CS 305 Lab Tutorial
Lab 6 CDN DASH

Dept. Computer Science and Engineering
Southern University of Science and Technology

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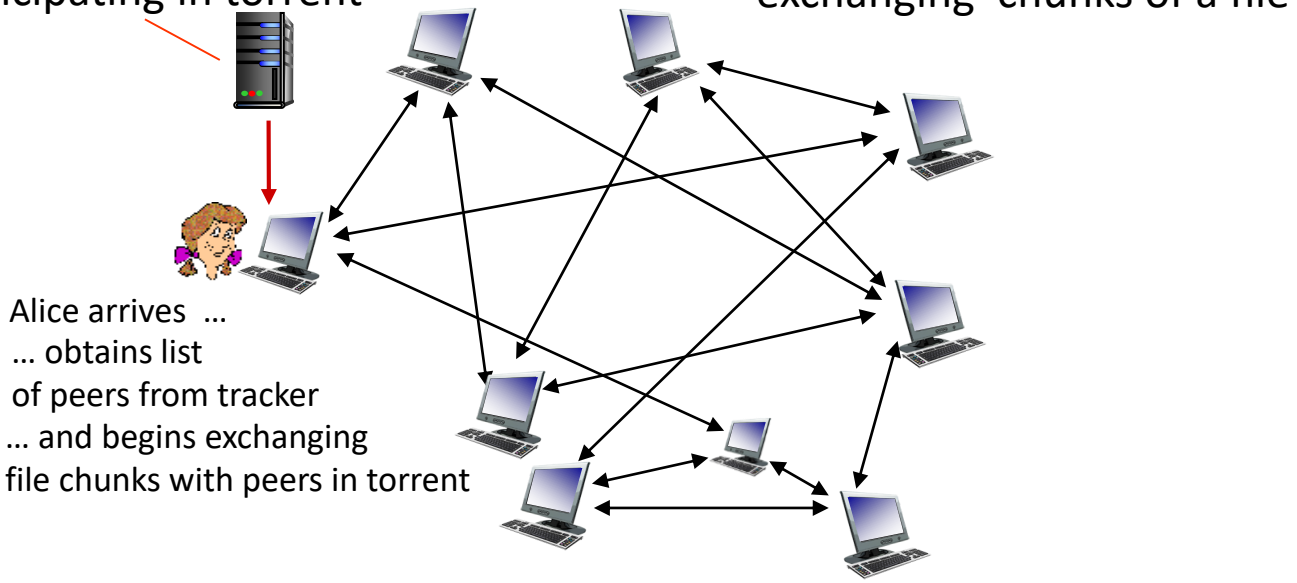
Part A.1 P2P file distribution: BitTorrent

- file divided into 256Kb chunks
- peers in torrent send/receive file chunks

tracker: tracks peers participating in torrent

torrent: group of peers exchanging chunks of a file



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Part A.1 P2P BitTorrent: requesting, sending file chunks

Requesting chunks:

- at any given time, different peers have different subsets of file chunks
- periodically, Alice asks each peer for list of chunks that they have
- Alice requests missing chunks from peers, rarest first

Sending chunks: tit-for-tat

- Alice sends chunks to those four peers currently sending her chunks *at highest rate*
  - other peers are choked（堵塞）by Alice (do not receive chunks from her)
  - re-evaluate top 4 every 10 secs

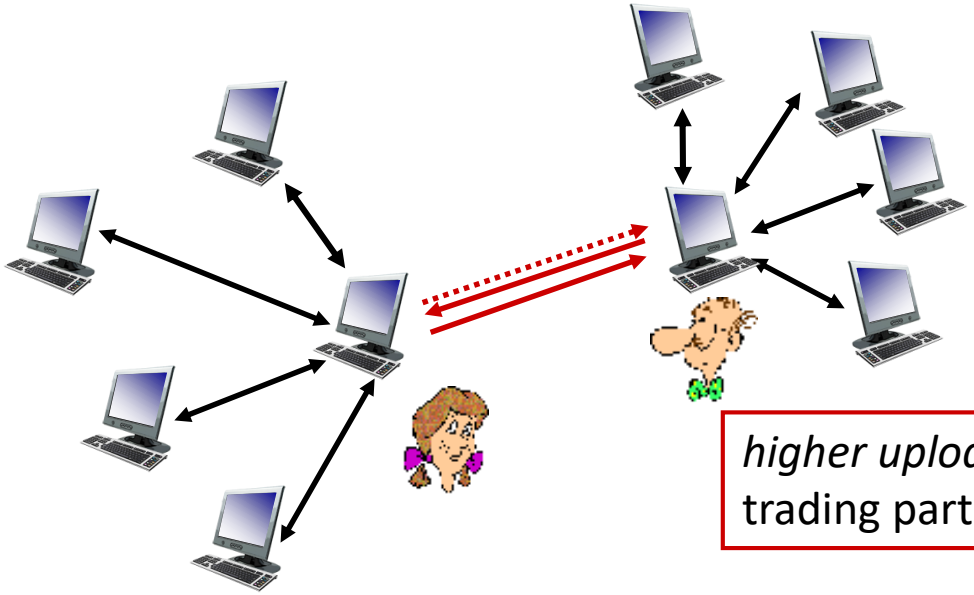
Part A.1 BitTorrent: tit-for-tat（一报还一报）

(1) every 30 secs: randomly select another peer, starts sending chunks, say Bob

(2) Alice “optimistically unchokes” Bob

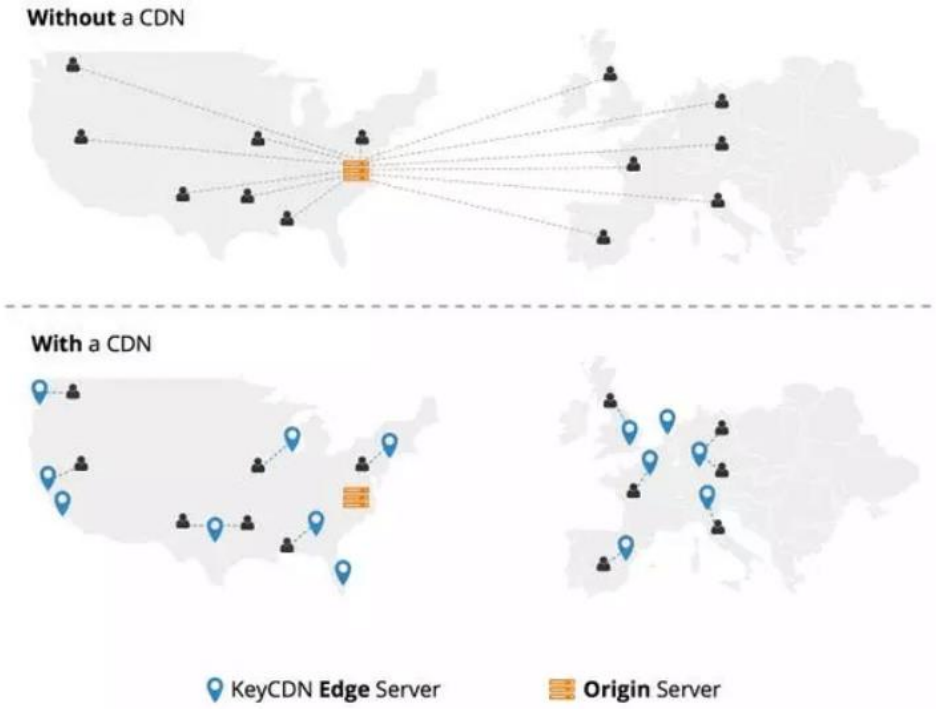
(3) Alice becomes one of Bob’s top-four providers; Bob reciprocates

(4) Bob becomes one of Alice’s top-four providers



higher upload rate: find better trading partners, get file faster !

Part A.2 CDN

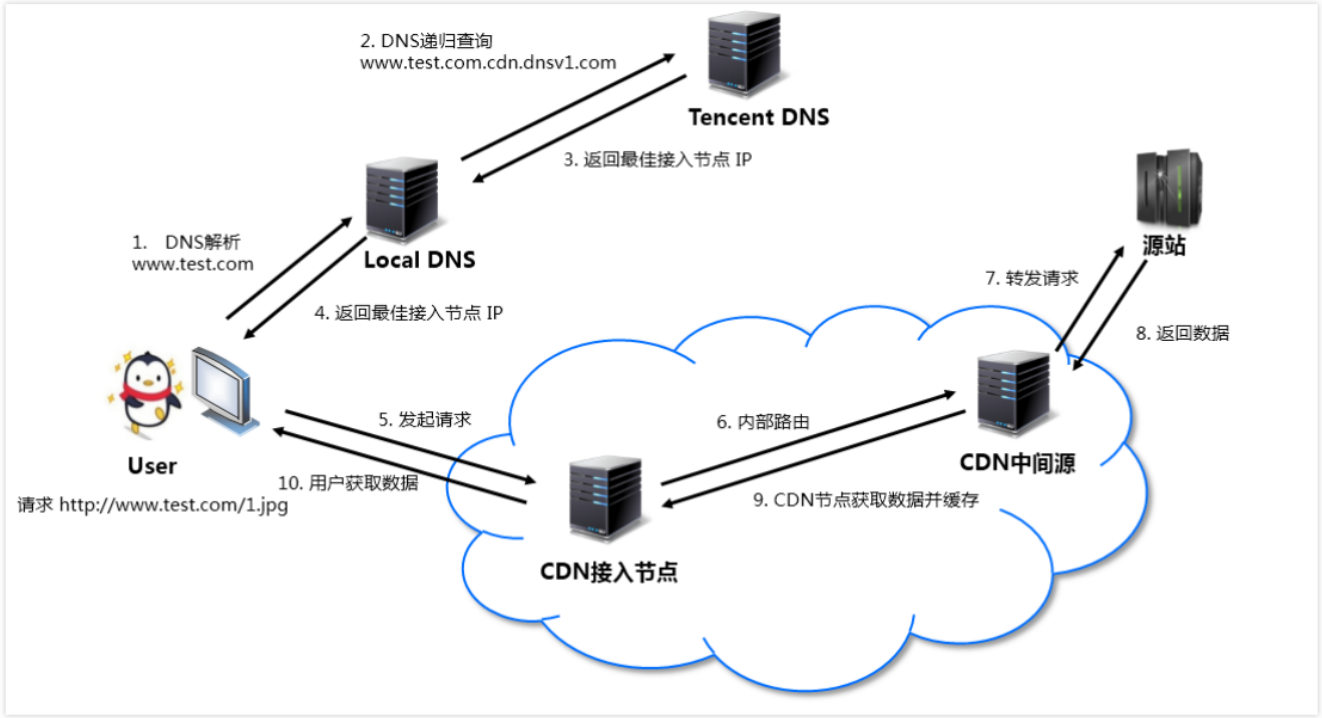


CDN is to cache content on a node closer to the user to improve the user experience;

What are the scenarios of CDN?

- **Big flow** website, such as: online video, games, pictures, audio, social, e-commerce, download stations, etc.
- CDN is suitable for a certain level of **static resource** access, including html, js, css, apk, mp3, flv, jpg, gif, mp4, flv and all other static resources.

Part A.2 CDN



If: X-Cache(HIT): TCP_MEM_HIT means hit cache.
If: X-Cache(MISS): TCP_MISS means Miss cache.

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https://cloud.tencent.com/document/product/228/2939

Part A.2 CDN

Q: How long is the cache time of file on the CDN server ?

A:

- The caching time of files refers to the cache time cycle of files in browsers.
- The CDN cache server strictly adheres to the standard HTTP protocol, and the cache time is controlled by the Cache-Control and Expires response headers in the HTTP response header
- Html file cache time viewing: Look at the Cache-Control in the HTTP header, such as "Cache-Control max-age = 2592000 (seconds)" to indicate that the file will be cached for 30 days. At this point, unless you use manual refresh, the newly opened browser page will not go back to the source to retrieve the file during the file cache cycle.

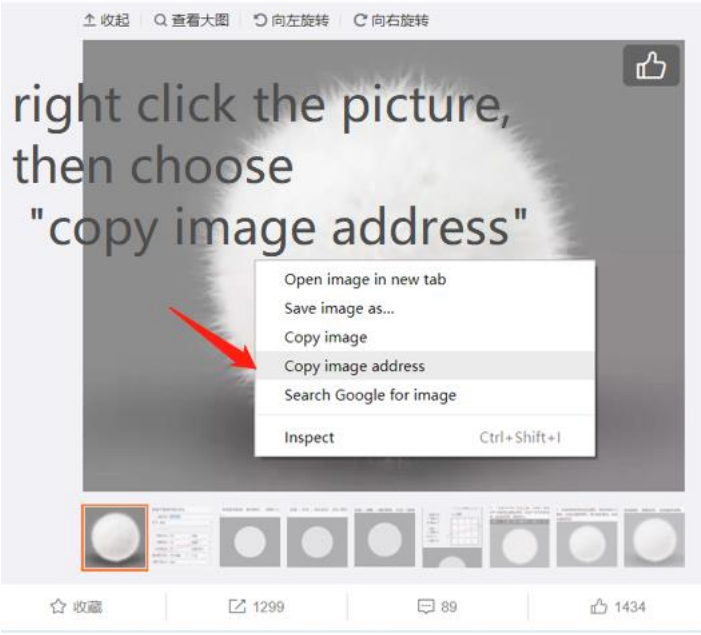
Demo 1

1. Find a web sit which may use CDN, find a static resource on it

2. To get the URL of this static resource(such as a picture)

3. Using command “curl” to get the content of this static resource

4. Check if this is on the CDN node or not based on the command output

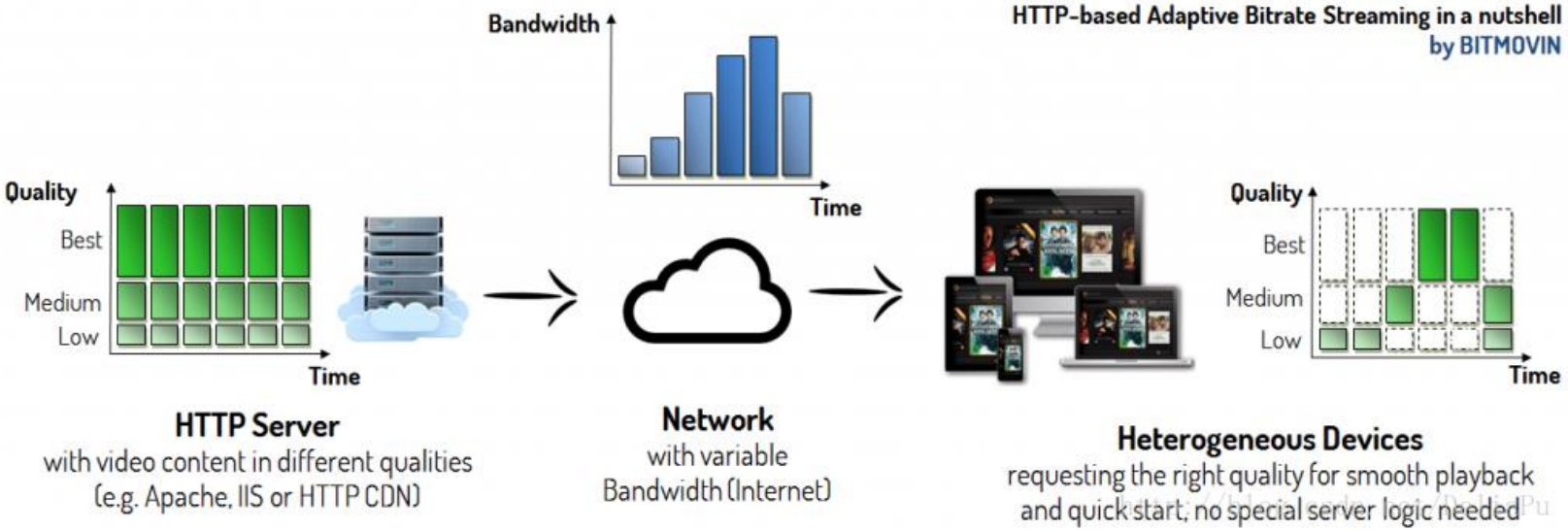


The result of curl

```
C:\Users\Administrator>curl https://d4.sina.com.cn/202110/15/1581703.jpg --head
HTTP/1.1 200 OK
Server: nginx
Date: Mon, 18 Oct 2021 01:25:27 GMT
Content-Type: image/jpeg
Content-Length: 86080
Connection: keep-alive
X-RequestId: 0cbc680a-2110-1809-0045-0894eff93828
X-Requester: GRPS000000ANONYMOUSE
Last-Modified: Fri, 15 Oct 2021 07:16:45 GMT
X-Filesize: 86080
ETag: "96292990b34d783193938a31187d892c"
x-amz-meta-crc32: 12D0DBA9
x-amz-meta-uploadlocation: /ad4
Cache-Control: max-age=604800
Access-Control-Allow-Headers: Origin, Content-Type, Accept, Range, Content-Length
Access-Control-Allow-Methods: GET, PUT, POST, DELETE, OPTIONS, HEAD
Access-Control-Max-Age: 31536000
Access-Control-Allow-Origin: *
Expires: Mon, 25 Oct 2021 01:00:45 GMT
Edge-Copy-Time: 1634518845207
Age: 1483
Via: https/1.1 dfwx.guangdong.union.163 (ApacheTrafficServer/6.2.1 [cRs f ])
X-Cache: HIT.163
X-Via-CDN: f=edge,s=dfwx.guangdong.union.163.nb.sinaedge.com,c=10.245.100.15;f=Edge,s=dfwx.guangdong.union.163,c=103.116
.123.163
X-Via-Edge: 16345203279890f64f50aa37b74676d6ca013
```

A static resource which is cached on a CDN node

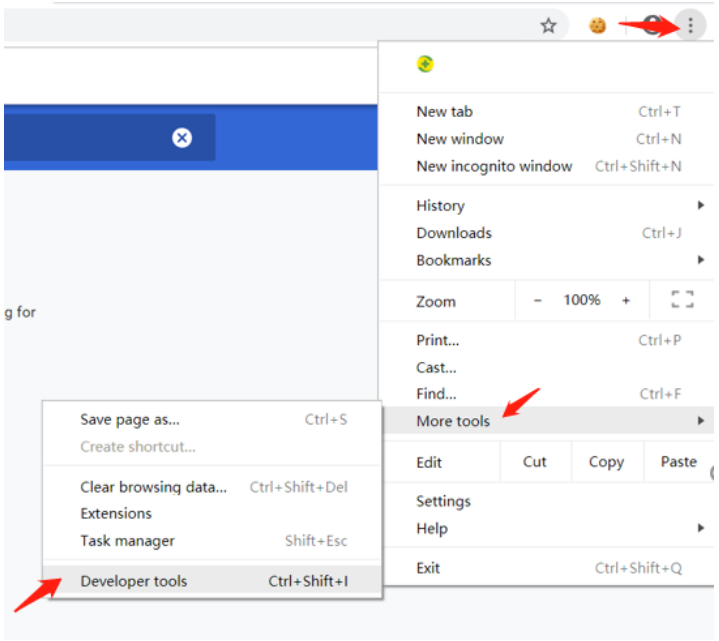
Part A.3 DASH

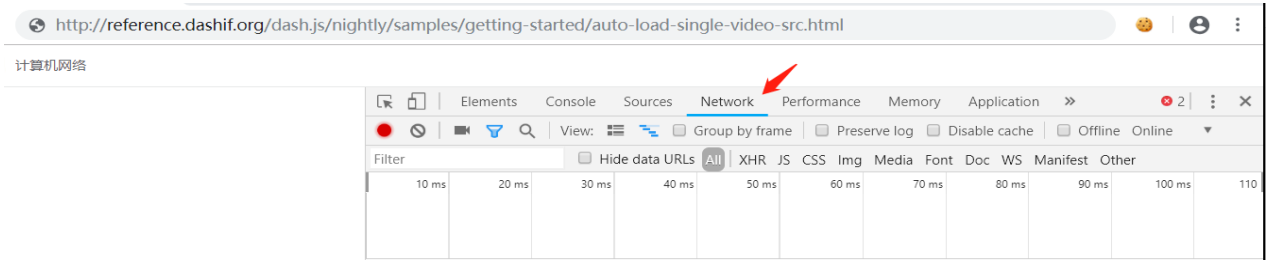

HTTP-based Adaptive Bitrate Streaming in a nutshell
by BITMOVIN
Bandwidth
Time
Quality
Best
Medium
Low
Time
HTTP Server
with video content in different qualities
(e.g. Apache, IIS or HTTP CDN)
Network
with variable
Bandwidth (Internet)
Quality
Best
Medium
Low
Time
Heterogeneous Devices
requesting the right quality for smooth playback
and quick start; no special server logic needed

Demo 2

1. open “chrome”
2. open the “developer tools” of chrome
3. visit the url: https://reference.dashif.org/dash.js/nightly/samples/dash-if-reference-player/index.html

4. Observe what happened on the ‘Network’ view of “developer tools”





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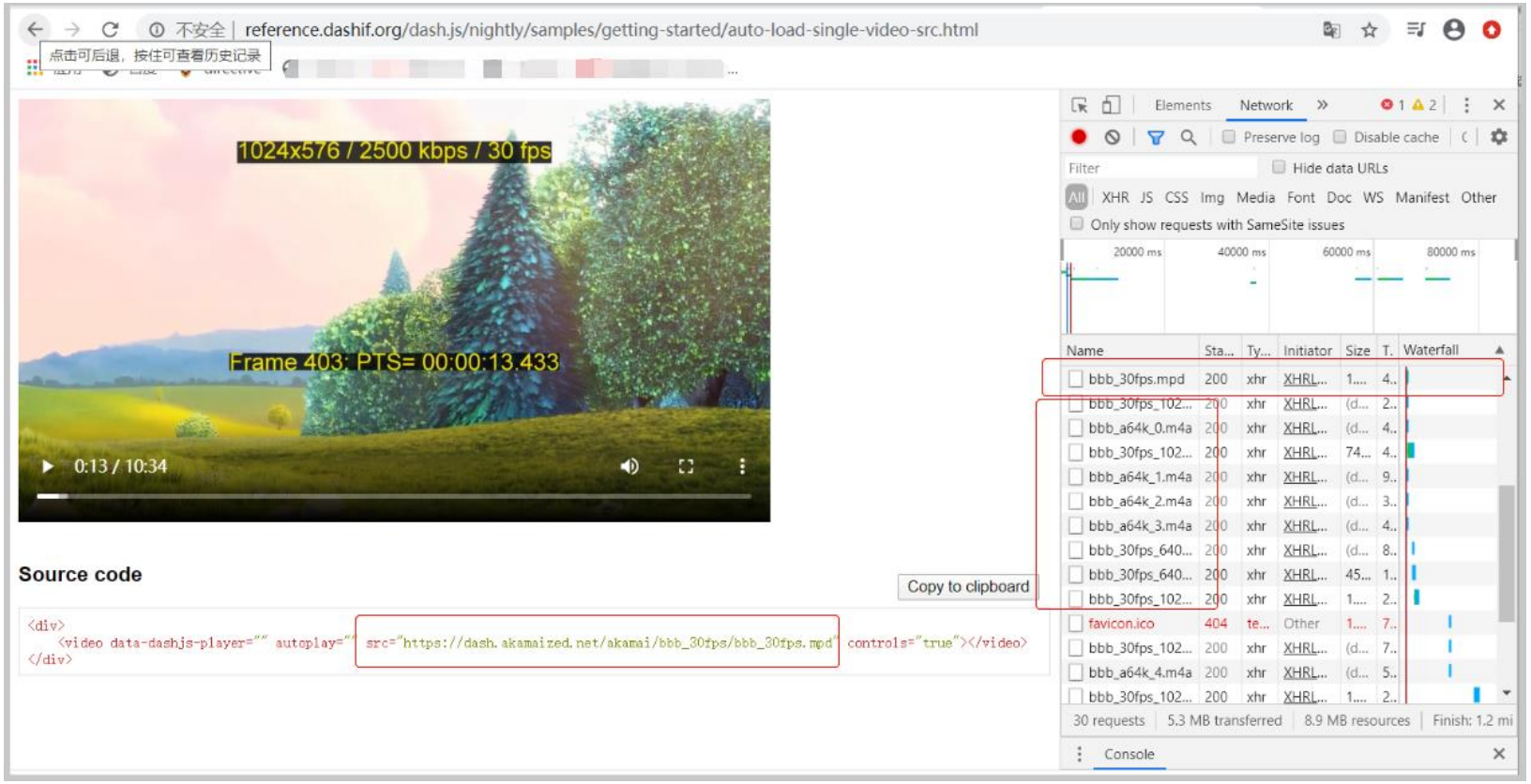
Testing result



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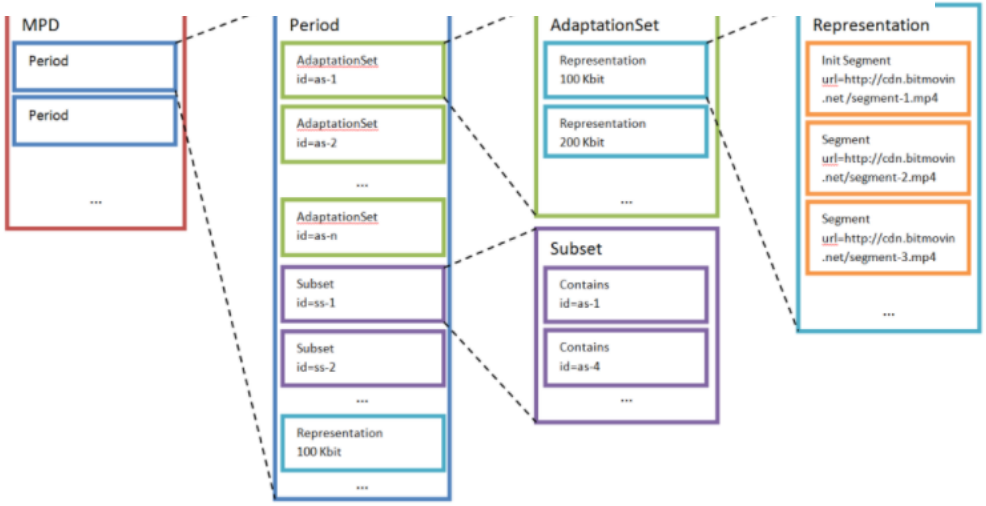
MPD FILE



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Practise 6.1 Loading a Dash resource

- Using dash.js to load a dash resource
- Open “Network” view in ’developer tools’ of browse(such as chrome) to observe
  - Is there any ‘mpd’ files, What’s its name, what is the description of ‘mpd’ in mime
  - Is there any ‘m4s’ or 'm4v' or 'mp4' files, what’s its related rate, will the files’ ‘rate’ change along with the changing of network condition(especially the bandwidth)
- Reference:
  - A html embedded a dash.js which maybe helpful for loading a ‘mpd’ file
    - https://reference.dashif.org/dash.js/nightly/samples/dash-if-reference-player/index.html
  - A dataset of dash resources
    - https://dash.akamaized.net/akamai/bbb_30fps/

Practise 6.2 Finding a CDN user

- Using curl to get a resource from web which using CDN to upgrade the accessing speed and balance the traffic load
  - How can you tell that this web is using CDN
  - Using nslookup/dig in your computer to find the IP address of this web sit
  - Ask your friend who is in another province to practice the same thing(using nslookup/dig to find the IP address of the web site which using CDN, find the IP address of this web site.)