IETF96 INFO

SECURE CONTENT DELEGATION (BLIND CACHE)

TODAY'S AGENDA

WHAT IT IS
WHERE WE ARE
(SPECS&IMPL)
DISCUSSION

DRAFT-THOMSON-HTTP-SCD

SECURE CONTENT DELEGATION

SPLIT CONTENT AND METADATA

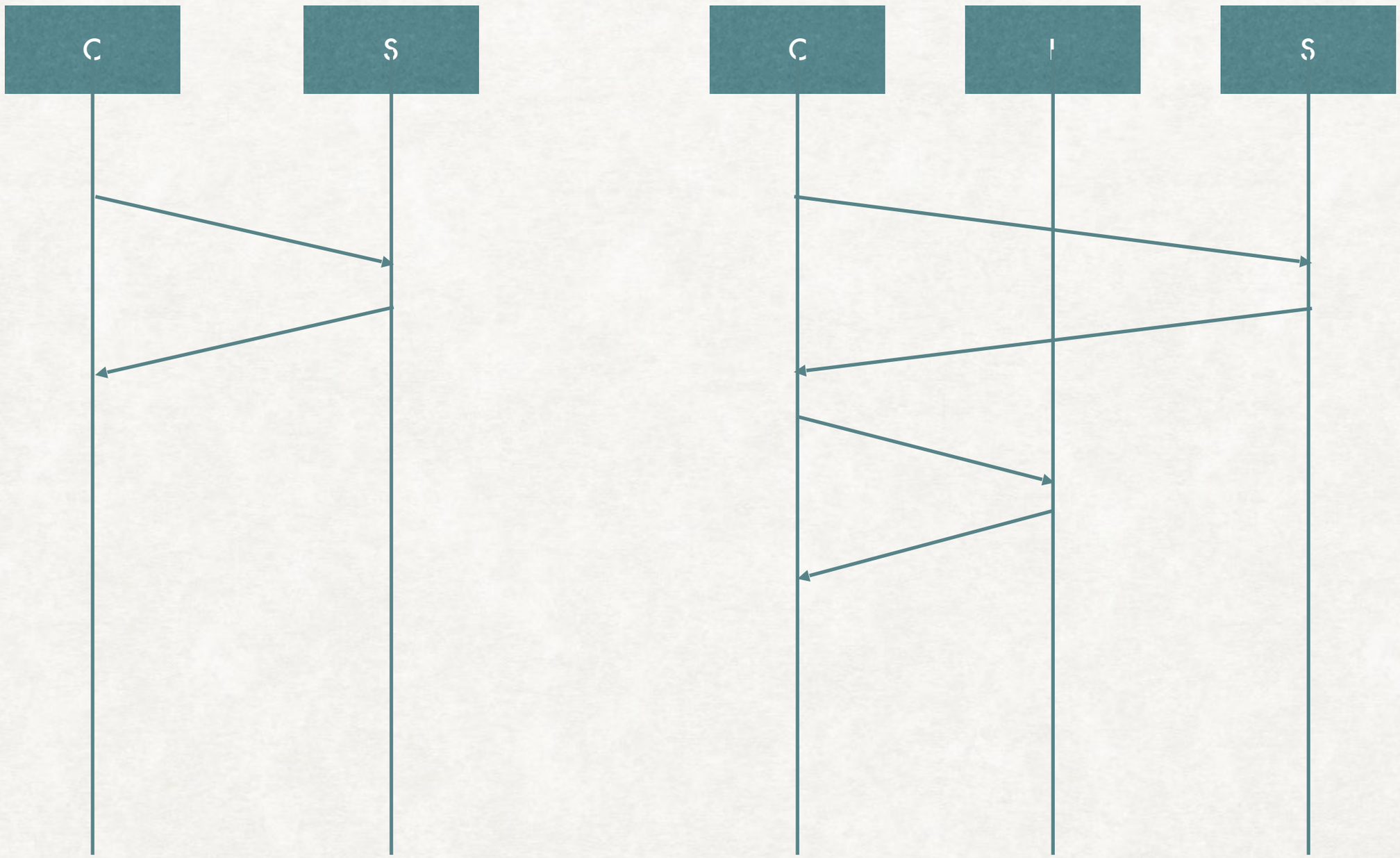
AND HOST CONTENT ANYWHERE

Responses don’t include real content

- Content delivered using out of band content encoding
- Plus integrity checks
- Plus encryption

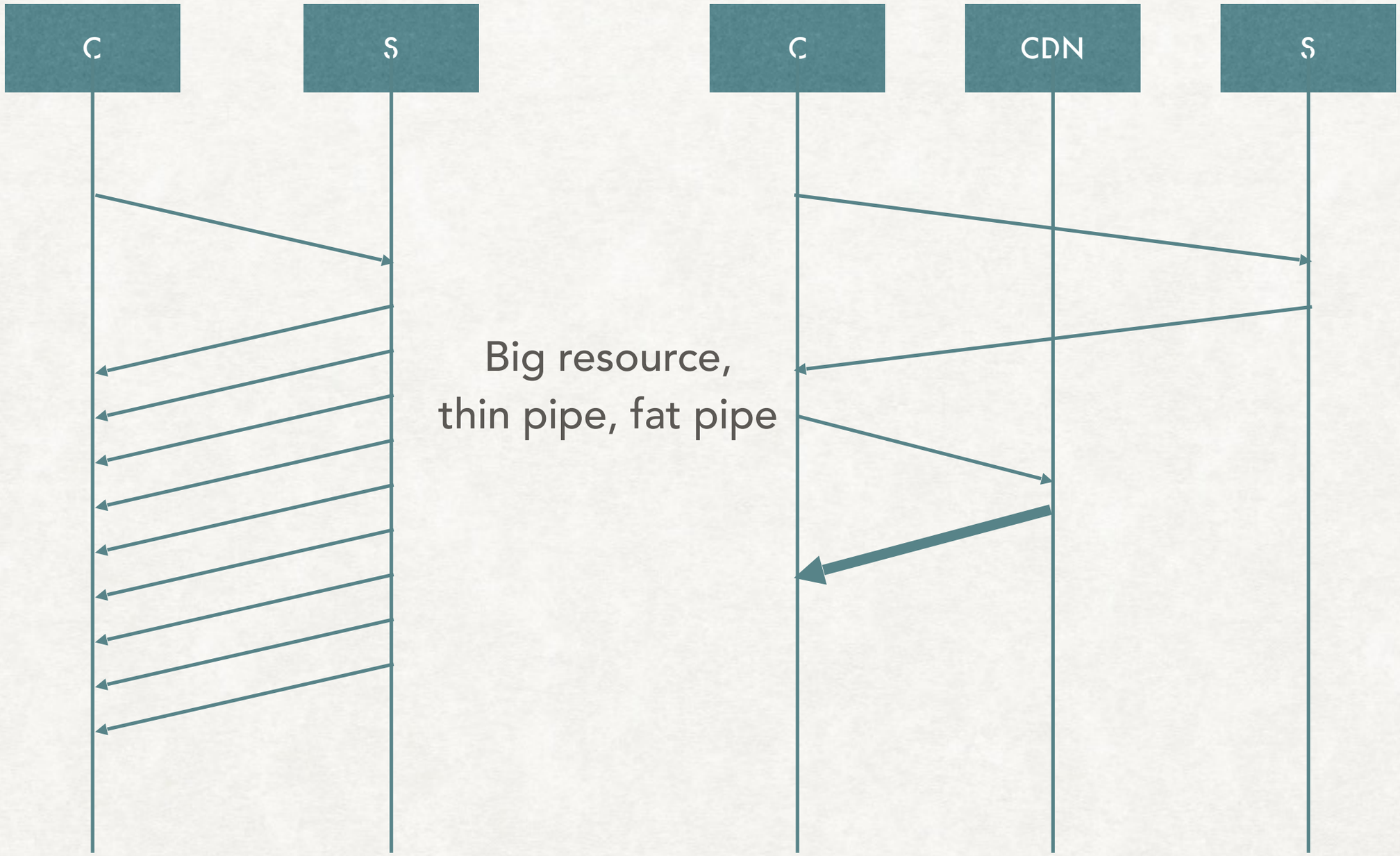
SLOWER

MAYBE



GO SLOWER

AND MAYBE, LATER, GO FASTER



POSSIBLE APPLICATIONS

BIG STUFF

Applicable to distribution of content with large payloads

- Video
- Large downloads (no need for “official” mirrors)
- Maybe down to large images on web pages

DRAFT-THOMSON-HTTP-BC

SELF DELEGATION

“

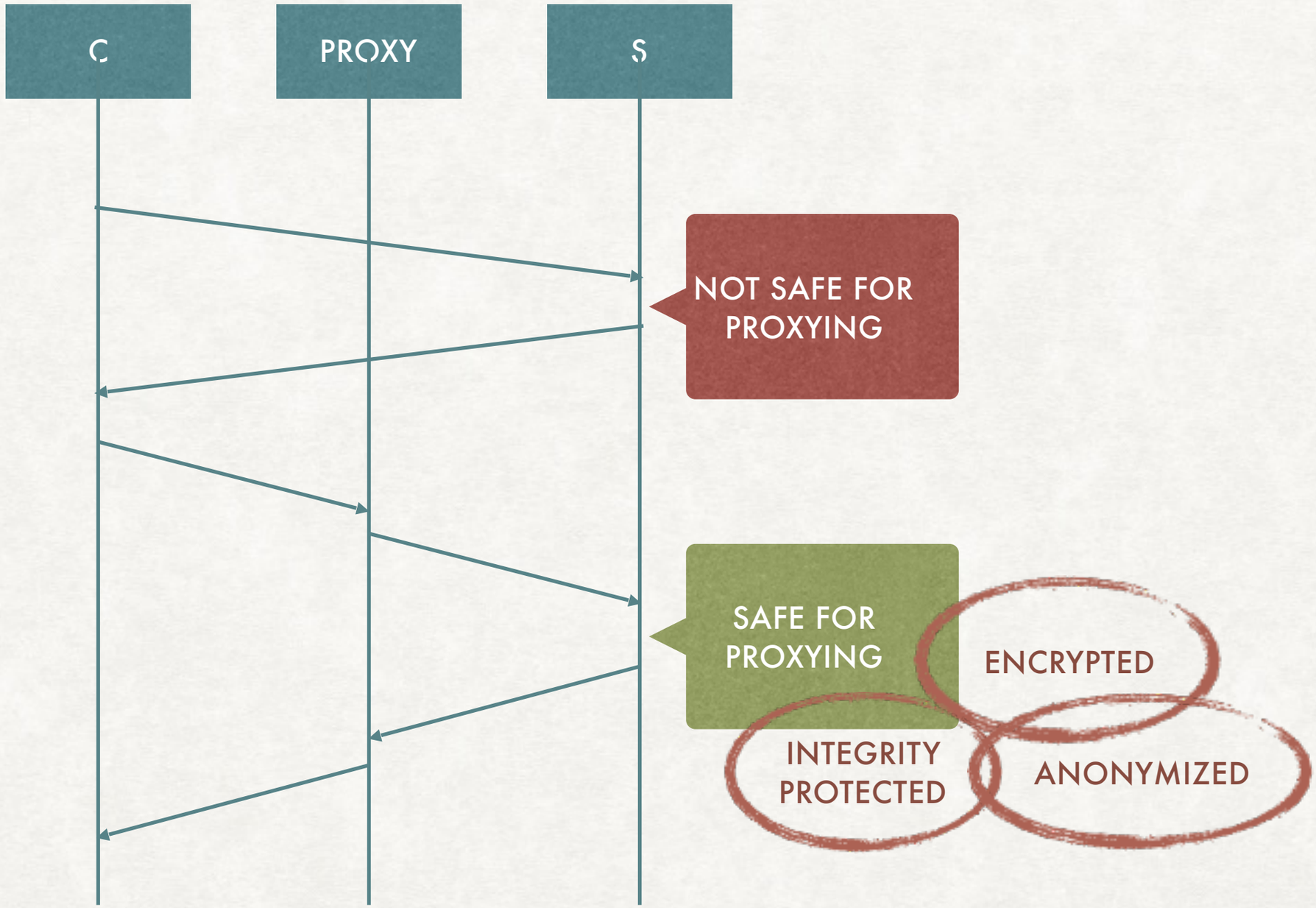
IF YOU WANT SOMETHING DONE RIGHT

DO IT YOURSELF

”

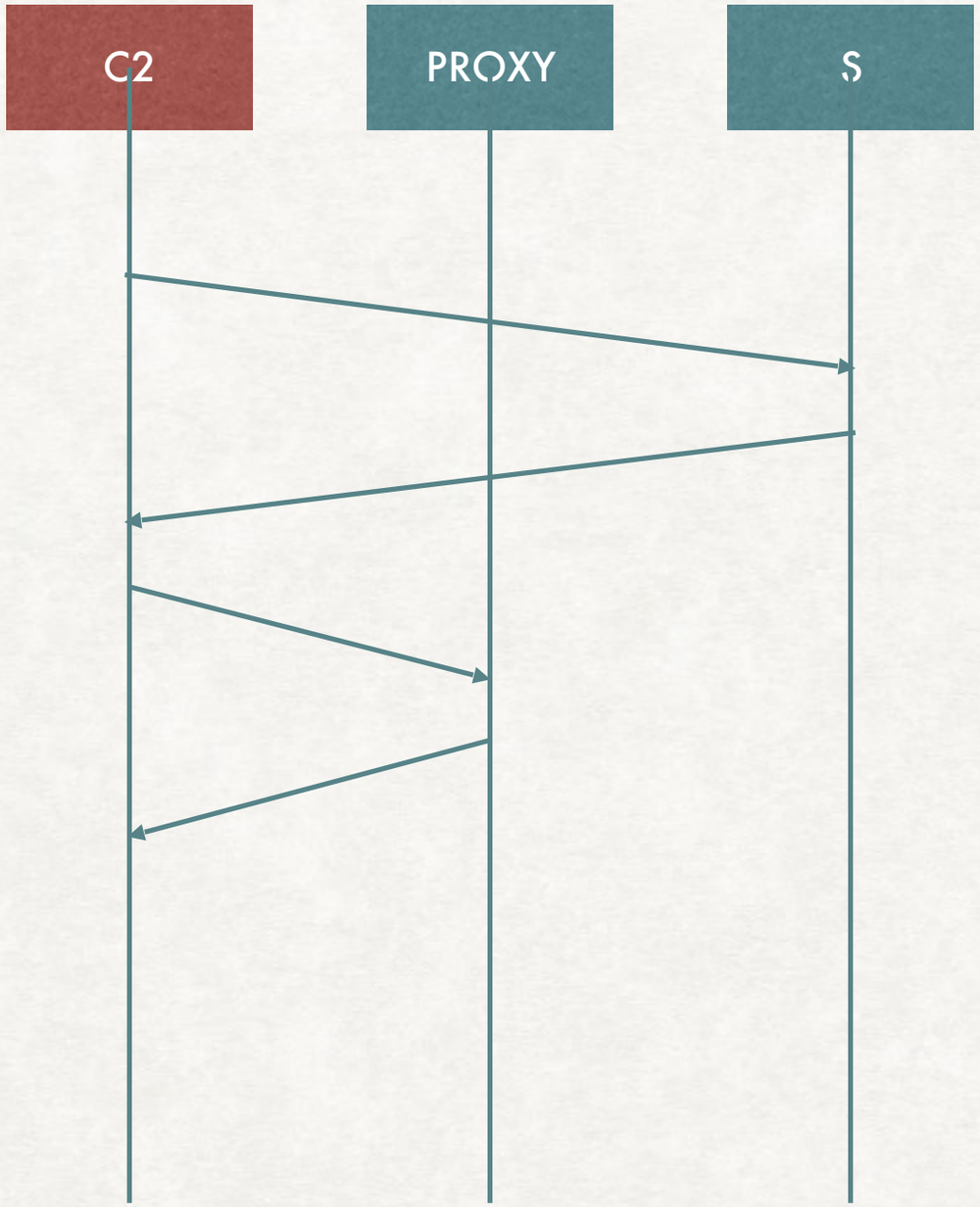
BUT

...WHY?


C
PROXY
S
NOT SAFE FOR PROXYING
SAFE FOR PROXYING
ENCRYPTED
INTEGRITY PROTECTED
ANONYMIZED

… LATER

SHARED CACHING!



HOW?

Client makes requests with two indicators:

- “I accept out of band content encoding”
- “I have a proxy handy”

Server decides what to do about that

- New signal for out of band: “using a proxy is OK”

DRAFT-RESCHKE-HTTP-OOB

OOB

OOB ENCODING

Metadata from the origin (primary) server, payload from a cache (secondary resource).

Somewhat equivalent to an HTTP redirect, but

- done on the content coding layer
- preserves the HTTP origin
- Payload allows additional data, such as additional URIs and extensions

Composes with other content codings, such as for encryption.

OMFG

SHARED CACHING?!

All we needed to do was add a new mechanism for content delegation, slap on a whole bunch of crypto, and make a bunch of extra requests, plus a smattering of new signalling

… does it make things faster? Maybe, maybe not

… is it all worthwhile? Quite possibly

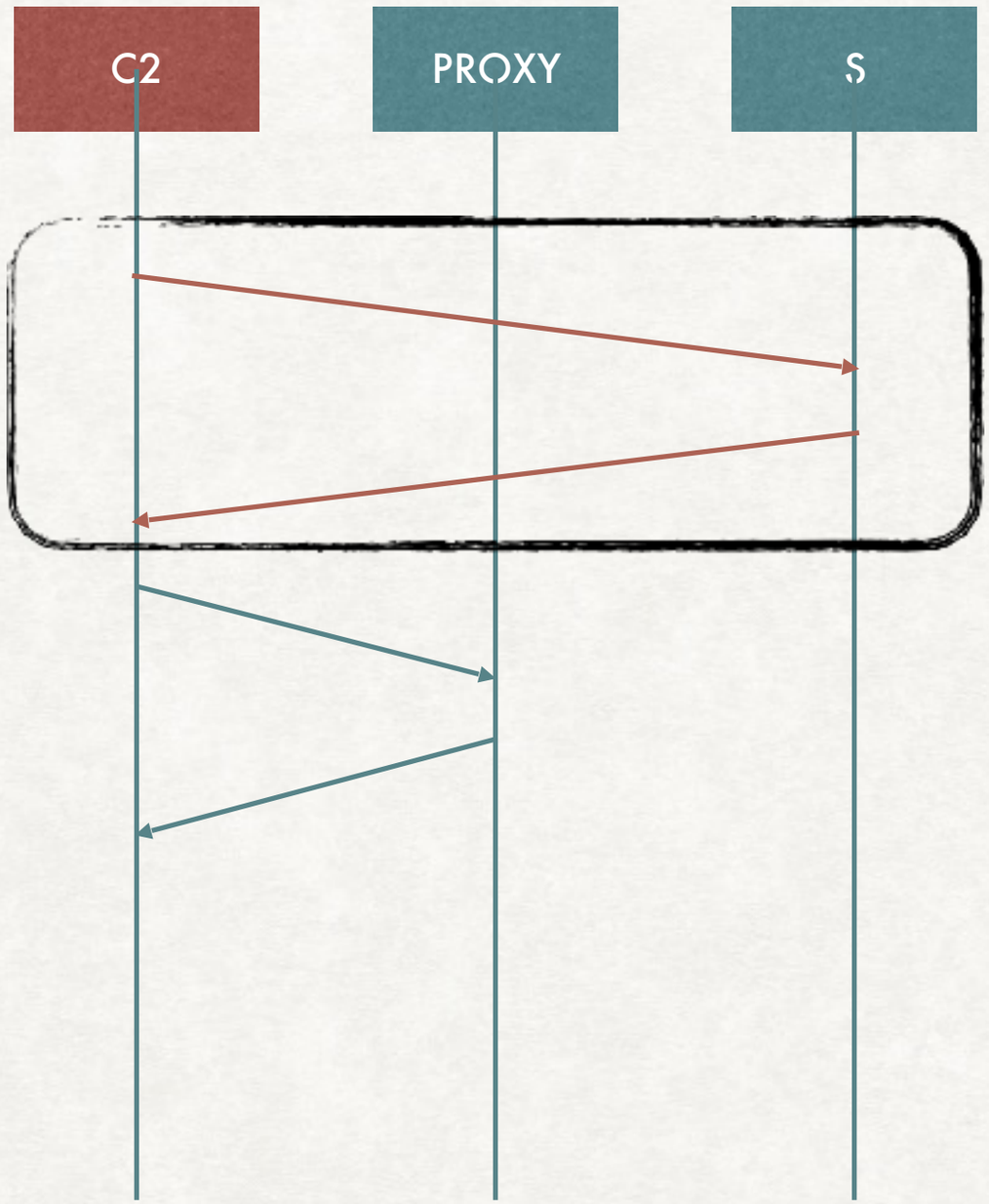
DRAFT-ERIKSSON-HTTP-RESOURCE-MAP

WHO NEEDS SERVERS?

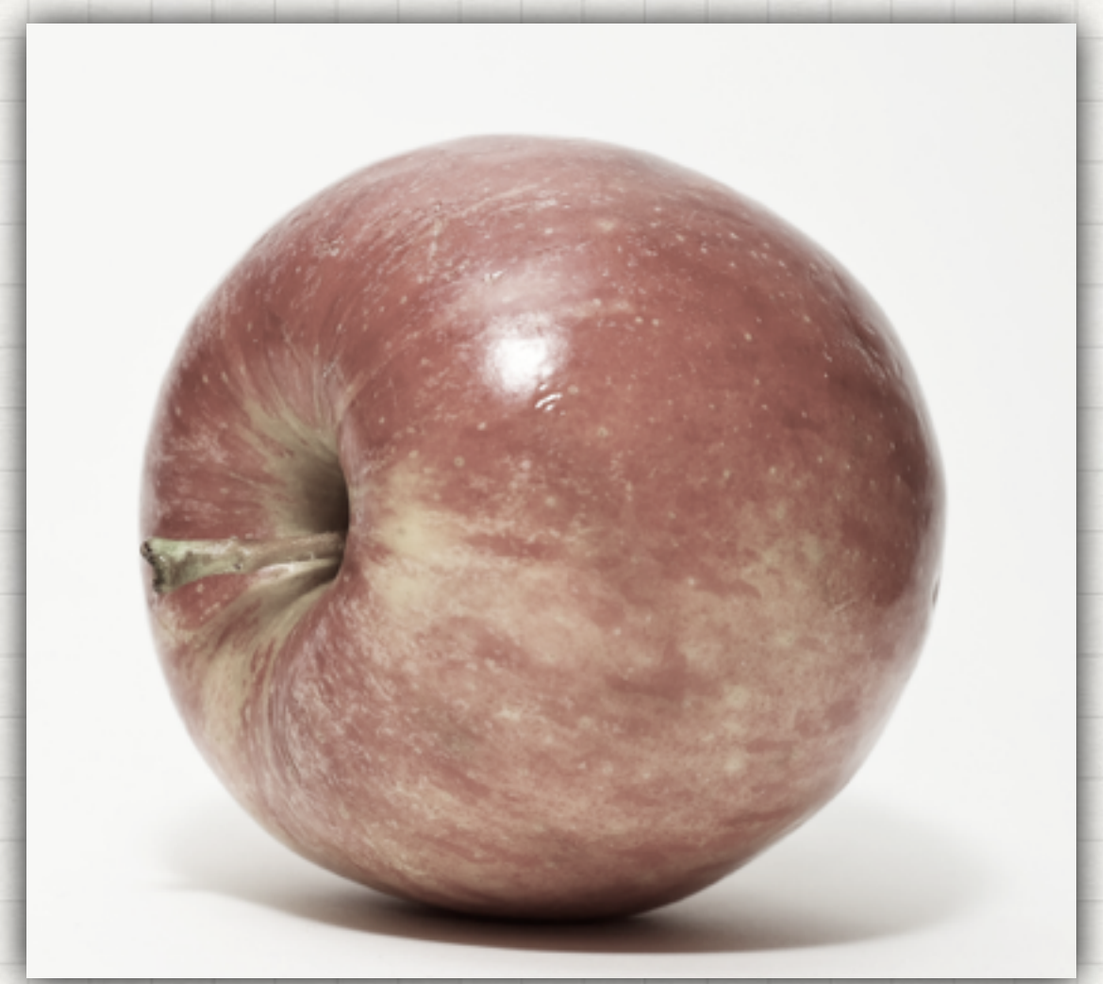
http://www.flickr.com/photos/pinadd/2858659917/

THIS FIRST REQUEST

IS A REAL DRAG



SPOT THE DIFFERENCE



http://www.flickr.com/photos/24340456@N03/3345977842/

https://en.wikipedia.org/wiki/Orange_(fruit)#/media/File:Orange-Whole-%26-Split.jpg

REMOVE CONTENT AND...

Lots of request-handling headers, or common values

```
Accept-Ranges: bytes
Age: 47451
Content-Type: image/jpeg
Strict-Transport-Security: max-age=31536000
Timing-Allow-Origin: *
Via: 1.1 varnish, 1.1 varnish, 1.1 varnish, 1.1 varnish
X-Cache: cp1049 hit(5), cp2005 hit(1), cp4007 hit(2), cp4005 frontend miss(0)
X-Firefox-Spdy: 3.1
X-Timestamp: 1443711458.04701
X-Trans-Id: txe34b67c455304376aeb09-0056fbd60c
access-control-allow-origin: *
access-control-expose-headers: Age, Date, Content-Length, Content-Range, X-
Content-Duration, X-Cache, X-Varnish
x-analytics: WMF-Last-Access=31-Mar-2016;https=1
x-client-ip: 192.0.2.75
x-object-meta-sha1base36: 1d91dx0894wjewukeyxu56os5uhx4ph
x-varnish: 3535512625 3458104777, 3419142795 3407795571, 3968671036 3922511061,
3667758745
```

Remainder of metadata is small, and could change infrequently

Last-Modified, Etag, Content-Disposition, and x-object-meta-sha1base36 for these images

SO COMPRESS

A LOT

Without content in every response, h2 server push for large swathes of a site might be possible

Test limits of hpack for very large numbers of resources

Maybe more practical with a custom format

…work in progress

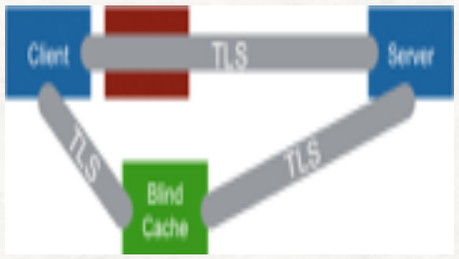
RESOURCE MAP

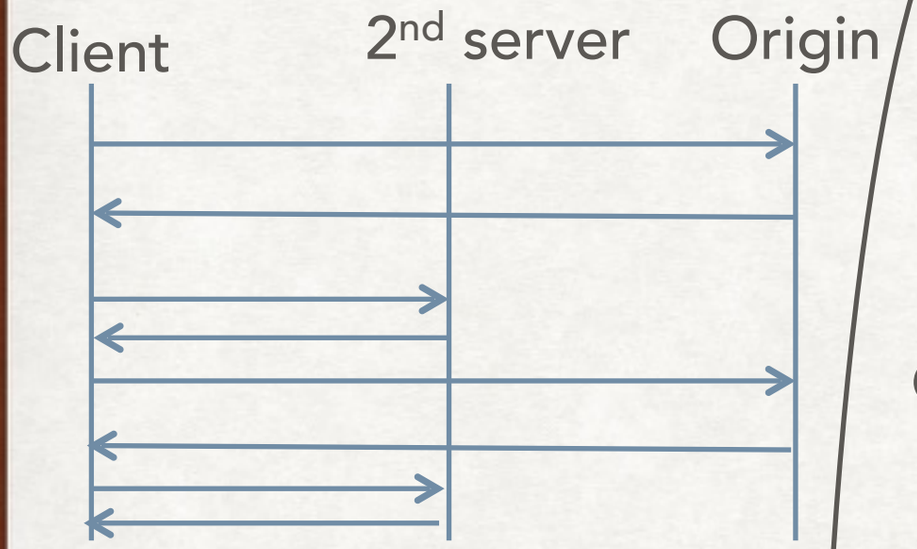
AN OOB RESPONSE OPTIMISATION

draft-eriksson-http-resource-map

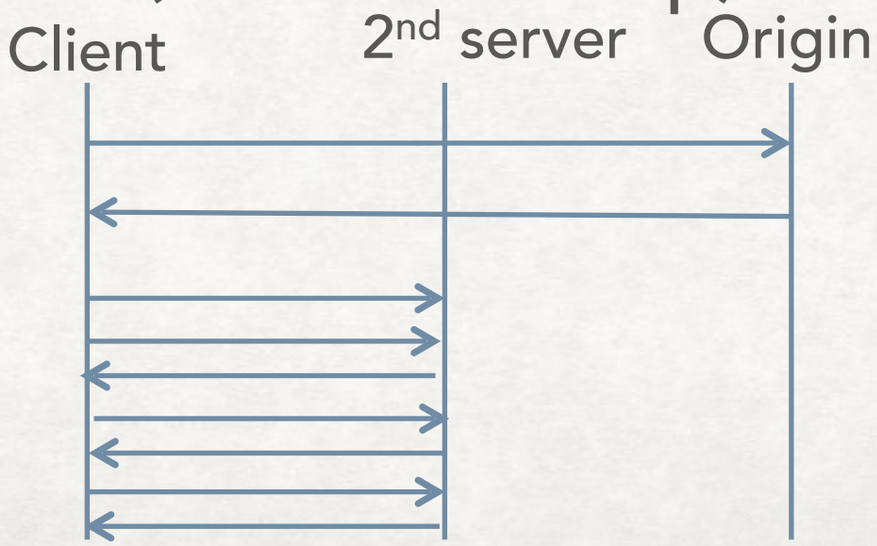
OOB RESPONSE "ON-A-STICK"

HTTP RESOURCE MAP





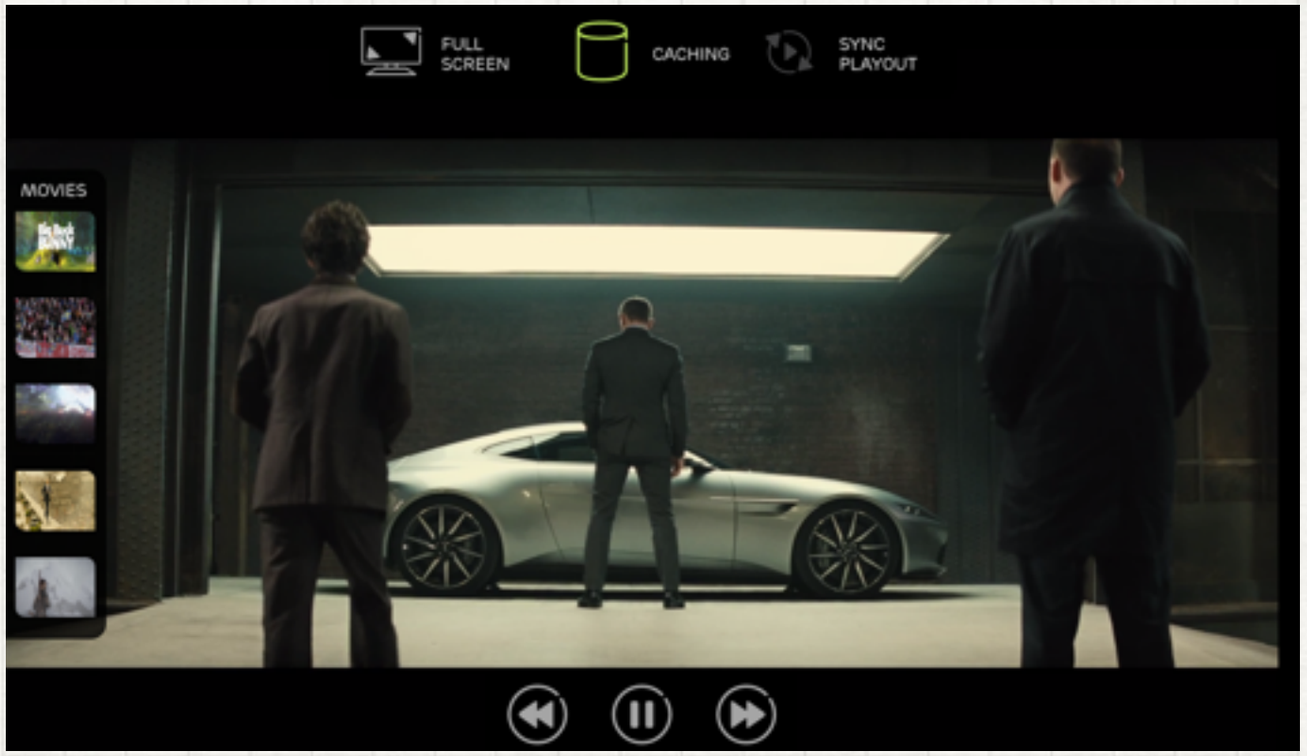
Origin "pushes" OOB info for several resources to client (Resource Map)

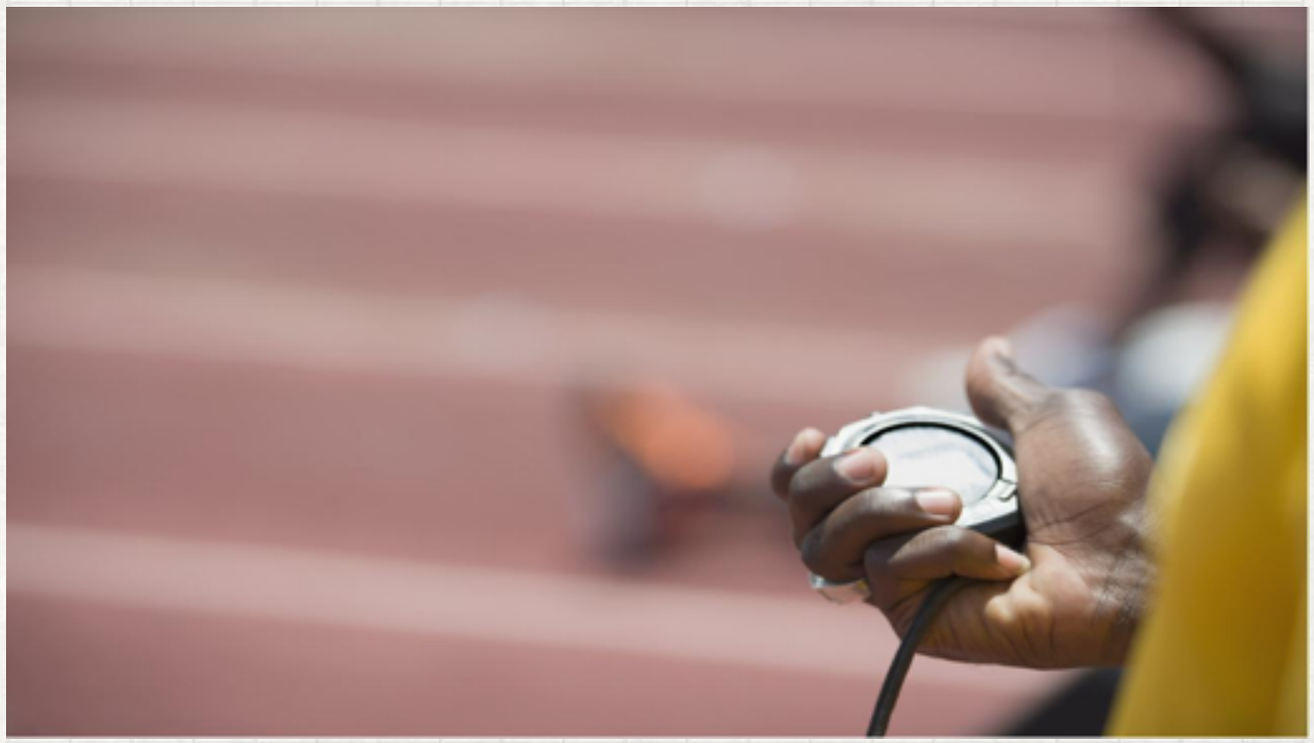



```
Resource Map
{
   /* Info  to client
   about resources
   location on
   secondary servers
   and stuff to
   re-compose
   response from
   origin */
}
```

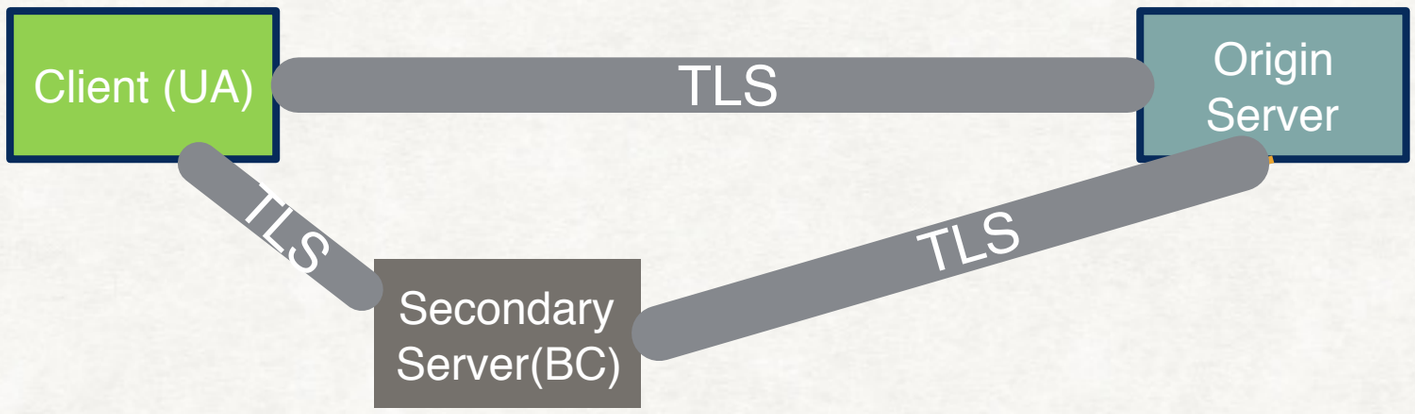
RUNNING CODE AND TEST BED

SOME TEST RESULTS





TESTBED



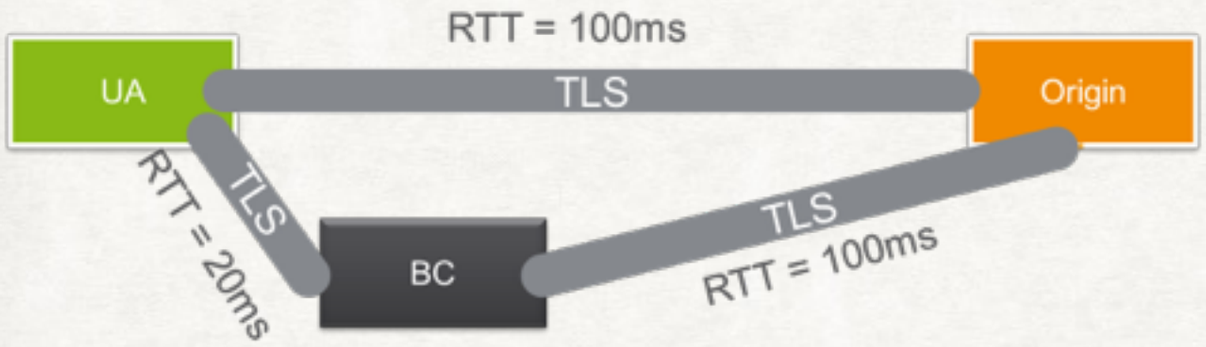
Virtual machines running our prototype

- Only link RTTs are emulated

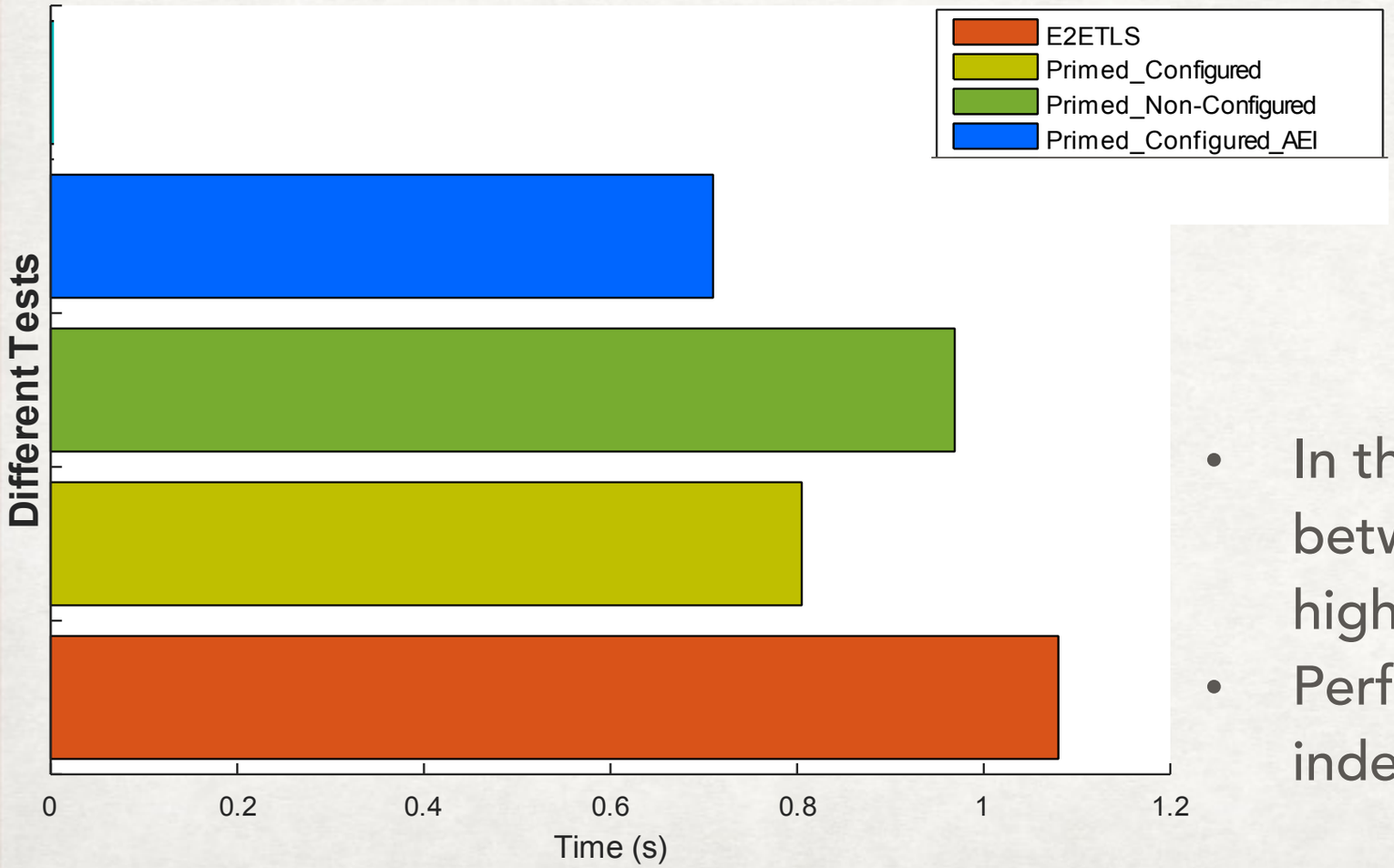
- ON KPI
  - User experience (page load time, networking time)

- On network and topology
  - 2nd'ary servers are closer to client
  - Between client and BC
    - Low latency
    - High bandwidth
  - Between 2nd'ary server(s) and Origin(s) and Client and Origin
    - Low bandwidth
    - High latency
  - 2nd'ary server and client might have same access and network characteristic towards Origin

DIFFERENT DELAYS BETWEEN ORIGIN AND UA



COMPARED TO END 2 END TLS			
CACHE PRIMED?	CLIENT CONFIGURED?	ALL CONTENT VIA CACHE?	PAGE LOAD TIME EFFICIENCY
RTT = 200 MS			
YES	YES	NO	+27%
YES	NO	NO	+11%
YES	YES	YES	+38%
RTT = 300 MS			
YES	YES	NO	+30%
YES	NO	NO	+13%
YES	YES	YES	+45%



- In this setup, the bigger the delay between the origin and the client the higher the gain.
- Performance can be improved more if index.html is cached

RESOURCE SEGMENTATION

RESOURCE SEGMENTATION

- Video on Demand
  - Contains multiple Random Access Points
    - Integrity Mechanism work on whole resource
    - If segmenting with independent integrity verification
  - Random access improved
- Segmentation also useful for:
  - Load Spreading
  - Simultaneous retrieval from multiple servers
  - Privacy Improvements