

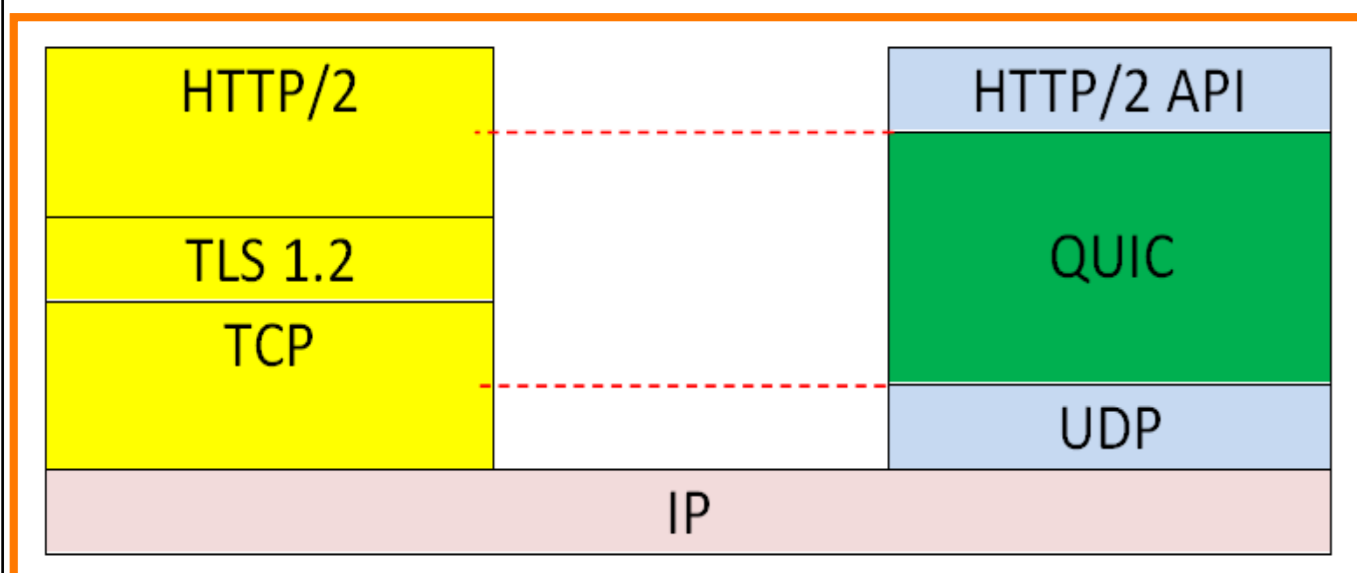
# Future Internet metrology : New metrics and measurement techniques for Web Navigation Quality

## Motivations

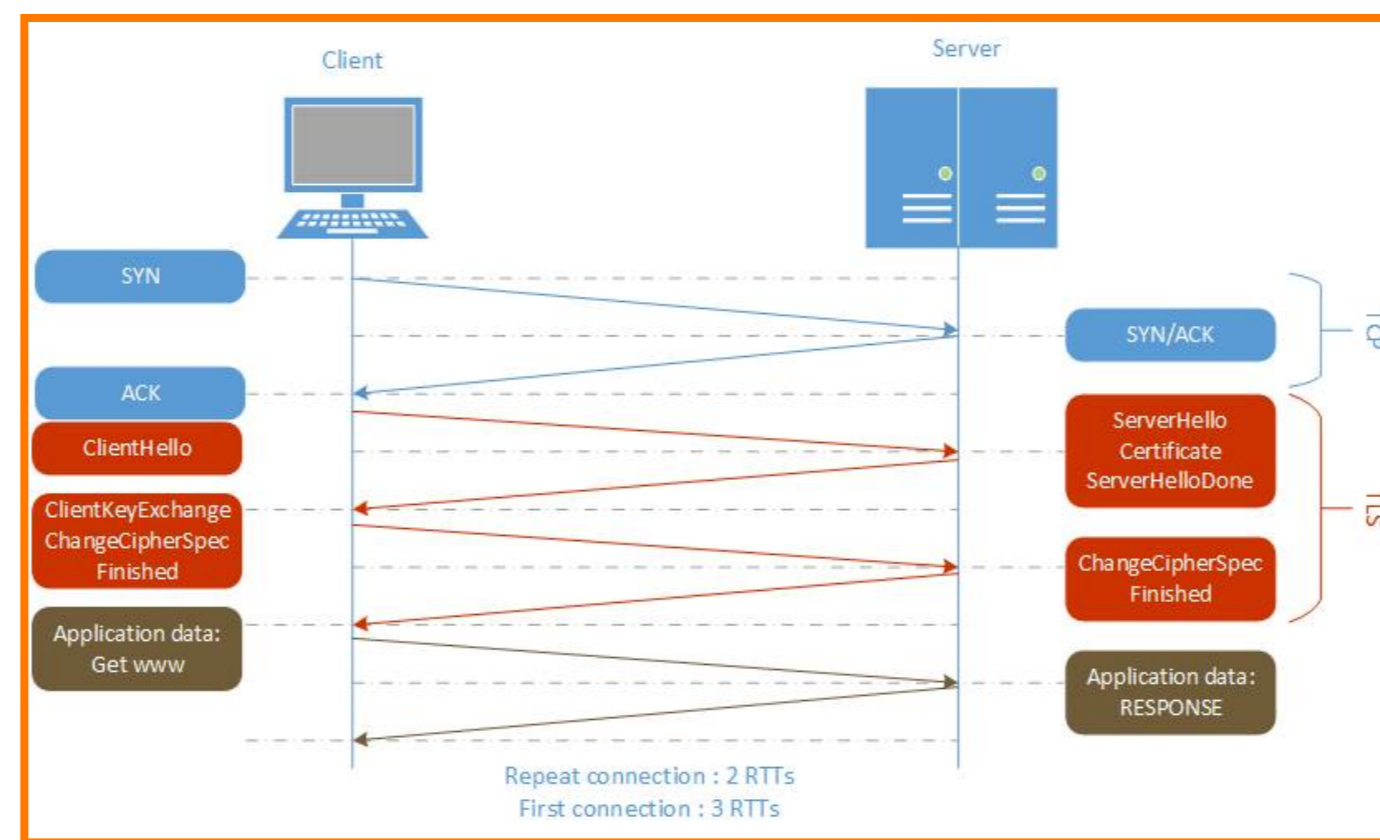
Define an evaluation methodology for Web Navigation quality taking into account:

- Users' characteristics : devices, profiles, browser, etc.
- Network performance : protocols (HTTP/2, QUIC), topology, Quality of Service, etc.
- Web servers design : complexity of web pages structure and compliance to implementation guidelines.

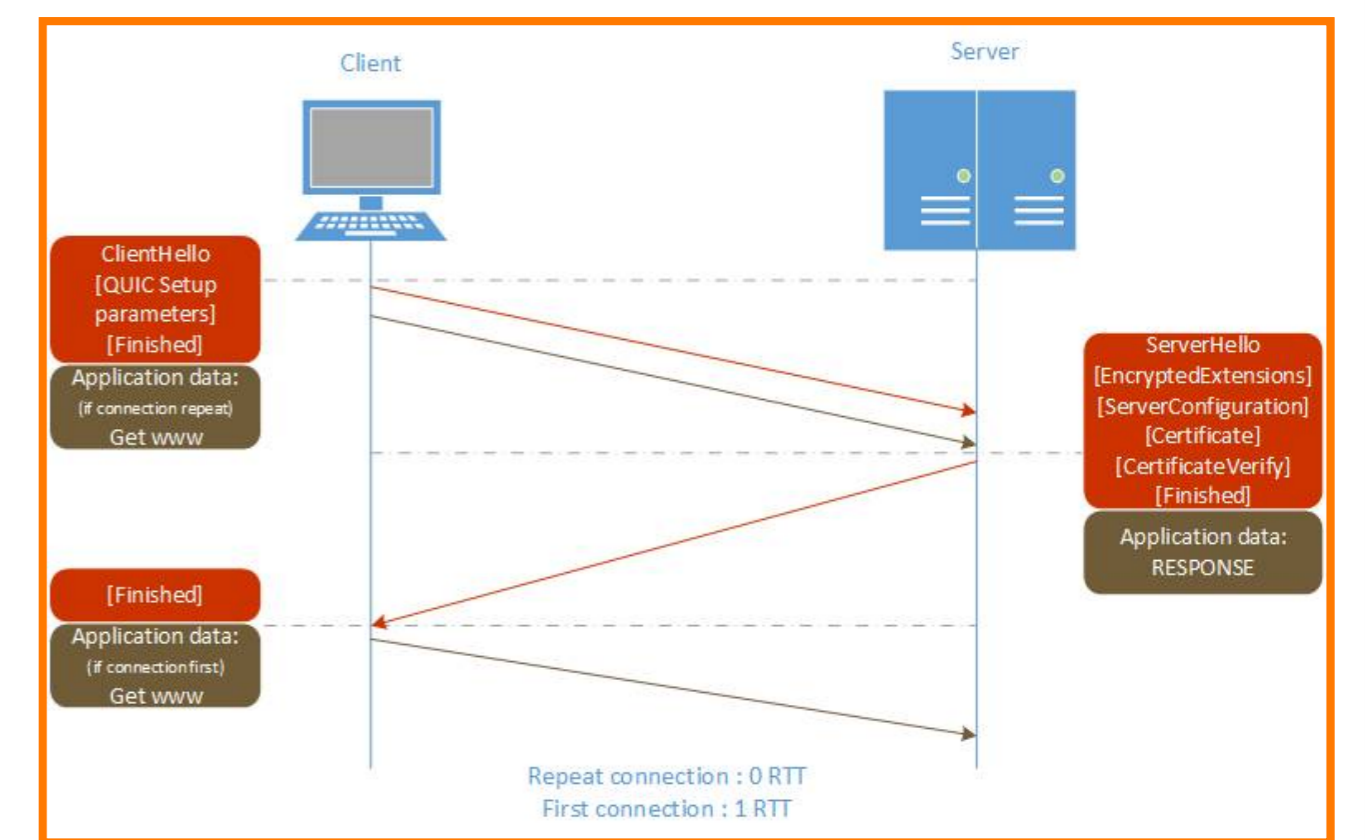
## QUIC : Quick UDP Internet Connection



- New transport protocol promoted by Google,
- Built-in handshake mechanism,
- Built into user space over UDP.



HTTP/2 on top of TLS/TCP

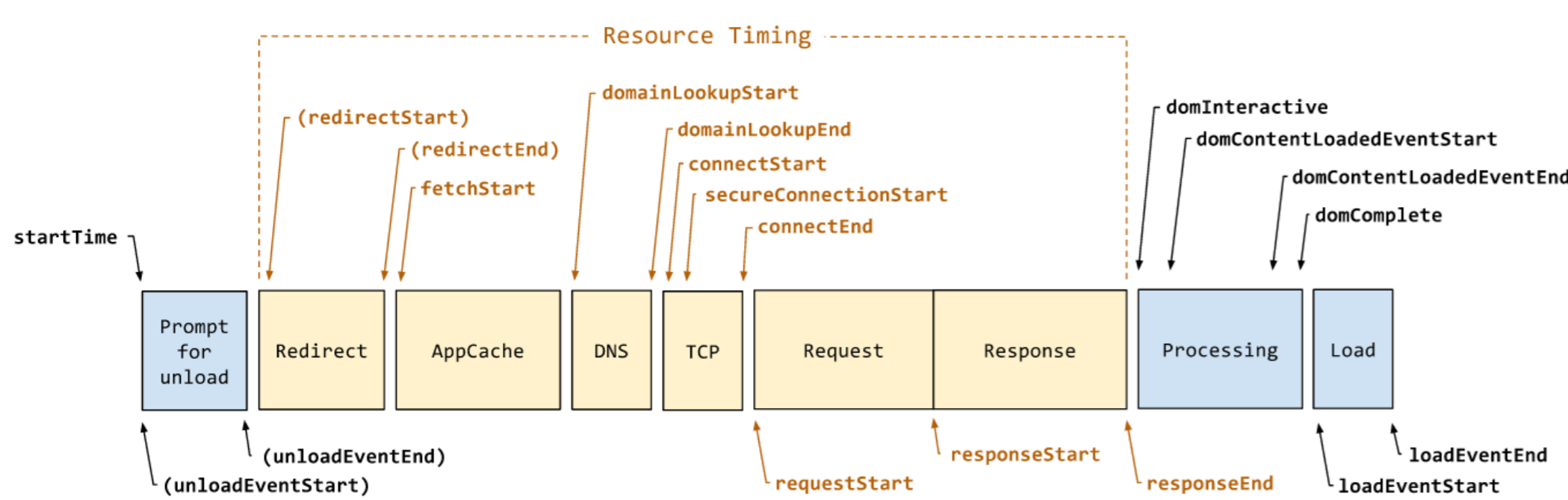


HTTP/2 on top of QUIC/UDP

## Existing metrics

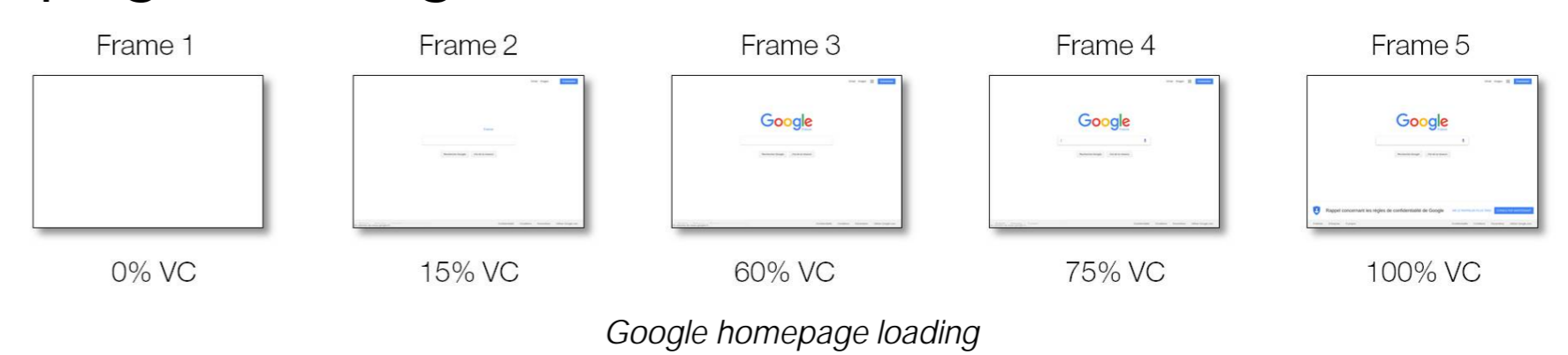
**PLT : Page Load Time** defined at W3C

Performance Timeline : Navigation, Resource and User Timing



Ref : <https://www.w3.org/TR/navigation-timing-2/>

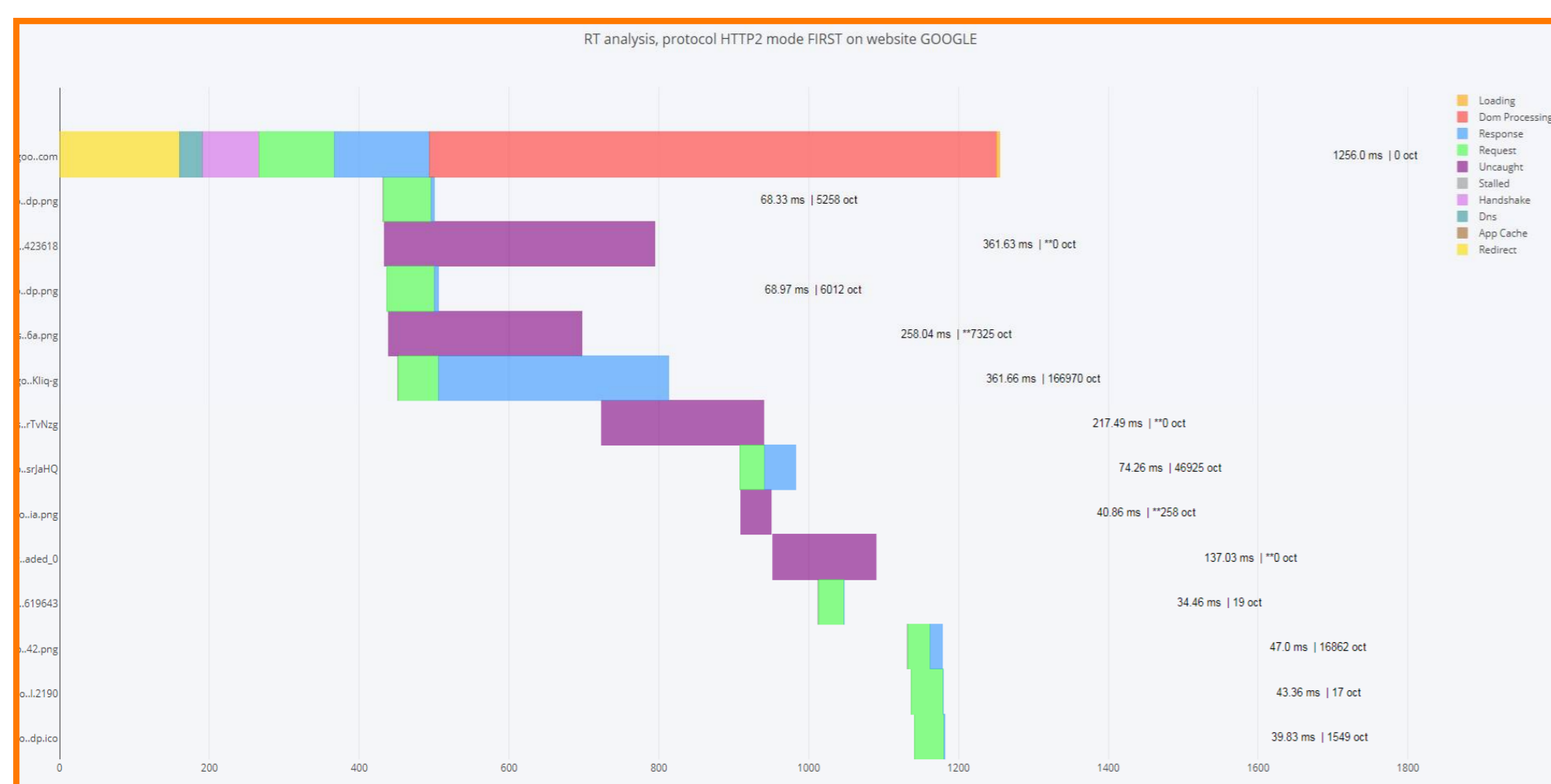
- SpeedIndex : Monitor visual progress of visible page loading



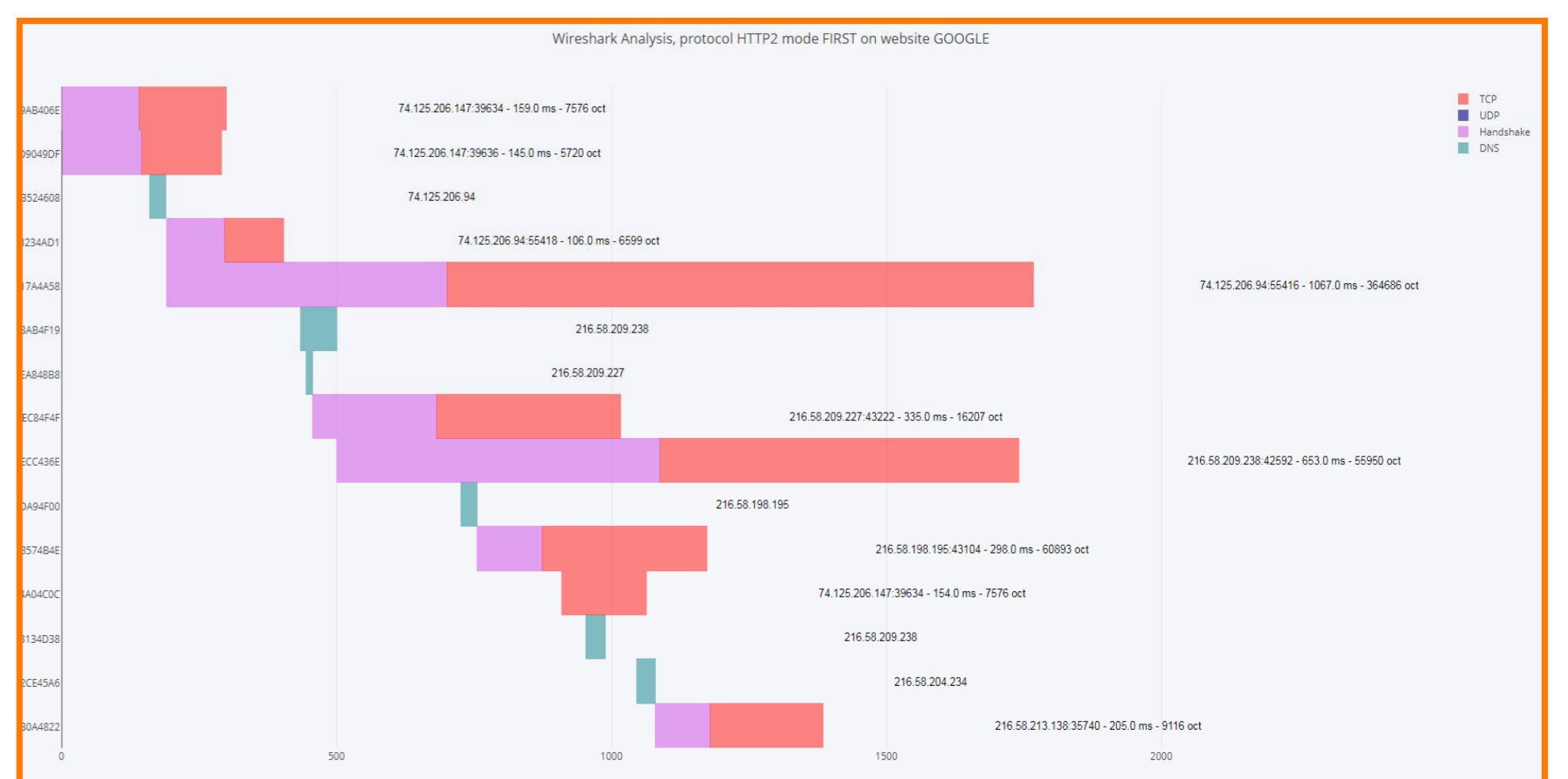
- PageSpeed Insights: Web page ranking upon structure
- Frame Timing API: Frame timing data from browser's event loop

## Approach

- Link existing application level metrics to packet level measurements,



Resource Timing waterfall



Packet level measurements

- Use active probing methods to characterize network's topology and performance,
- Use machine learning techniques to infer QoE values from the above constructed metrics,
- Online identification and troubleshooting of QoE degradation.