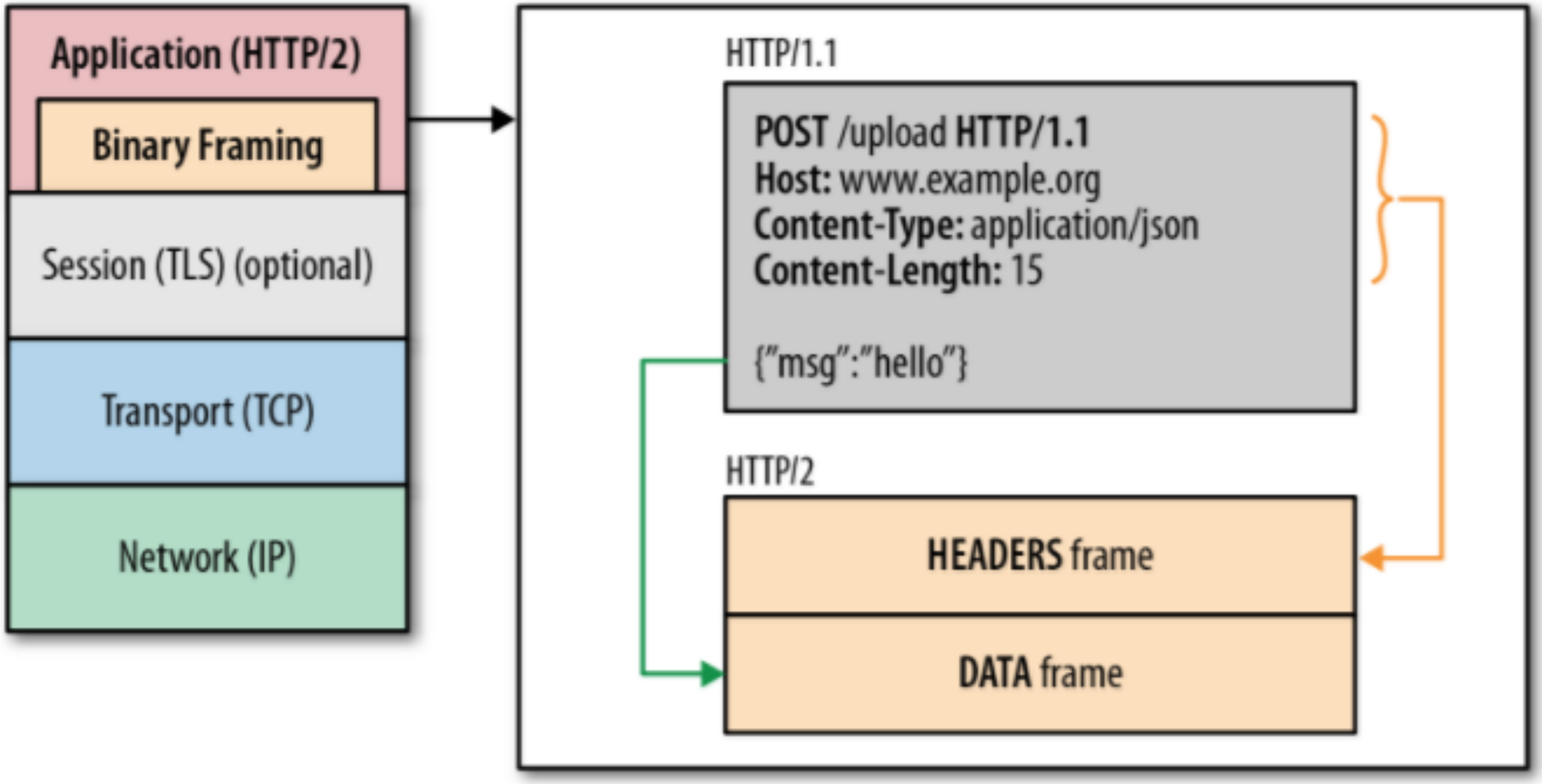
http/1.1
Load Time : 1178ms



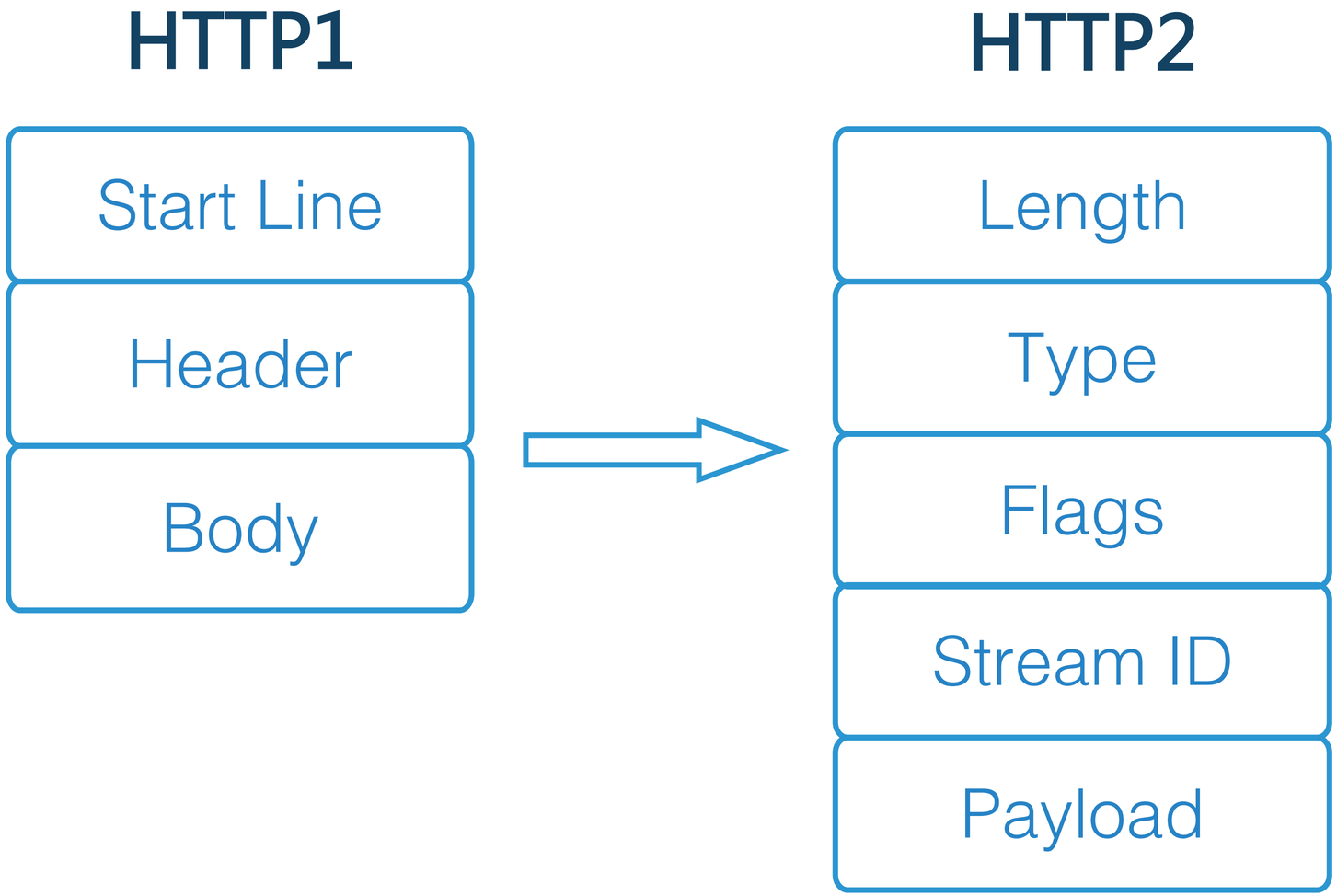
http/2
Load Time : 570ms



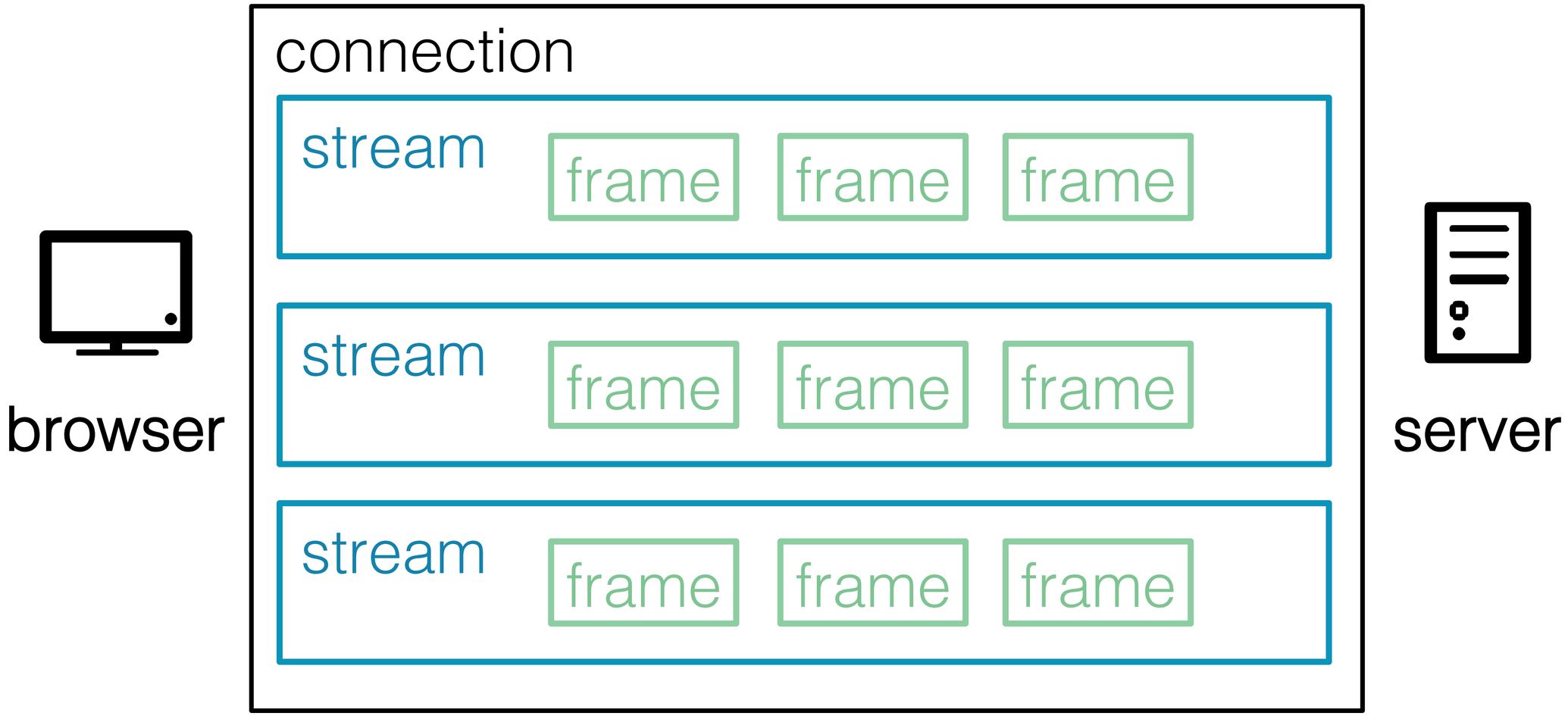
协议原理——二进制分帧


Application (HTTP/2)
Binary Framing
Session (TLS) (optional)
Transport (TCP)
Network (IP)
HTTP/1.1
POST /upload HTTP/1.1
Host: www.example.org
Content-Type: application/json
Content-Length: 15
{"msg":"hello"}
HTTP/2
HEADERS frame
DATA frame

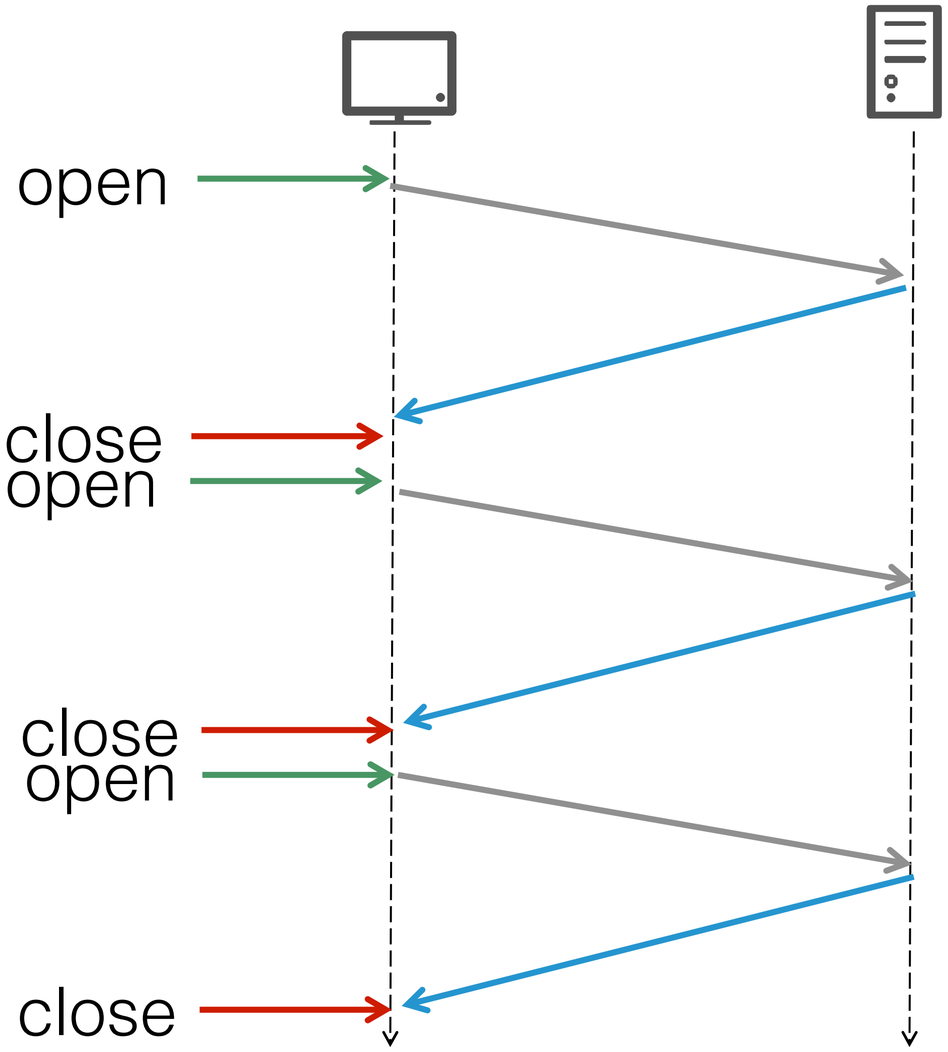
协议原理——二进制分帧

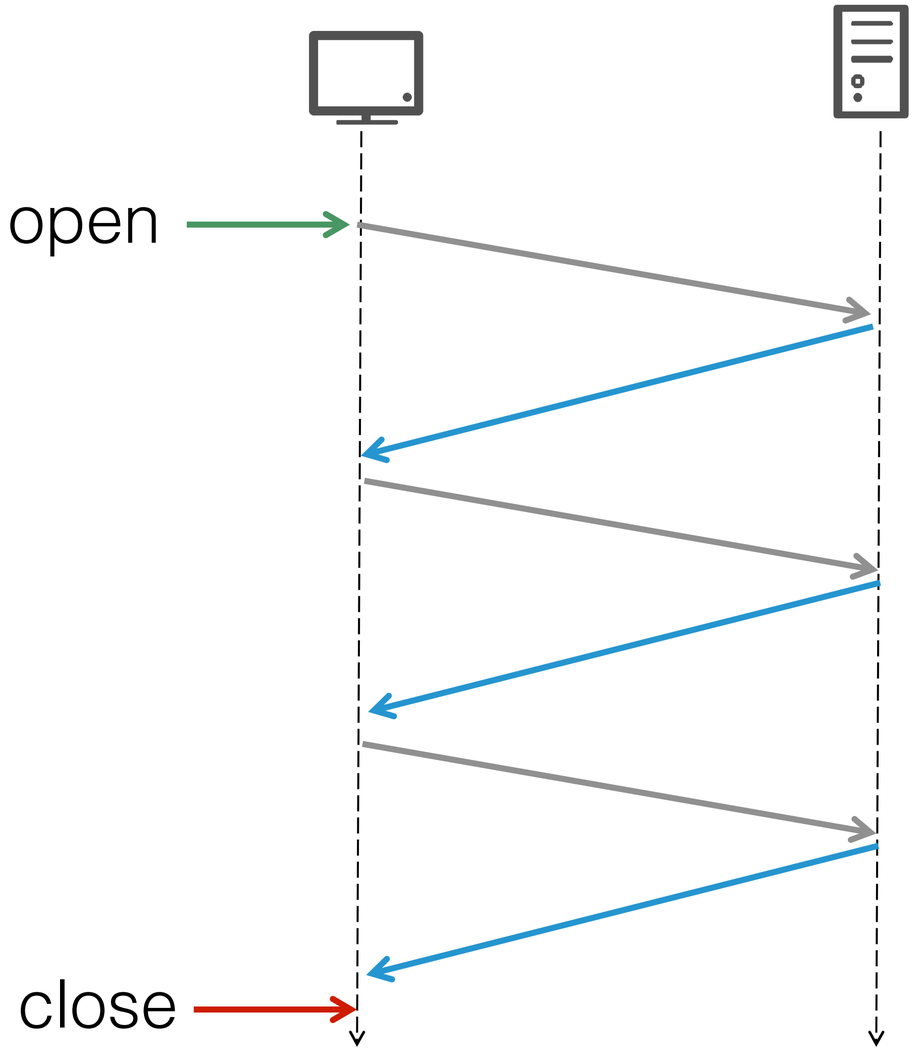

HTTP1
Start Line
Header
Body
HTTP2
Length
Type
Flags
Stream ID
Payload

协议原理——二进制分帧

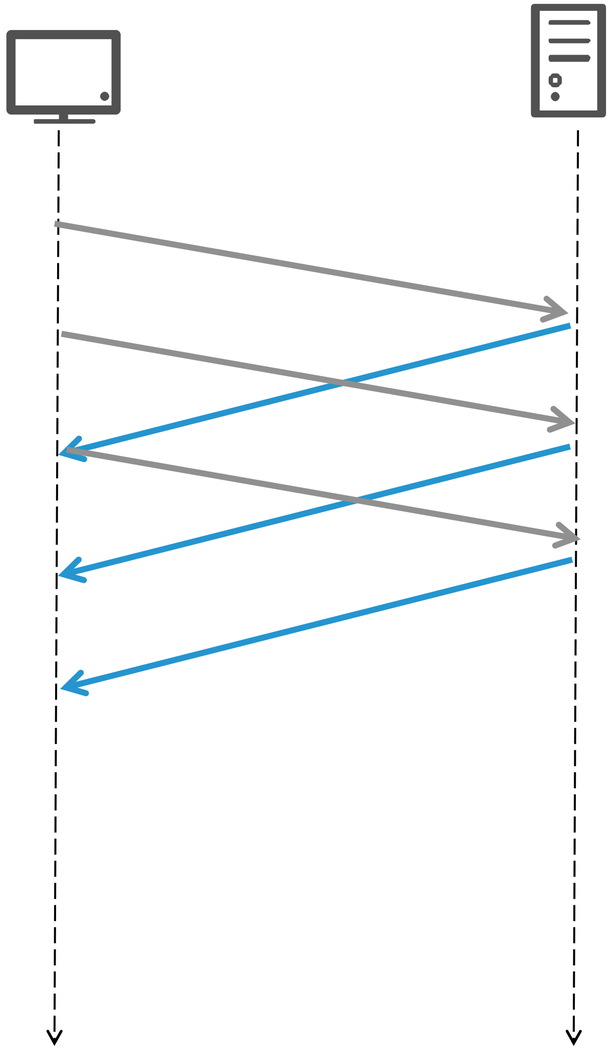

connection
stream
frame
frame
frame
stream
frame
frame
frame
stream
frame
frame
frame
browser
server

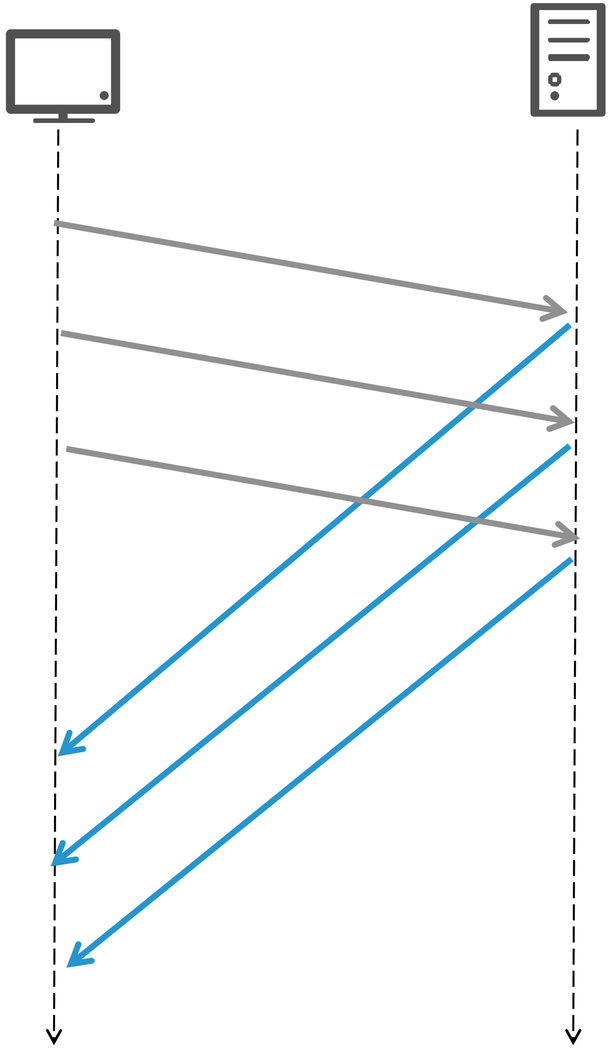
协议原理——多路复用



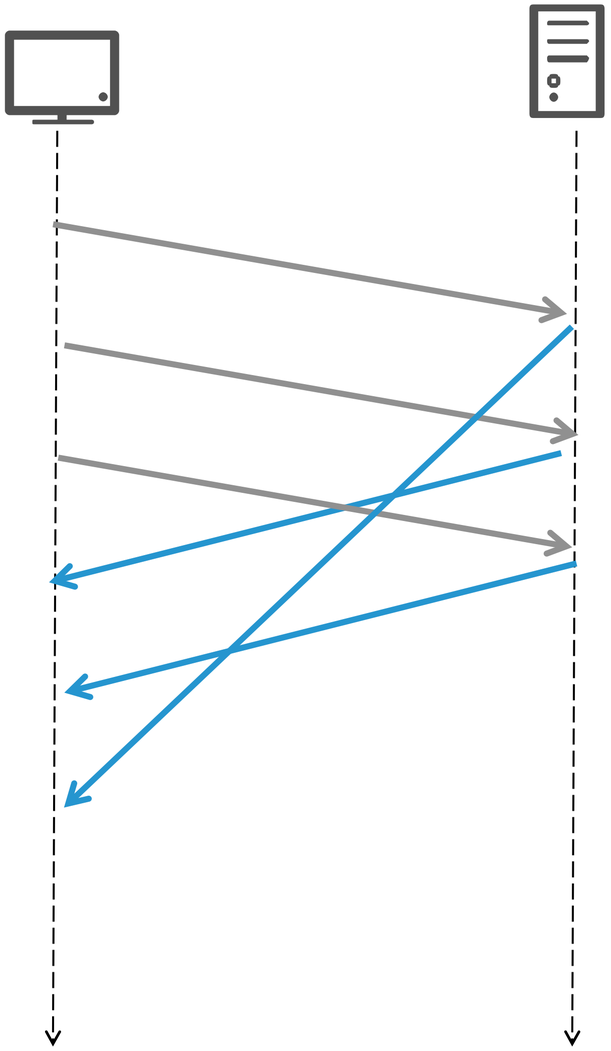


协议原理——多路复用

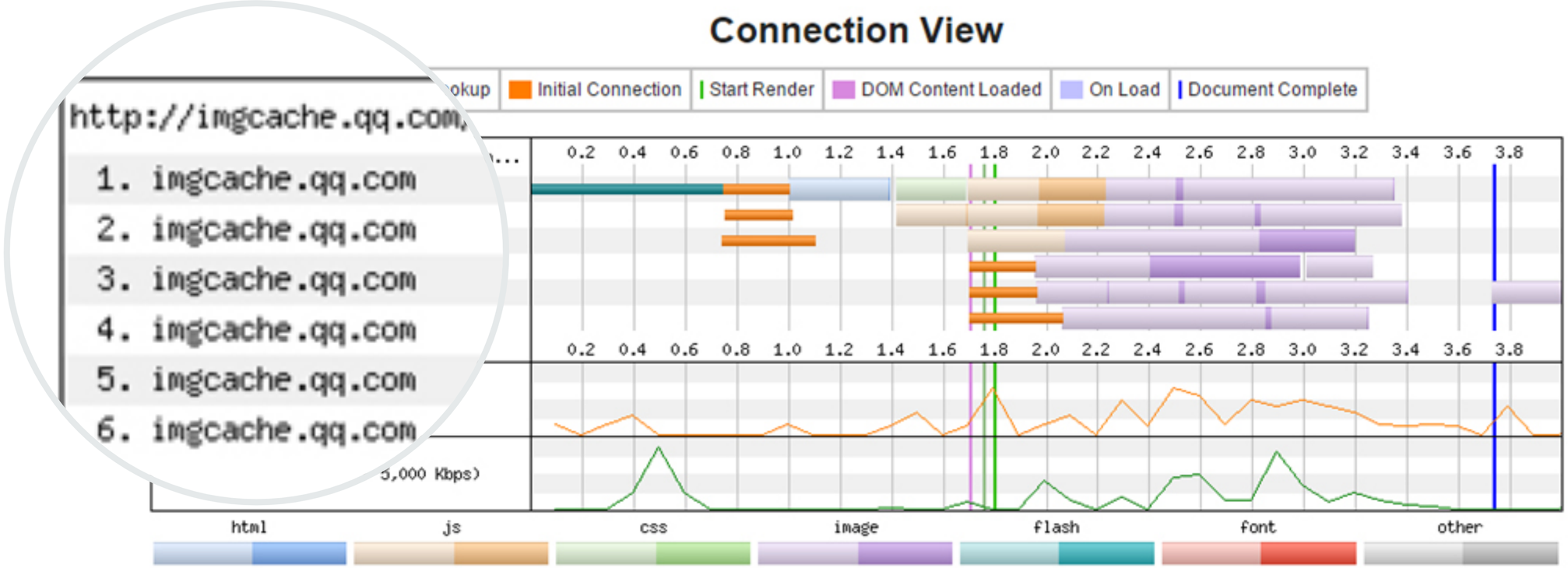




协议原理——多路复用

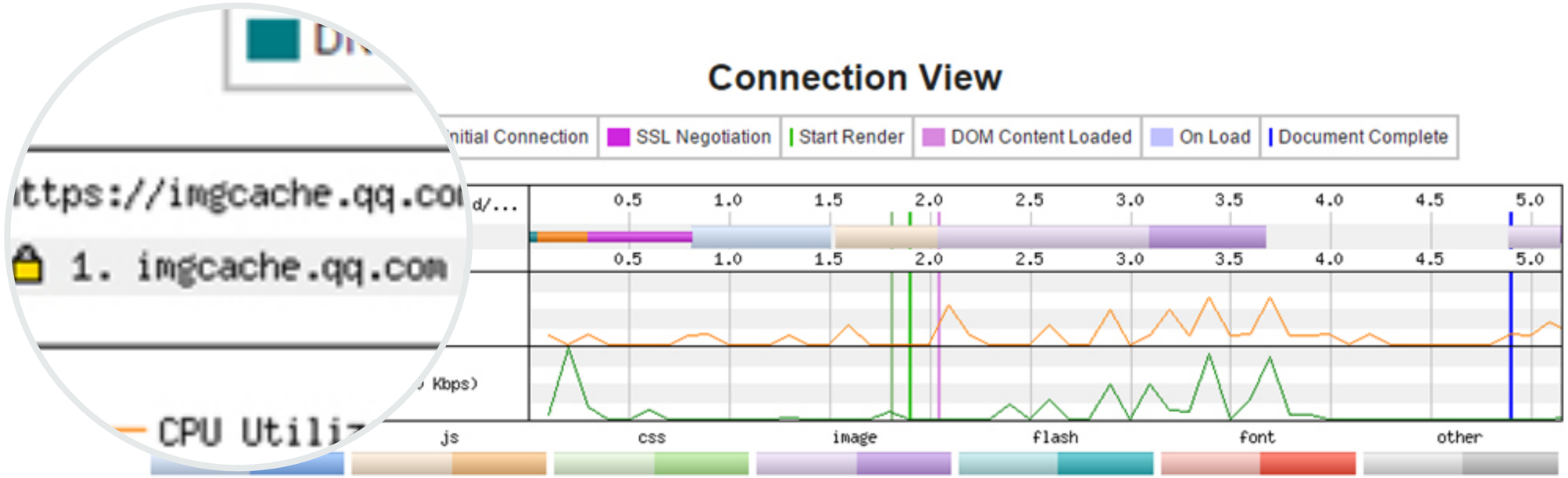


协议原理——多路复用



http://www.webpagetest.org/

协议原理——多路复用



http://www.webpagetest.org/

协议原理——头部压缩

▼ Response Headers

alt-svc: quic=":443"; ma=2592000; v="39,38,37,36,35"
cache-control: max-age=0, no-transform, proxy-revalidate
content-encoding: gzip
content-security-policy: script-src 'unsafe-inline' 'unsafe-eval' 'self' jsbridge: http://*.gtimg.cn https://*.gtimg.cn http://*.qq.com https://*.qq.com http://*.idqqimg.com https://*.idqqimg.com;child-src 'self' jsbridge: musicqzone: mqzonev2: mqzonev3: mqzone: mqqzone: mqqapi: nextradio: mvshow: weixin: mqq: blob: jserror: http://*.qq.com https://*.qq.com http://*.qzone.com https://*.qzone.com;frame-src 'self' jsbridge: musicqzone: mqzonev2: mqzonev3: mqzone: mqqzone: mqqapi: nextradio: mvshow: weixin: mqq: blob: jserror: http://*.qq.com https://*.qq.com http://*.qzone.com https://*.qzone.com http://*.gtimg.cn https://*.gtimg.cn https://www.darryring.com;report-uri https://h5.qzone.qq.com/csp/report?type=header&enable=1
content-security-policy-report-only: img-src 'self' about: data: blob: jsbridge: http://*.gtimg.cn https://*.gtimg.cn http://*.qpic.cn https://*.qpic.cn http://*.qlogo.cn https://*.qlogo.cn http://*.myqcloud.com https://*.myqcloud.com http://*.tenpay.com https://*.tenpay.com http://*.soso.com https://*.soso.com http://*.weiyun.com https://*.weiyun.com http://*.qzone.com https://*.qzone.com http://*.qq.com https://*.qq.com;default-src 'self' about: 'unsafe-inline' 'unsafe-eval' data: blob: http://*.qpic.cn https://*.qpic.cn http://*.gtimg.cn https://*.gtimg.cn http://*.gtimg.com https://*.gtimg.com http://*.qq.com https://*.qq.com http://*.qq.com:8080 https://*.qq.com:8080 http://*.myqcloud.com https://*.myqcloud.com http://*.weiyun.com https://*.weiyun.com https://www.darryring.com;report-uri https://h5.qzone.qq.com/csp/report?type=header&enable=1
content-type: text/html; charset=utf-8
date: Fri, 01 Dec 2017 09:15:51 GMT
last-modified: Fri, 01 Dec 2017 09:15:51 GMT

协议原理——头部压缩

header 占比10%

协议原理

method: get	1

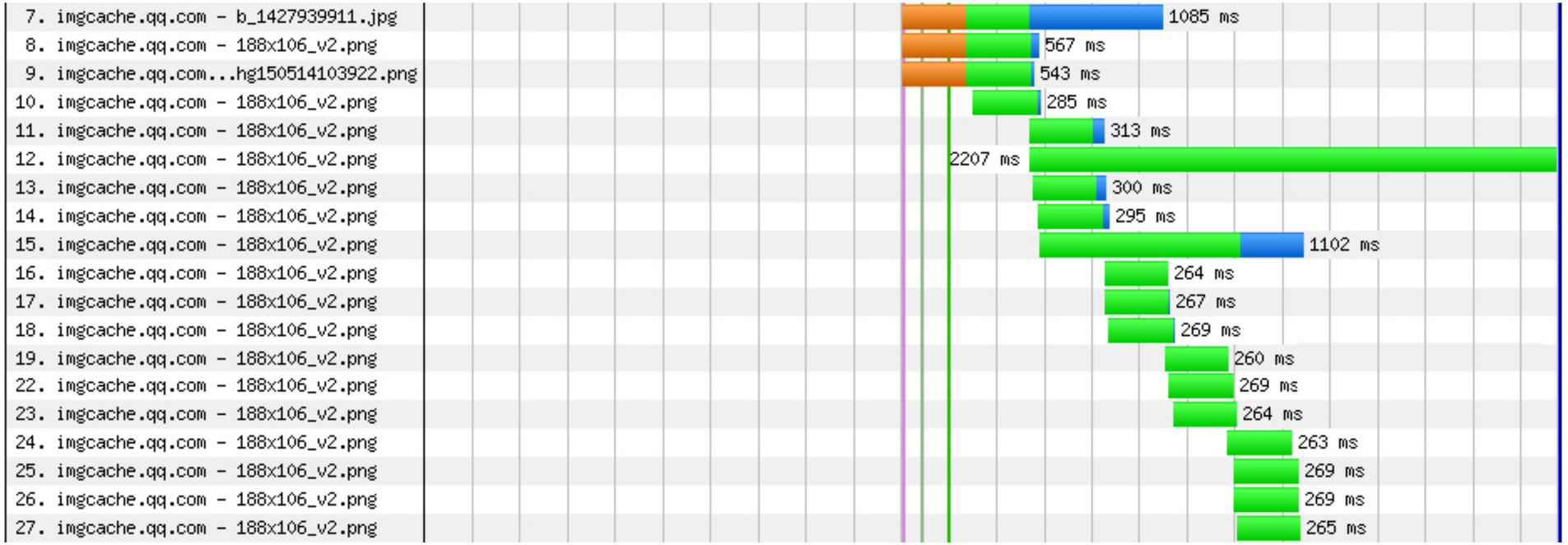
协议原理——头部压缩

减少60%

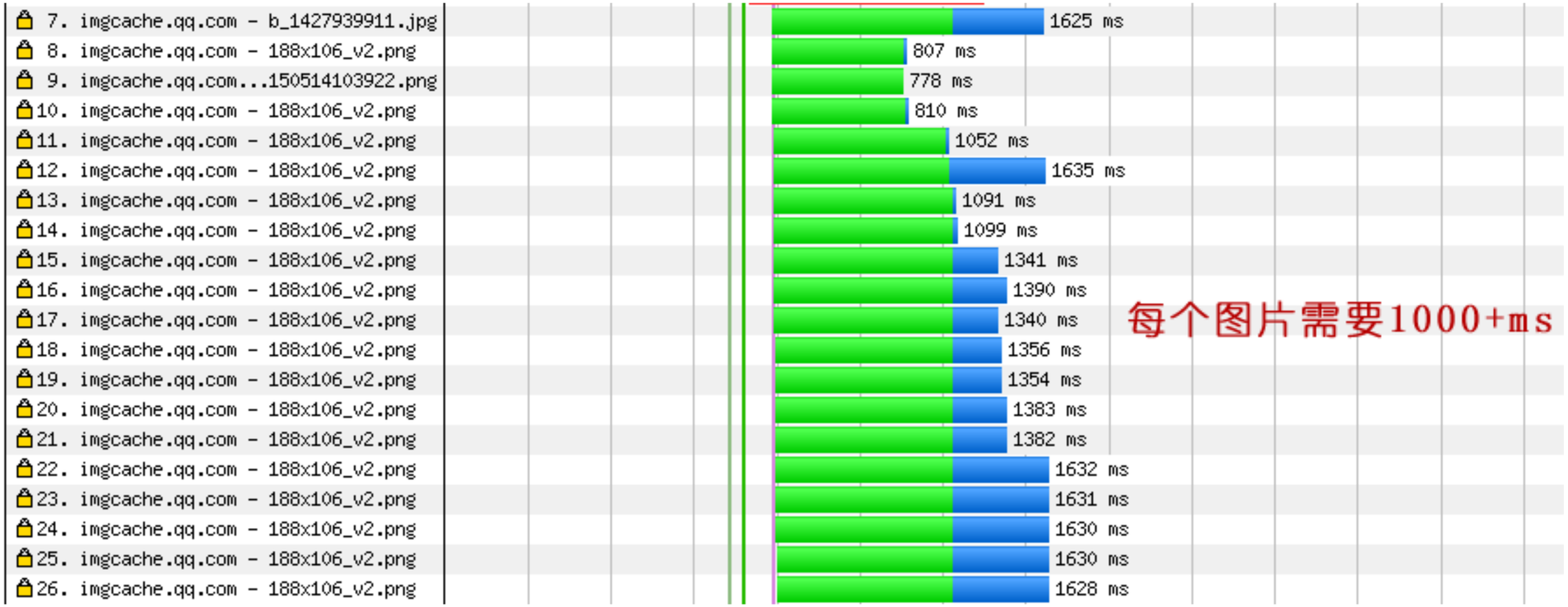
Name Path	Method	Status Text	Protocol	Type	Initiator	Size Content
w.cgi?releaseversion=null&apn=null&touin=99785763&... /wspeed.qq.com	GET	200	h2	document	Other	43 B 0 B

Name Path	Method	Status Text	Protocol	Type	Initiator	Size Content
w.cgi?releaseversion=null&apn=null&touin=99785763&... /wspeed.qq.com	GET	200 OK	http/1.1	document	Other	113 B 0 B

协议原理——请求优先级


7. imgcache.qq.com - b_1427939911.jpg
8. imgcache.qq.com - 188x106_v2.png
9. imgcache.qq.com...hg150514103922.png
10. imgcache.qq.com - 188x106_v2.png
11. imgcache.qq.com - 188x106_v2.png
12. imgcache.qq.com - 188x106_v2.png
13. imgcache.qq.com - 188x106_v2.png
14. imgcache.qq.com - 188x106_v2.png
15. imgcache.qq.com - 188x106_v2.png
16. imgcache.qq.com - 188x106_v2.png
17. imgcache.qq.com - 188x106_v2.png
18. imgcache.qq.com - 188x106_v2.png
19. imgcache.qq.com - 188x106_v2.png
22. imgcache.qq.com - 188x106_v2.png
23. imgcache.qq.com - 188x106_v2.png
24. imgcache.qq.com - 188x106_v2.png
25. imgcache.qq.com - 188x106_v2.png
26. imgcache.qq.com - 188x106_v2.png
27. imgcache.qq.com - 188x106_v2.png
1085 ms
567 ms
543 ms
285 ms
313 ms
2207 ms
300 ms
295 ms
1102 ms
264 ms
267 ms
269 ms
260 ms
269 ms
264 ms
263 ms
269 ms
269 ms
265 ms

协议原理——请求优先级

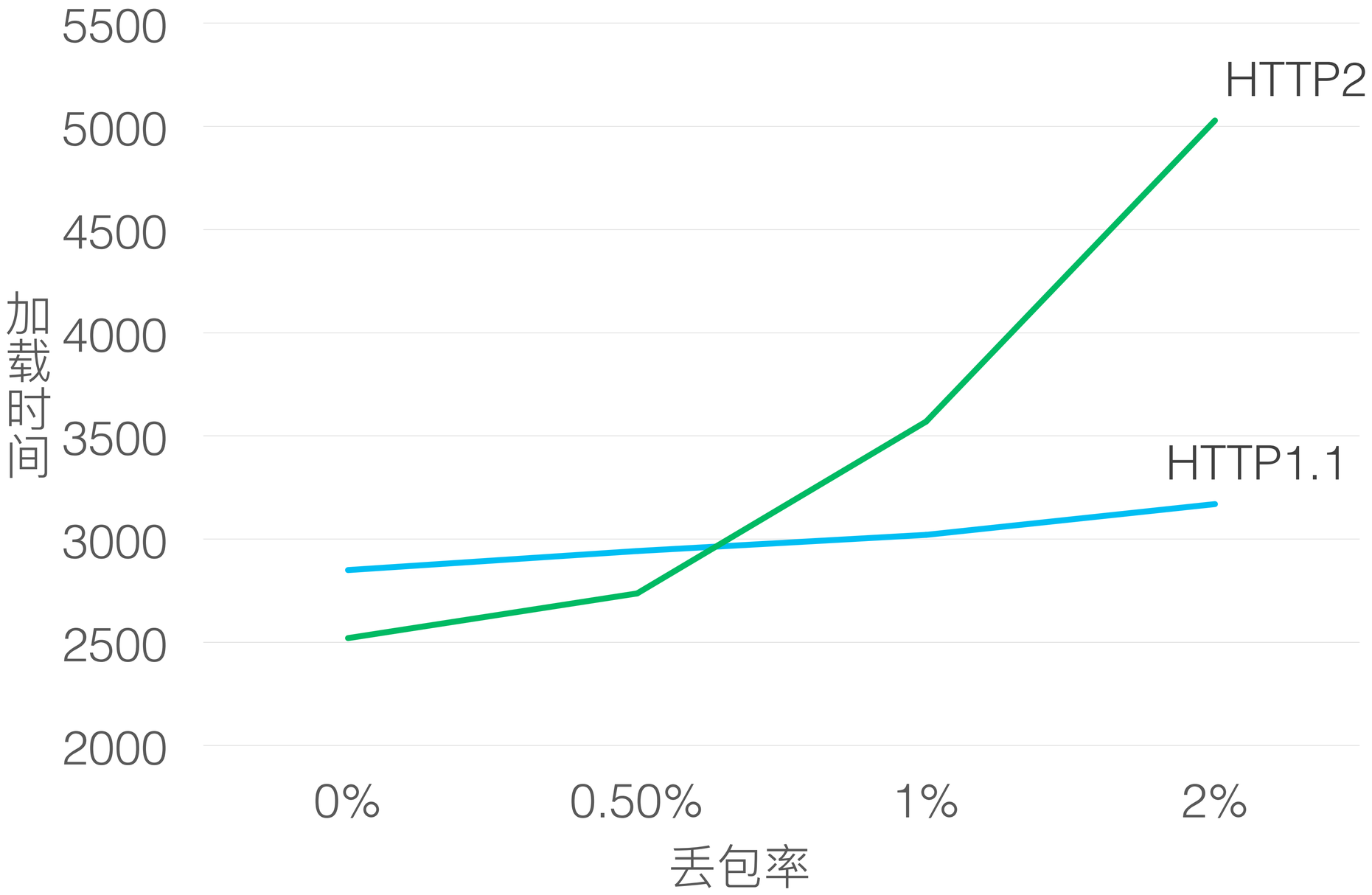

7. imgcache.qq.com - b_1427939911.jpg 1625 ms
8. imgcache.qq.com - 188x106_v2.png 807 ms
9. imgcache.qq.com...150514103922.png 778 ms
10. imgcache.qq.com - 188x106_v2.png 810 ms
11. imgcache.qq.com - 188x106_v2.png 1052 ms
12. imgcache.qq.com - 188x106_v2.png 1635 ms
13. imgcache.qq.com - 188x106_v2.png 1091 ms
14. imgcache.qq.com - 188x106_v2.png 1099 ms
15. imgcache.qq.com - 188x106_v2.png 1341 ms
16. imgcache.qq.com - 188x106_v2.png 1390 ms
17. imgcache.qq.com - 188x106_v2.png 1340 ms
18. imgcache.qq.com - 188x106_v2.png 1356 ms
19. imgcache.qq.com - 188x106_v2.png 1354 ms
20. imgcache.qq.com - 188x106_v2.png 1383 ms
21. imgcache.qq.com - 188x106_v2.png 1382 ms
22. imgcache.qq.com - 188x106_v2.png 1632 ms
23. imgcache.qq.com - 188x106_v2.png 1631 ms
24. imgcache.qq.com - 188x106_v2.png 1630 ms
25. imgcache.qq.com - 188x106_v2.png 1630 ms
26. imgcache.qq.com - 188x106_v2.png 1628 ms
每个图片需要1000+ms

协议原理——请求优先级

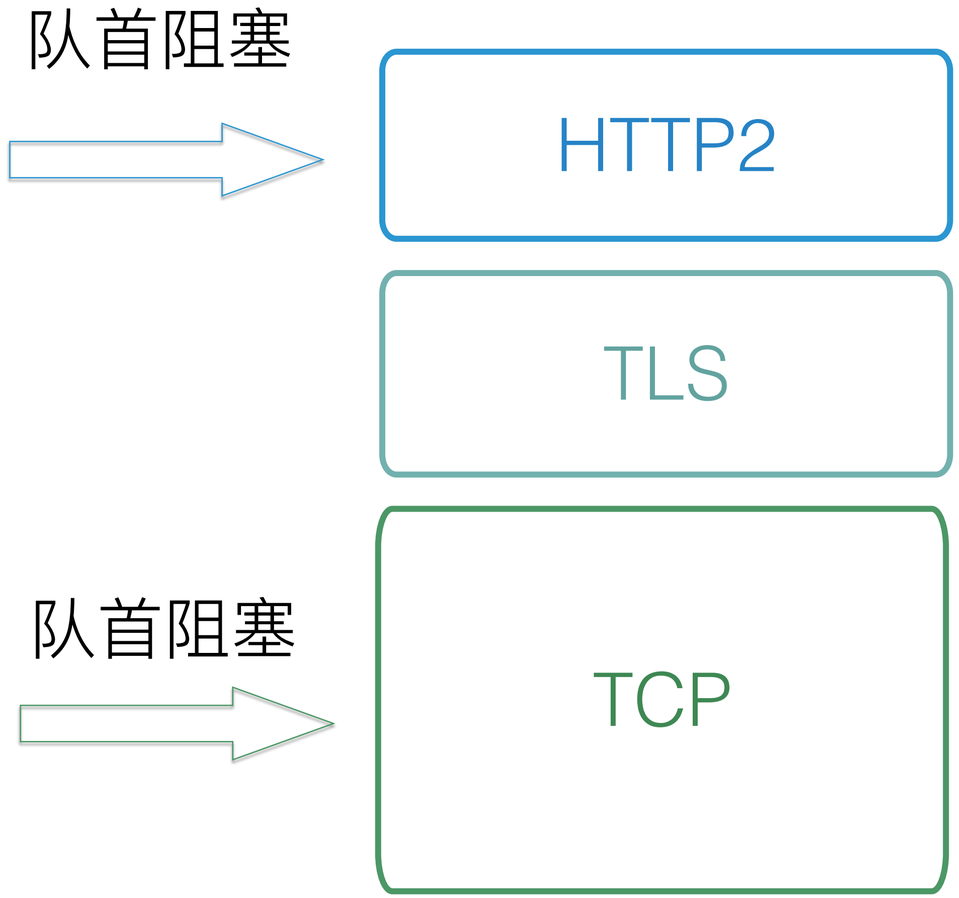
```
HTTP2_SESSION_SEND_HEADERS
—> fin = true
—> :method: GET
    :authority: h5.qzone.qq.com
    :scheme: https
    :path: /proxy/domain/qzonestyle.gtimg.cn/touch/components/css/ui-write.css?max_age=259200&v=2(
    pragma: no-cache
    cache-control: no-ca
    accept: text/css,*/*
    user-agent: Mozilla/
    referer: https://h5.
    accept-encoding: gzi
    accept-language: zh-
    cookie: [933 bytes w
—> priority = 0
—> stream_id = 129
—> unidirectional = fal
```

```
HTTP2_SESSION_SEND_HEADERS
—> fin = true
—> :method: GET
    :authority: h5.qzone.qq.com
    :scheme: https
    :path: /proxy/domain/qzonestyle.gtimg.cn/qzone/phone/m/v4/widget/spreader/index.js
    pragma: no-cache
    cache-control: no-cache
    accept: */*
    user-agent: Mozilla/5.0 (Linux; Android 6.0; Nexus 5 Build/MRA58N) AppleWebKit/537.36 (KHTM
    referer: https://h5.qzone.qq.com/mqzone/index
    accept-encoding: gzip, deflate, sdch
    accept-language: zh-CN,zh;q=0.8,en;q=0.6,zh-TW;q=0.4
    cookie: [933 bytes were stripped]
—> priority = 3
—> stream_id = 125
```

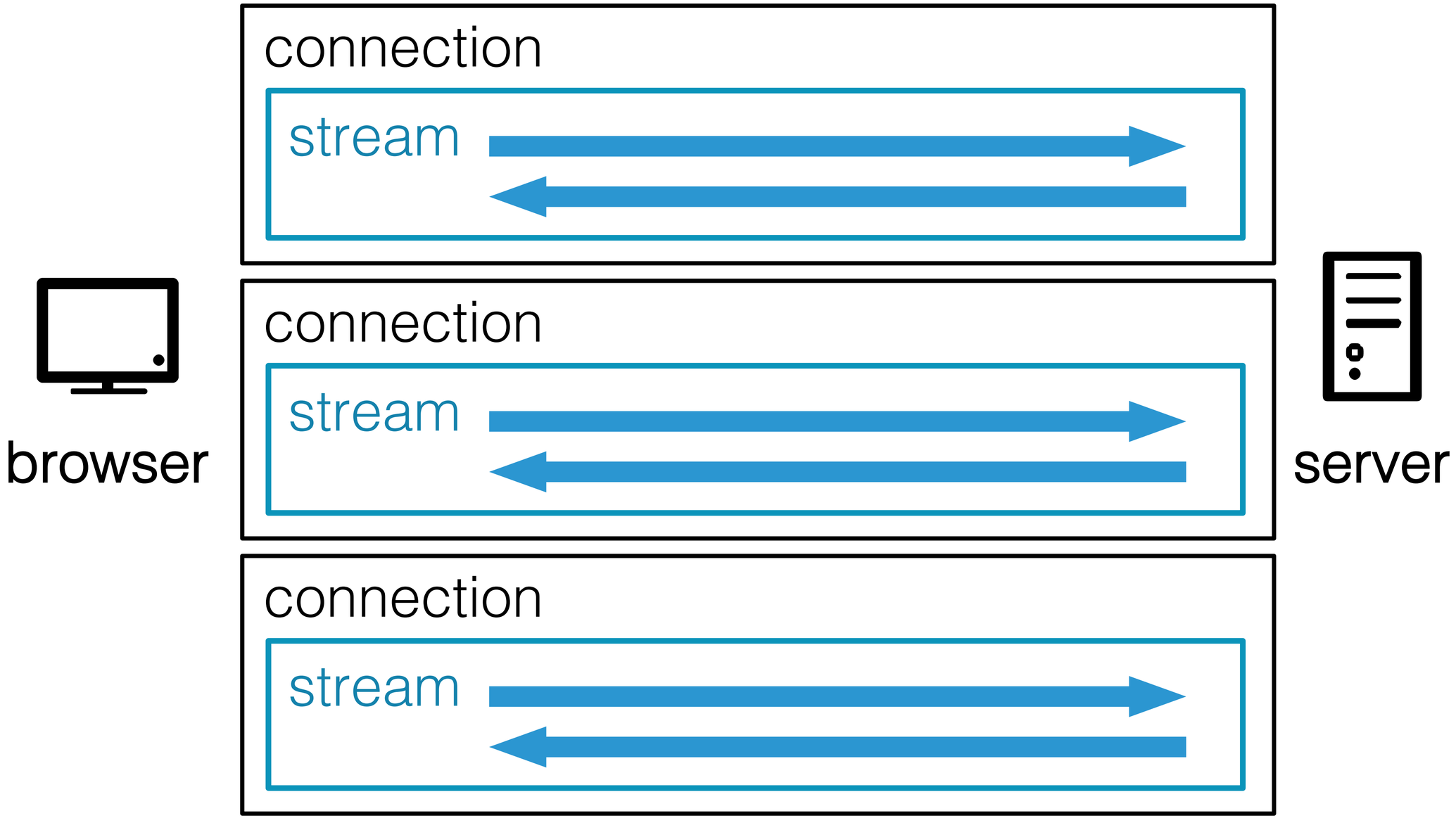
协议原理——潜在问题


5500
5000
4500
4000
3500
3000
2500
2000
加载时间
HTTP2
HTTP1.1
0%
0.50%
1%
2%
丢包率

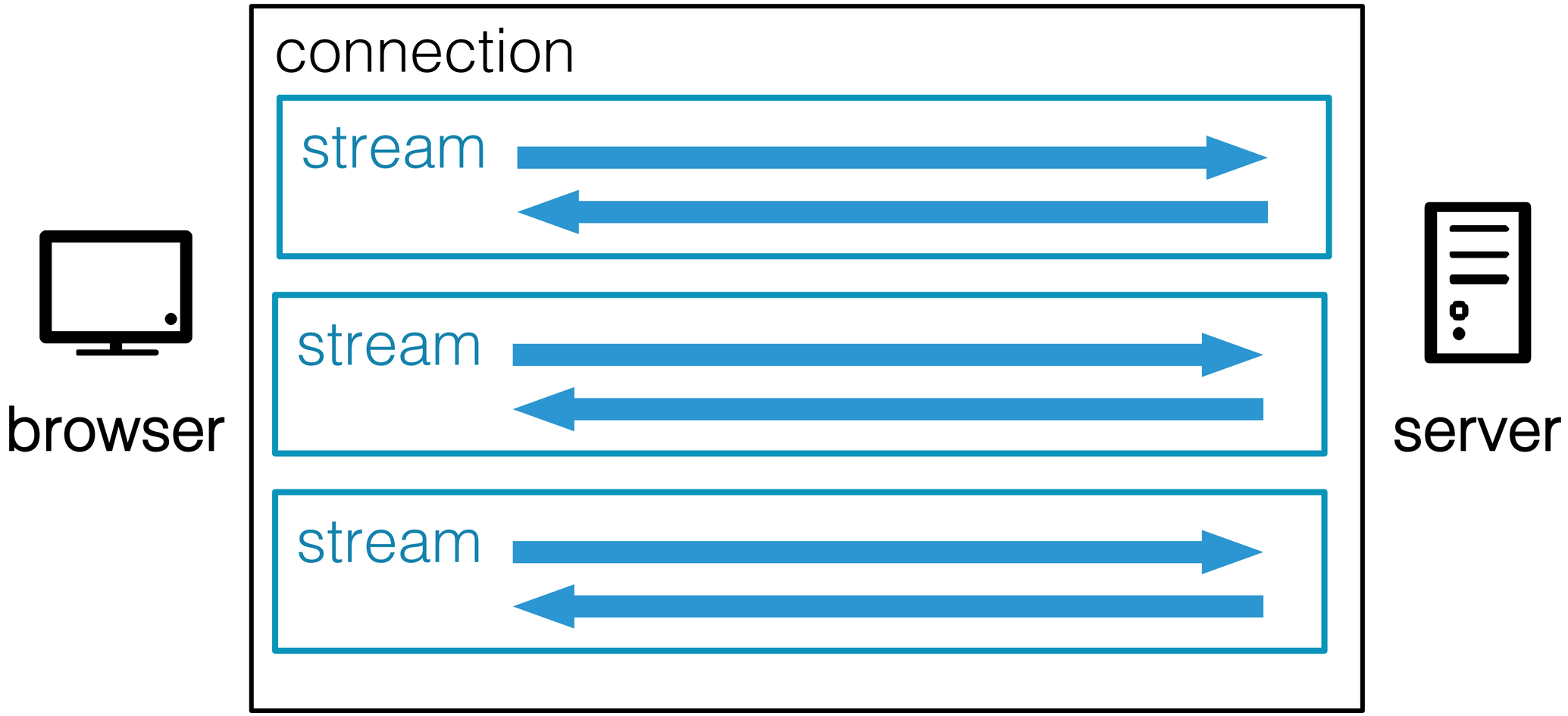
协议原理——潜在问题



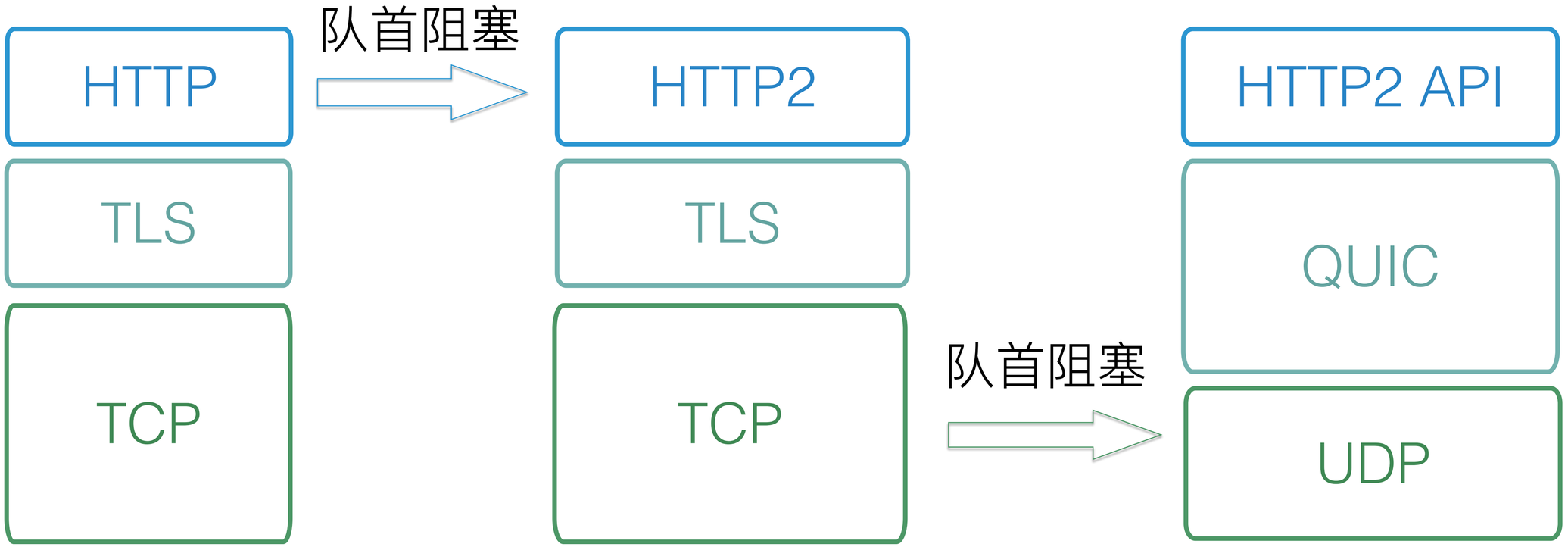
协议原理——潜在问题


connection
stream
connection
stream
connection
stream
browser
server

协议原理——潜在问题



协议原理——潜在问题

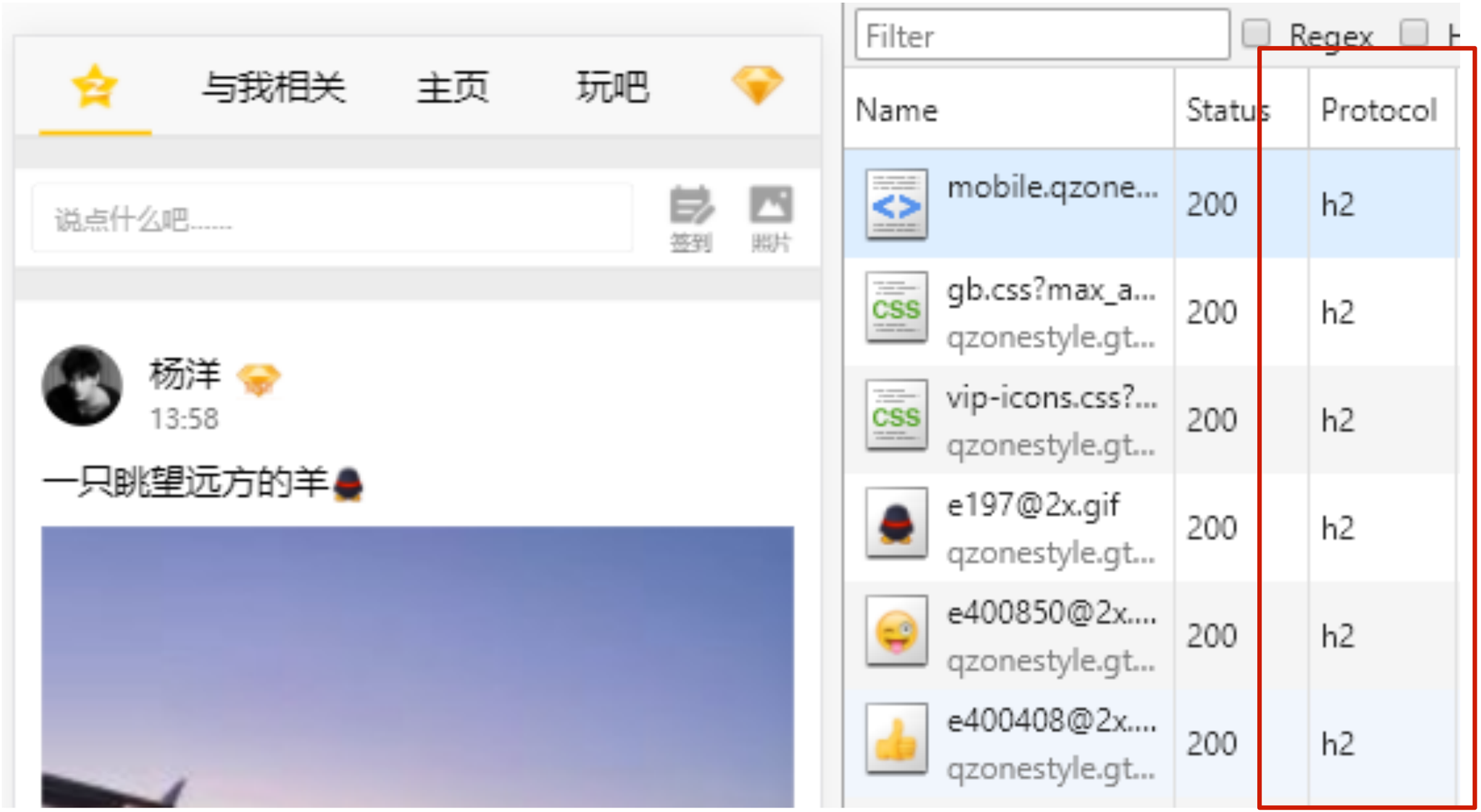


PART 3

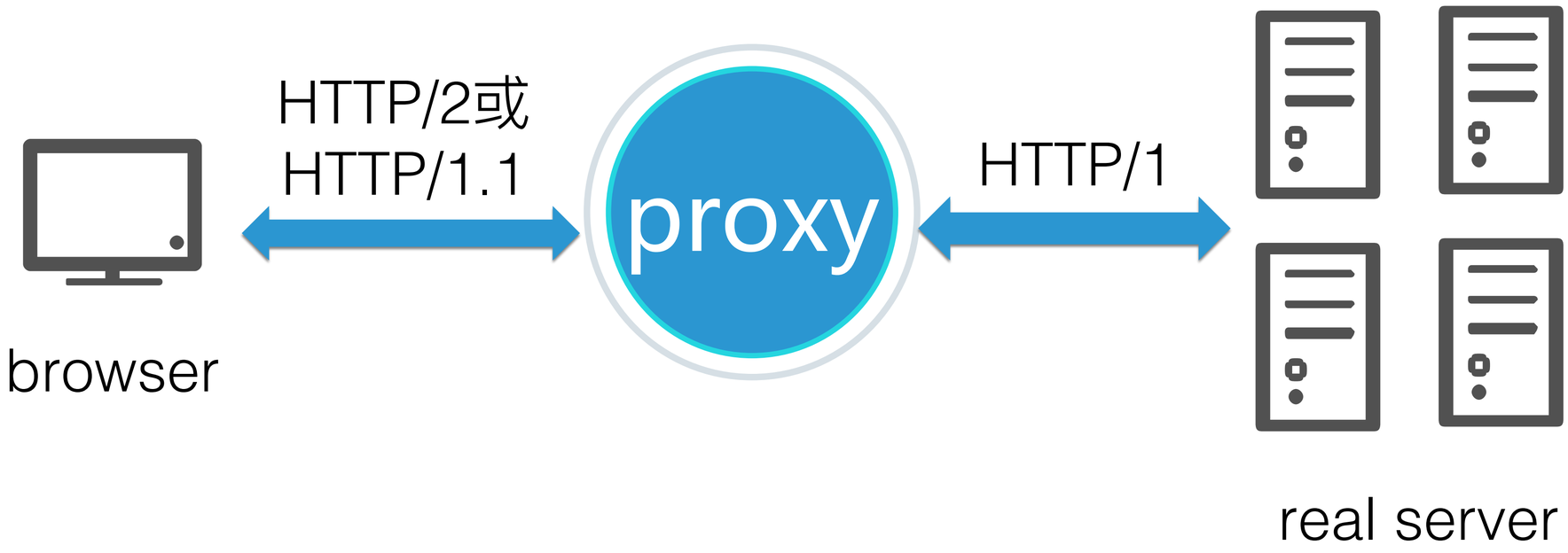
最佳实践

经过长期、多个业务的实践
我们总结出了一些经验和数据

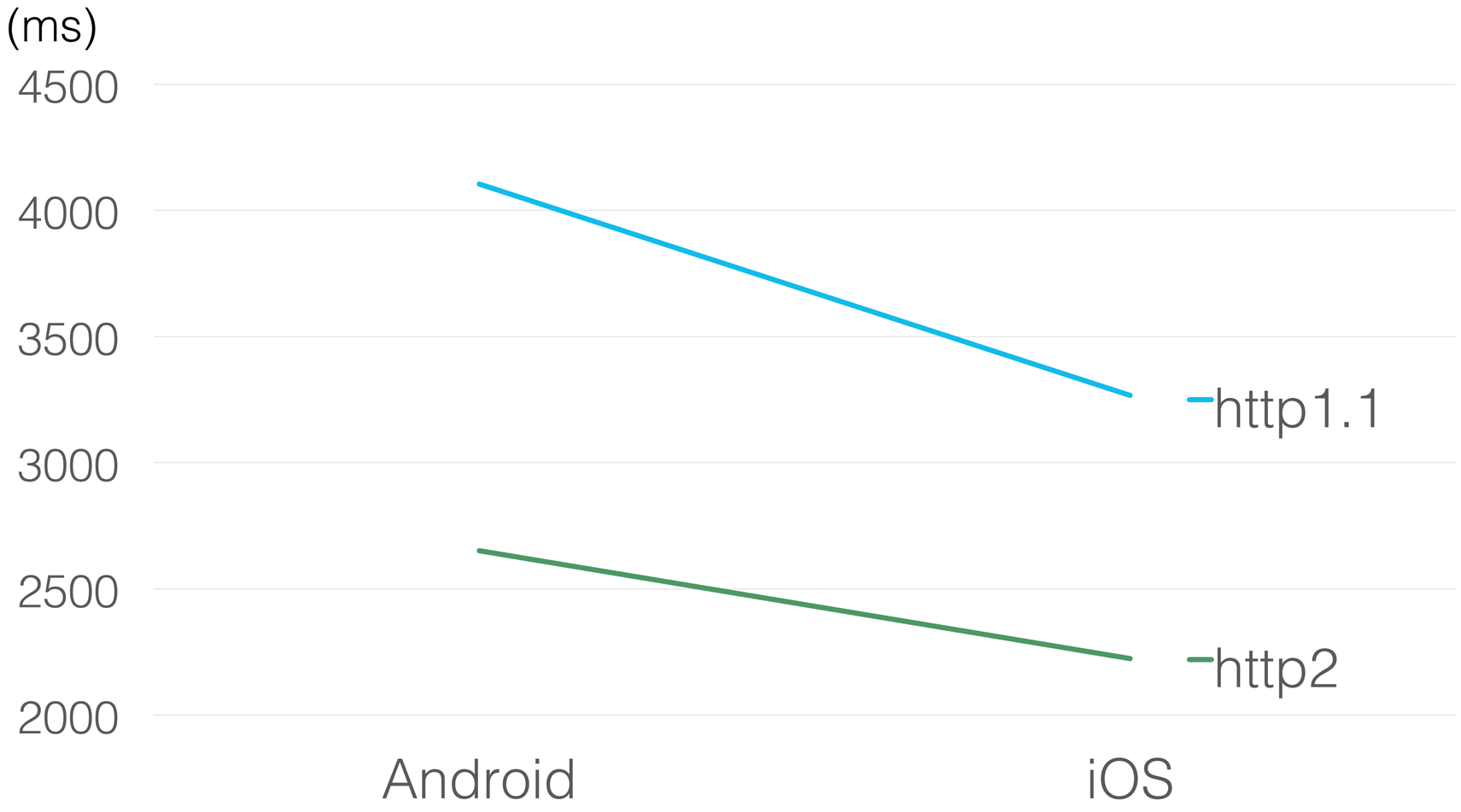
协议原理


与我相关
主页
玩吧
说点什么吧.....
签到
照片
杨洋
13:58
一只眺望远方的羊
Filter
Regex
Name
Status
Protocol
mobile.qzone...
200
h2
gb.css?max_a...
qzonestyle.gt...
200
h2
vip-icons.css?...
qzonestyle.gt...
200
h2
e197@2x.gif
qzonestyle.gt...
200
h2
e400850@2x....
qzonestyle.gt...
200
h2
e400408@2x....
qzonestyle.gt...
200
h2

接入架构

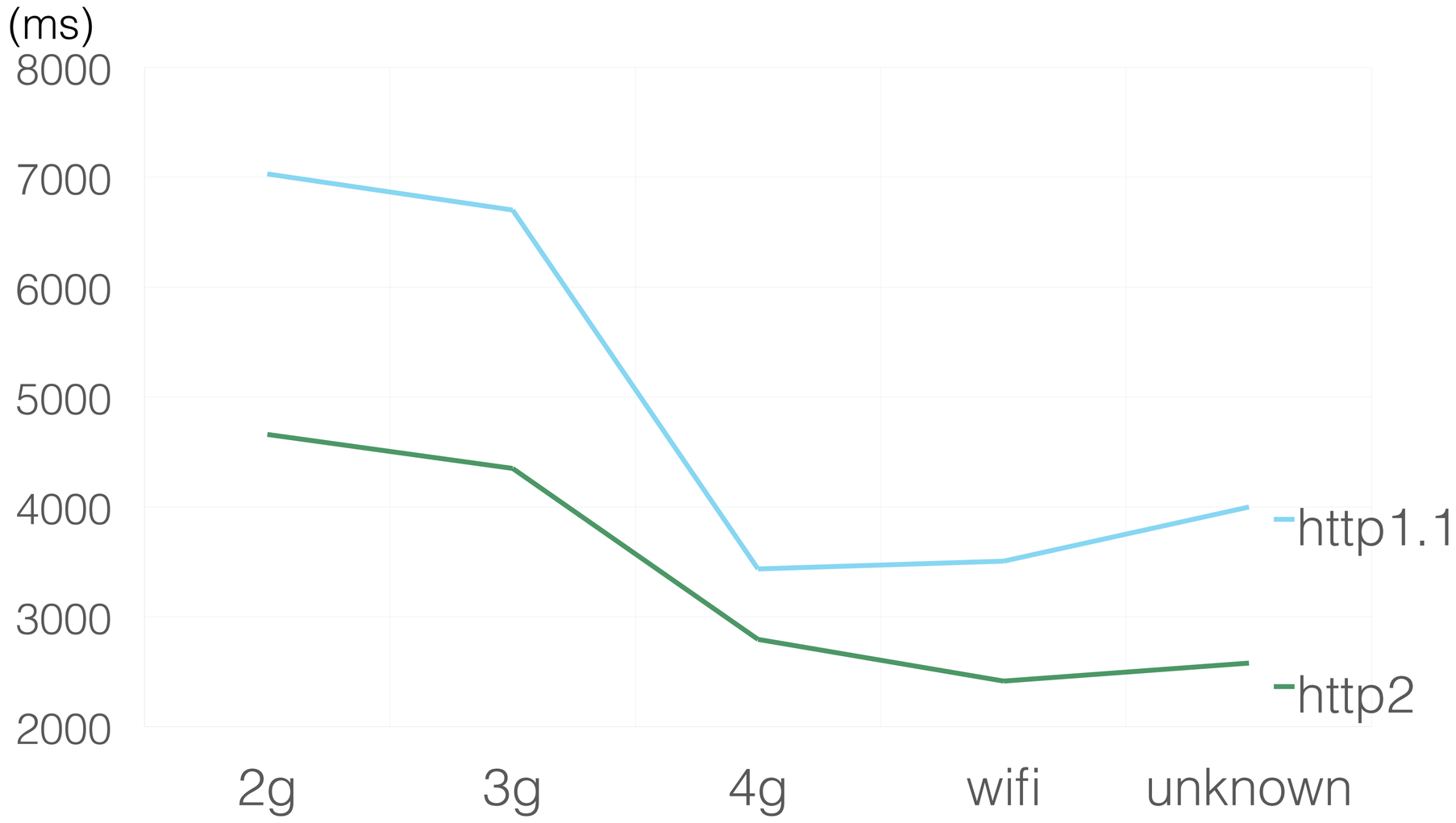


最佳实践——性能数据



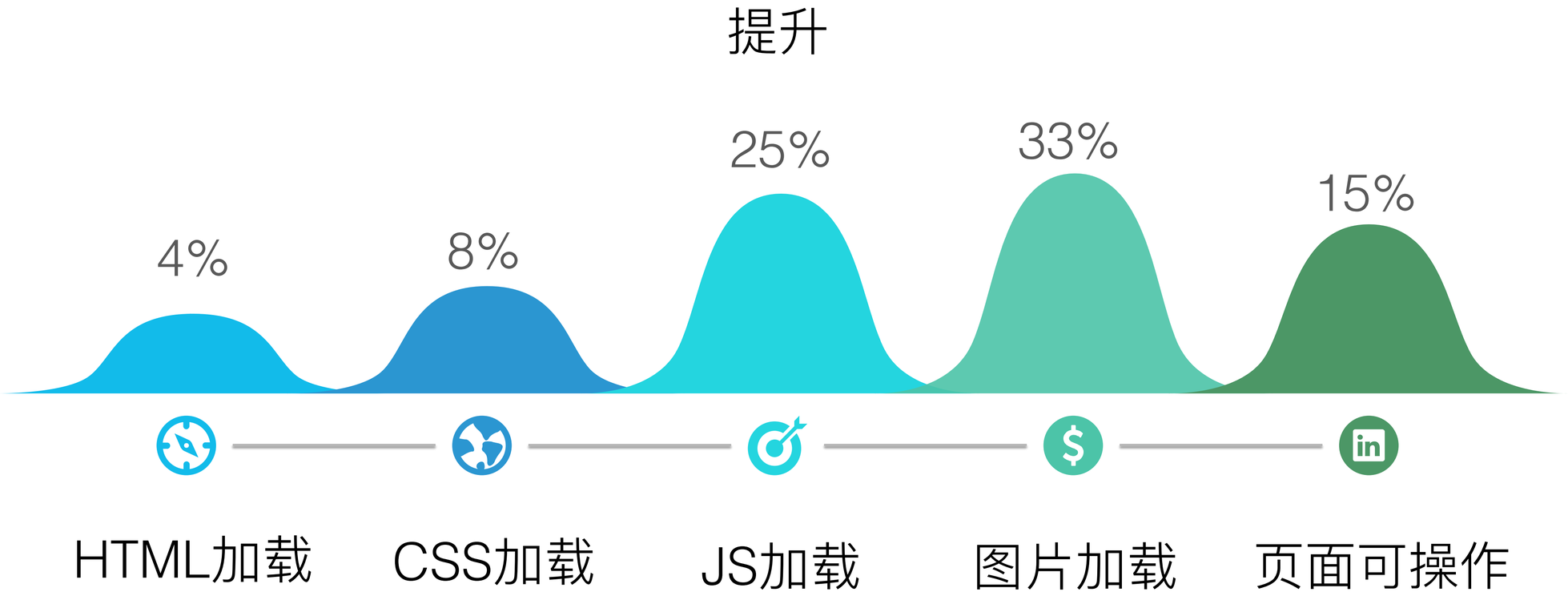
不同操作系统对比

最佳实践——性能数据



不同网络情况对比

最佳实践——性能数据



最佳实践——性能数据

连接时间、首字节时间

Performance timing

握手时间、是否复用

Server

JS、图片加载时间

异步资源

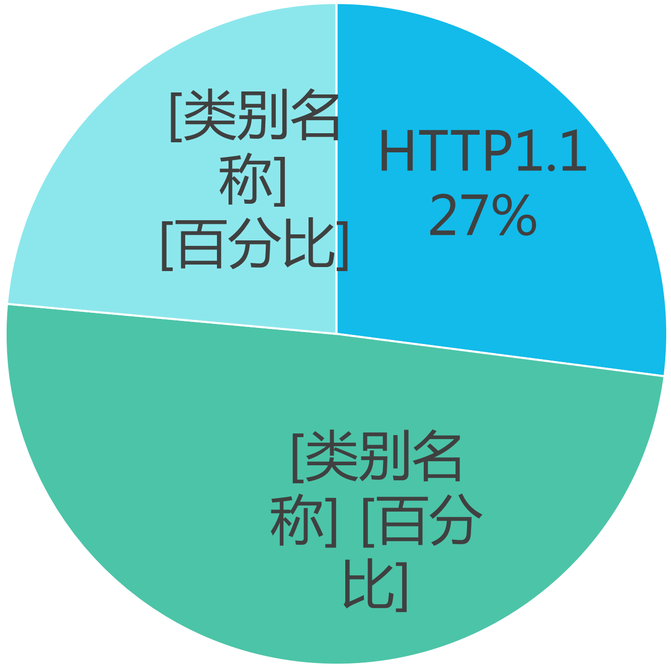
操作系统、网络环境

用户环境

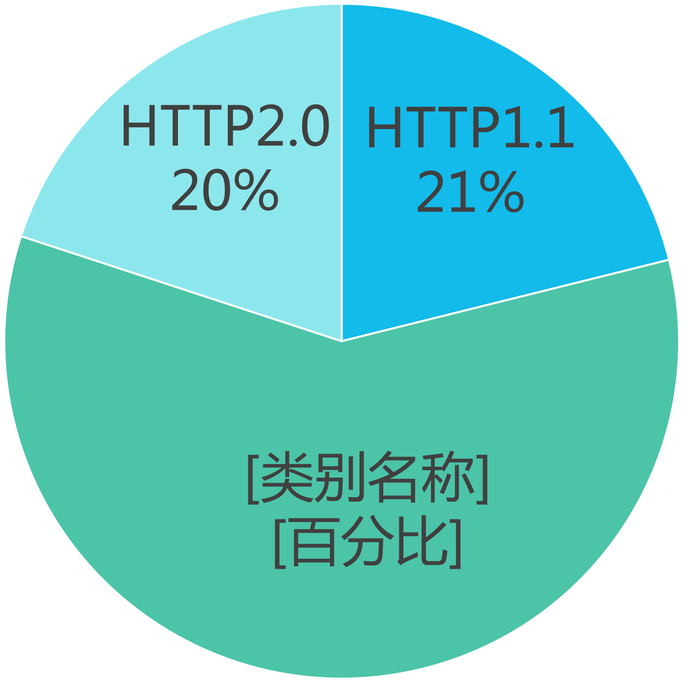
最佳实践——浏览器支持率

是否支持HTTP2

最佳实践——浏览器支持率

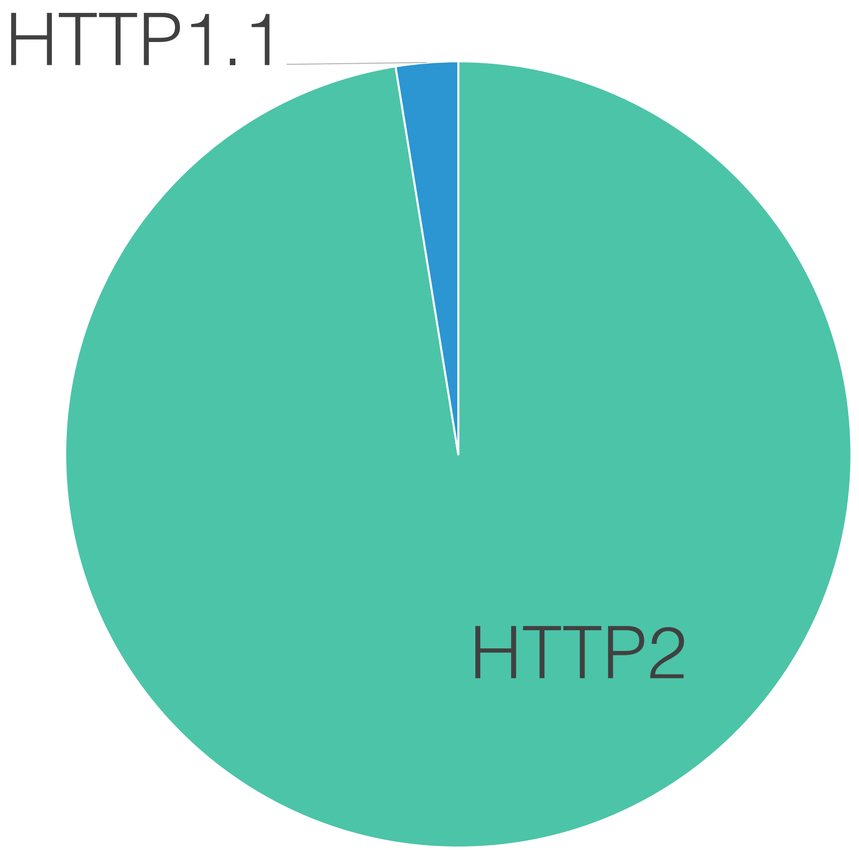


Android支持率



iOS支持率

最佳实践——浏览器支持率



最佳实践——浏览器支持率

最佳实践——调试工具

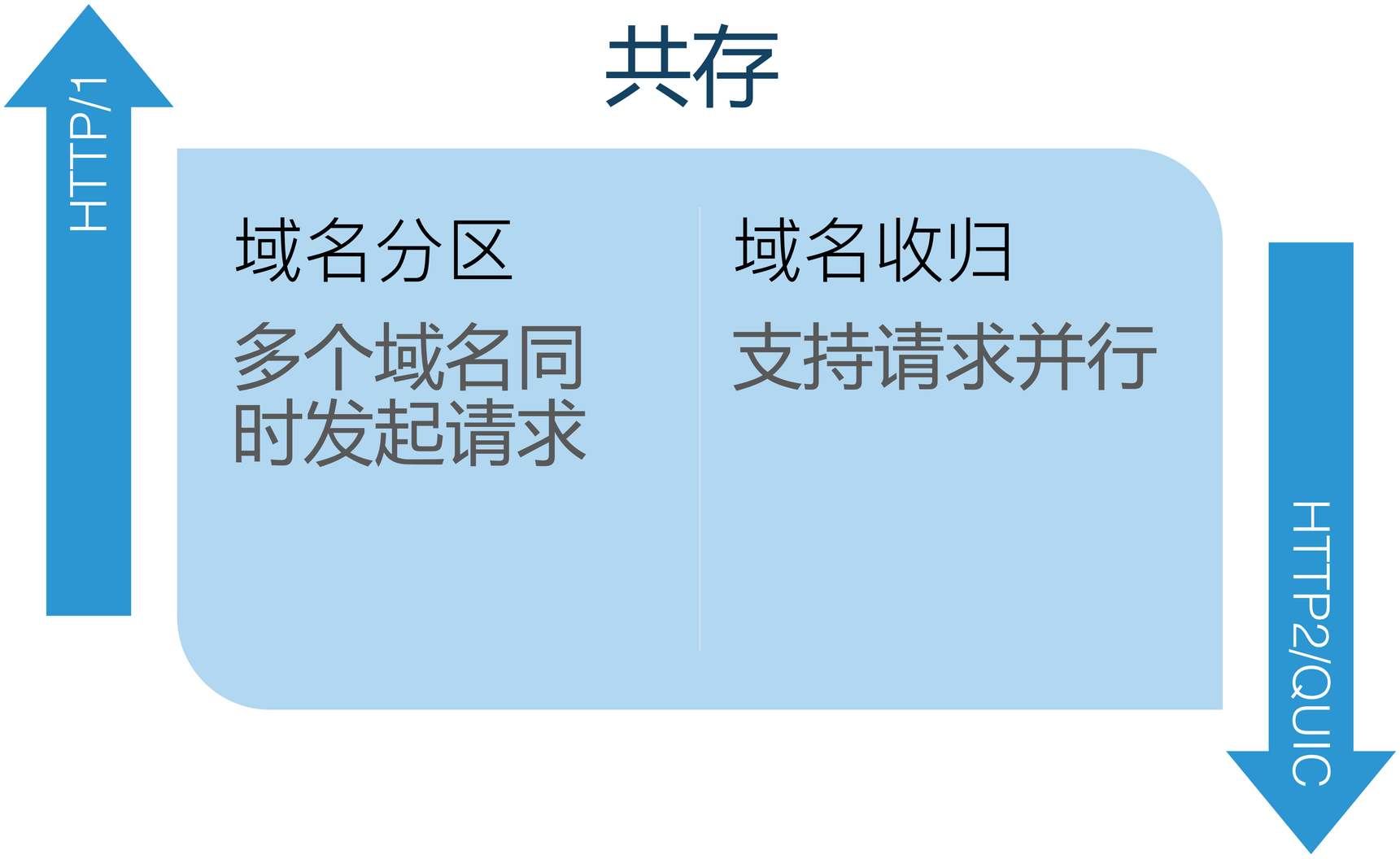
(?) id:126212 1 of 3088

	ID	Source Type	Description
☑	126212	HTTP2_SESSION	qzonestyle.gtimg.cn:443 (DIRECT)

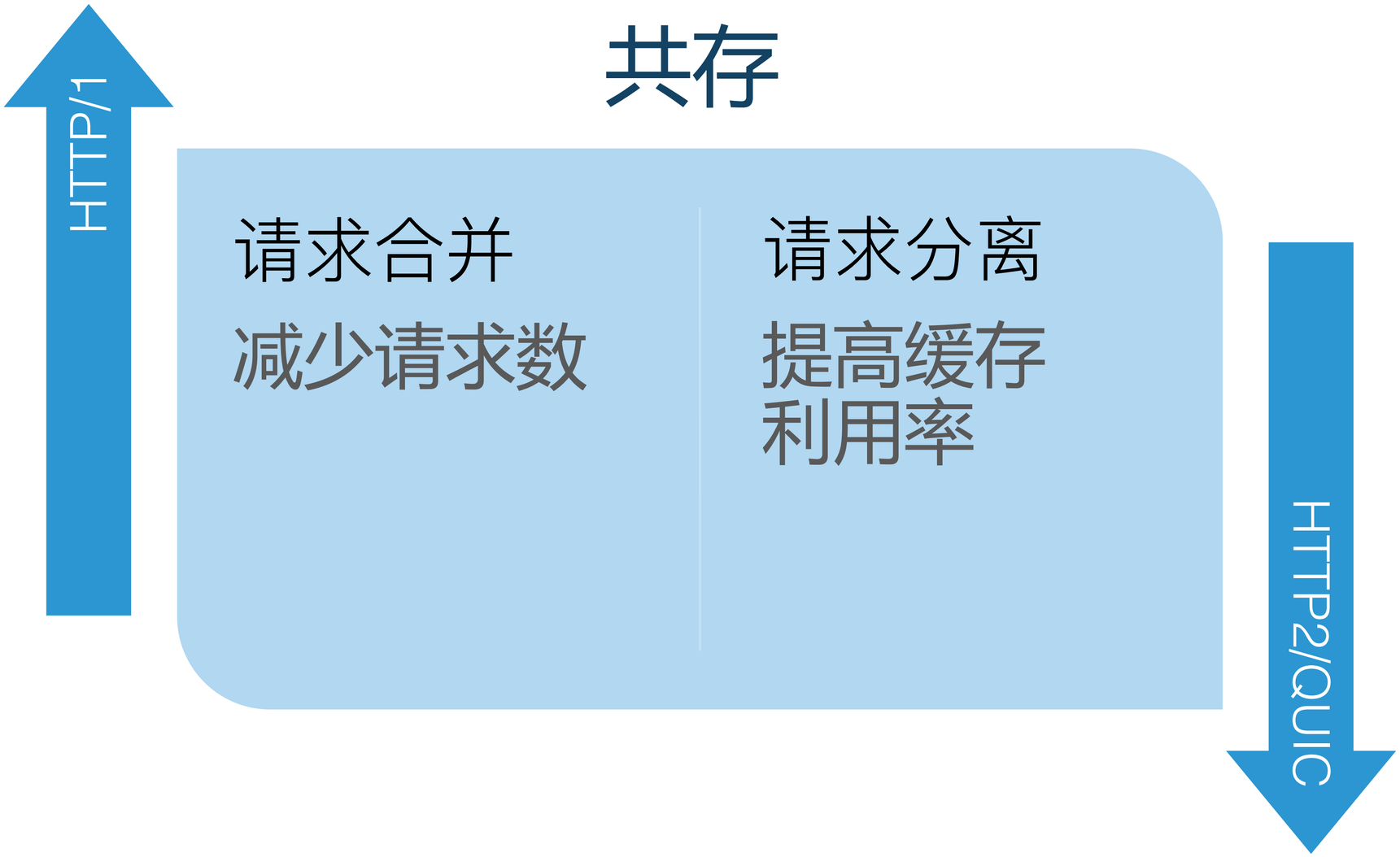
```
                                --> stream_id = 7
                                --> weight = 183
t=67361 [st=    7]    HTTP2_SESSION_SEND_HEADERS
                                --> exclusive = true
                                --> fin = true
                                --> has_priority = true
                                --> :method: GET
                                    :authority: qzonestyle.gtimg.cn
                                    :scheme: https
                                    :path: /ac/lib/seajs/sea-2.1.1.js
                                    pragma: no-cache
                                    cache-control: no-cache
                                    user-agent: Mozilla/5.0 (Windows NT 10.0; WOW64)
                                    accept: */*
                                    referer: https://user.qzone.qq.com/99785763?_t_=(
                                    accept-encoding: gzip, deflate, br
                                    accept-language: zh-CN,zh;q=0.8,en;q=0.6,zh-TW;q
                                --> parent_stream_id = 7
                                --> source_dependency = 126157 (HTTP_STREAM_JOB)
                                --> stream_id = 9
                                --> weight = 183
```

查看工具：chrome://net-internals

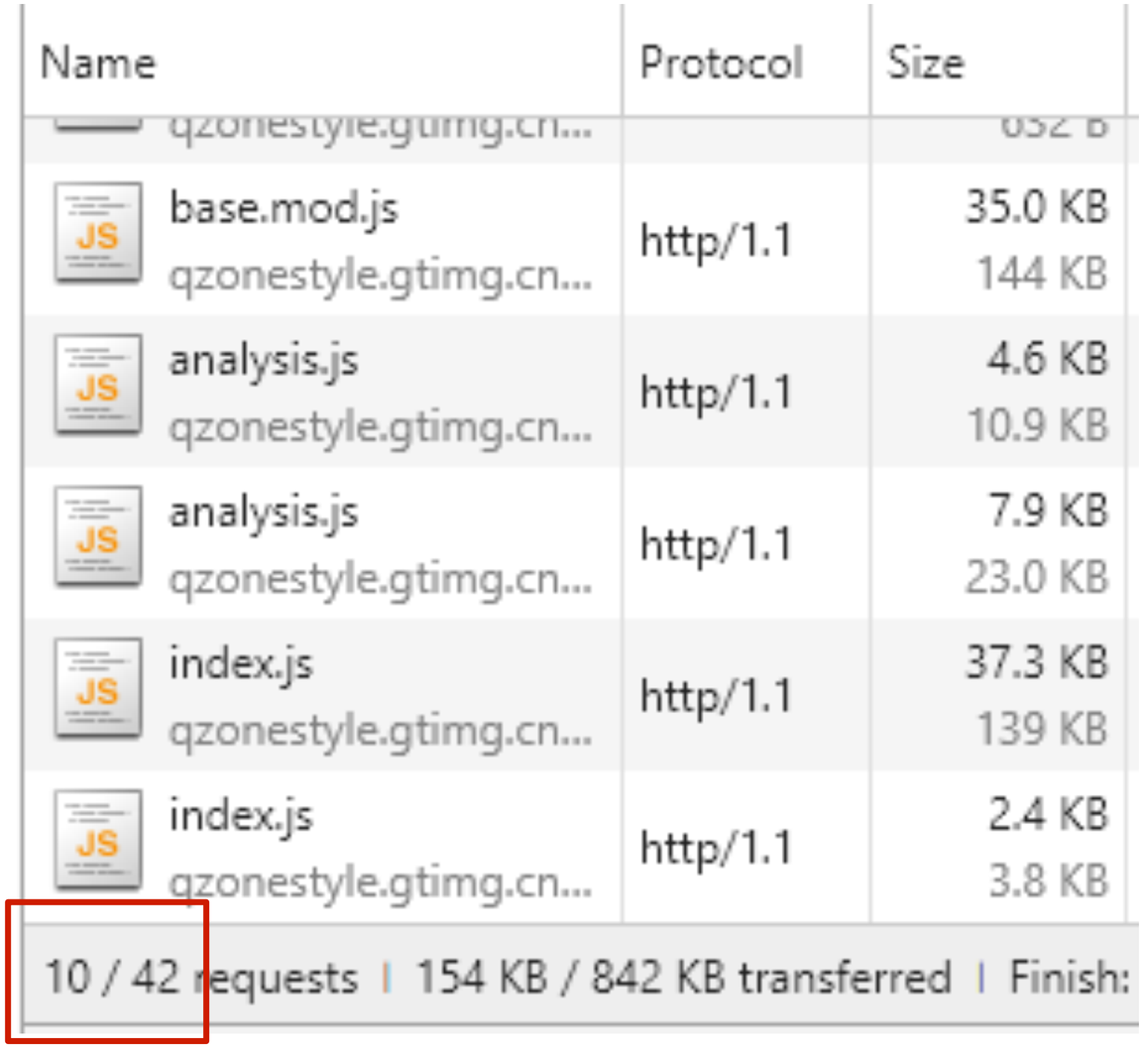
最佳实践——域名收归



最佳实践——请求分离

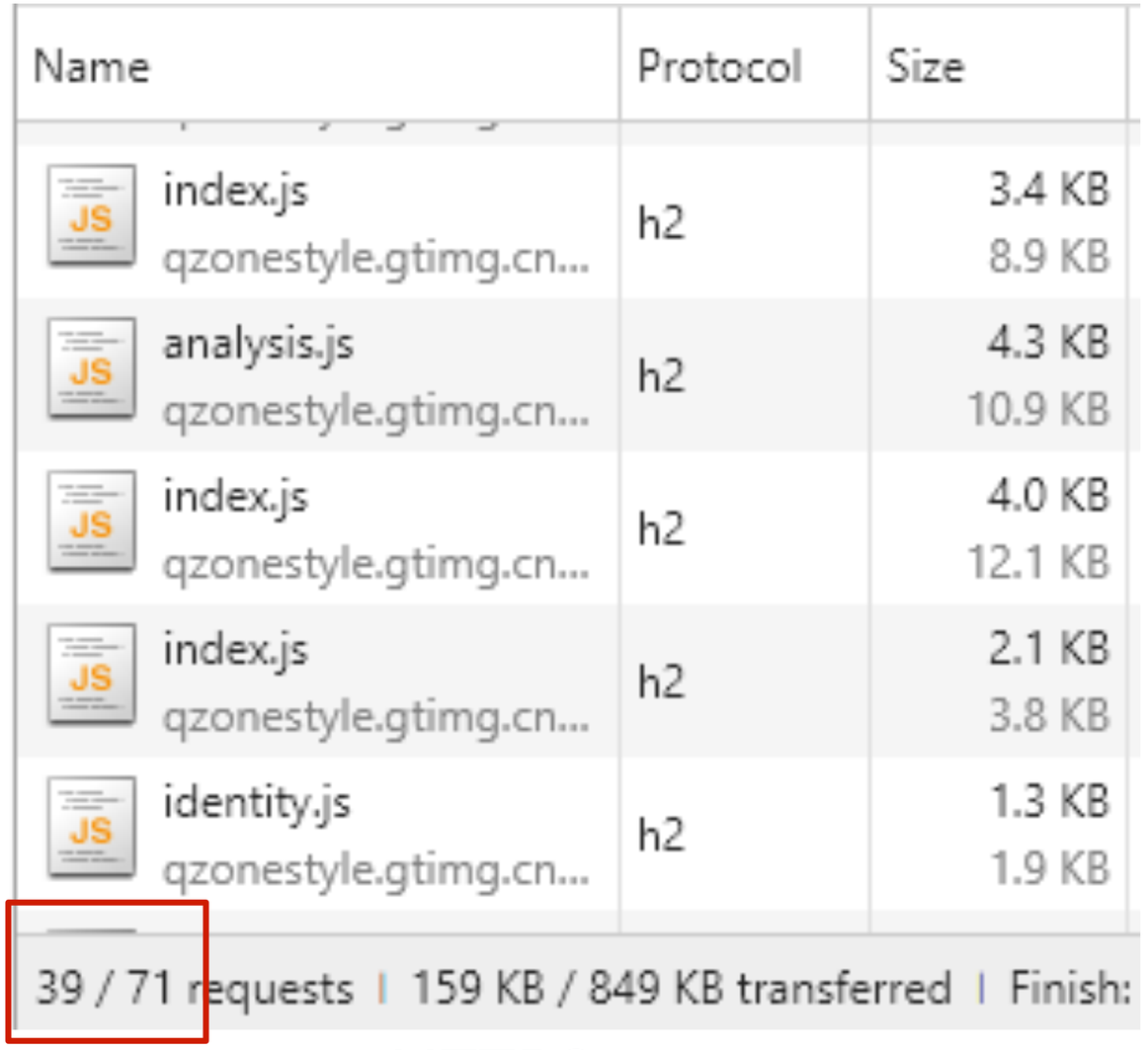


最佳实践——请求分离



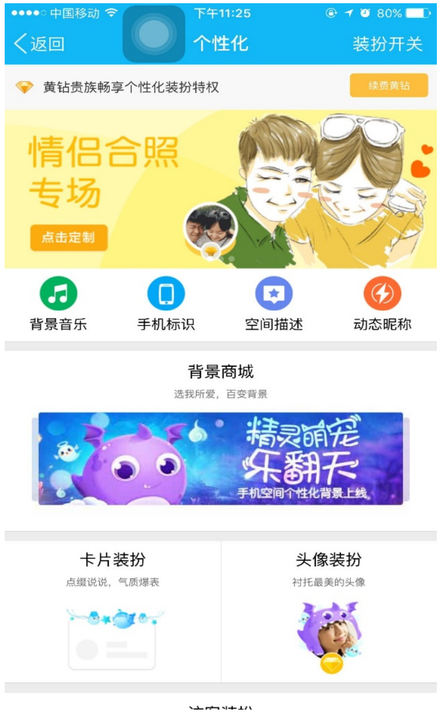
HTTP1.1

最佳实践——请求分离



HTTP2

预建连接



提前建立连接

入口

实际页面

复用率75%

提升400ms

Thanks!

Q&A

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