

Web & Networks

Use-cases And Requirements

26-Jun-2019

Plan

- Gather and Document Use-cases (github)
 - Capture Requirements
- Time Frame
 - July-Aug 2019
- Meetings
 - Conference Calls
 - IRC Channels
 - Public Mailing Lists
- Upcoming Milestone
 - TPAC September 16th -20th, 2019

Call to Action

- Share use-cases
- Discuss requirements

Use-Cases

- [Application Domain]

- Use-Case Description

- <Details about use-case>

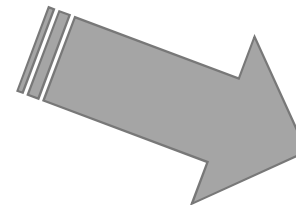
- Example

- <Application of use-case in any product segment>

- Requirements

- <List high level requirements. All requirements shall be consolidated in the end to prepare a generic requirements set>

Sample Template



Github

Sample Use-Cases

Use-Case Application Domain

#1 : Cloud Gaming

#2 : Machine Learning Inference

#3 : Web Browser Tools

#4 : UHD video - Remote Education Service

#5 : UHD – Remote diagnosis

#6 : UHD - Massively multiplayer online role-playing

#7 : Augmented Reality

#8 : Virtual Reality

Use-Case #1

- Cloud Gaming

- Use-Case Description

End users play Cloud Game for benefits in rendering quality, instant startup / handoff on any device, and battery life. In this cloud mode, the user agent needs to dynamically coordinate with cloud to decide / adjust the best video streaming parameters that fit into current network conditions.

Meanwhile, if enabled, it may switch to local mode which execute the same game locally with Web technologies (WebGL, WebAssembly etc.) in case it observes or is notified that the network becomes (or soon will be) too bad in terms of latency, bandwidth, stability, cost of data plan etc. It may switch back again to cloud mode if network requirements are satisfied again.

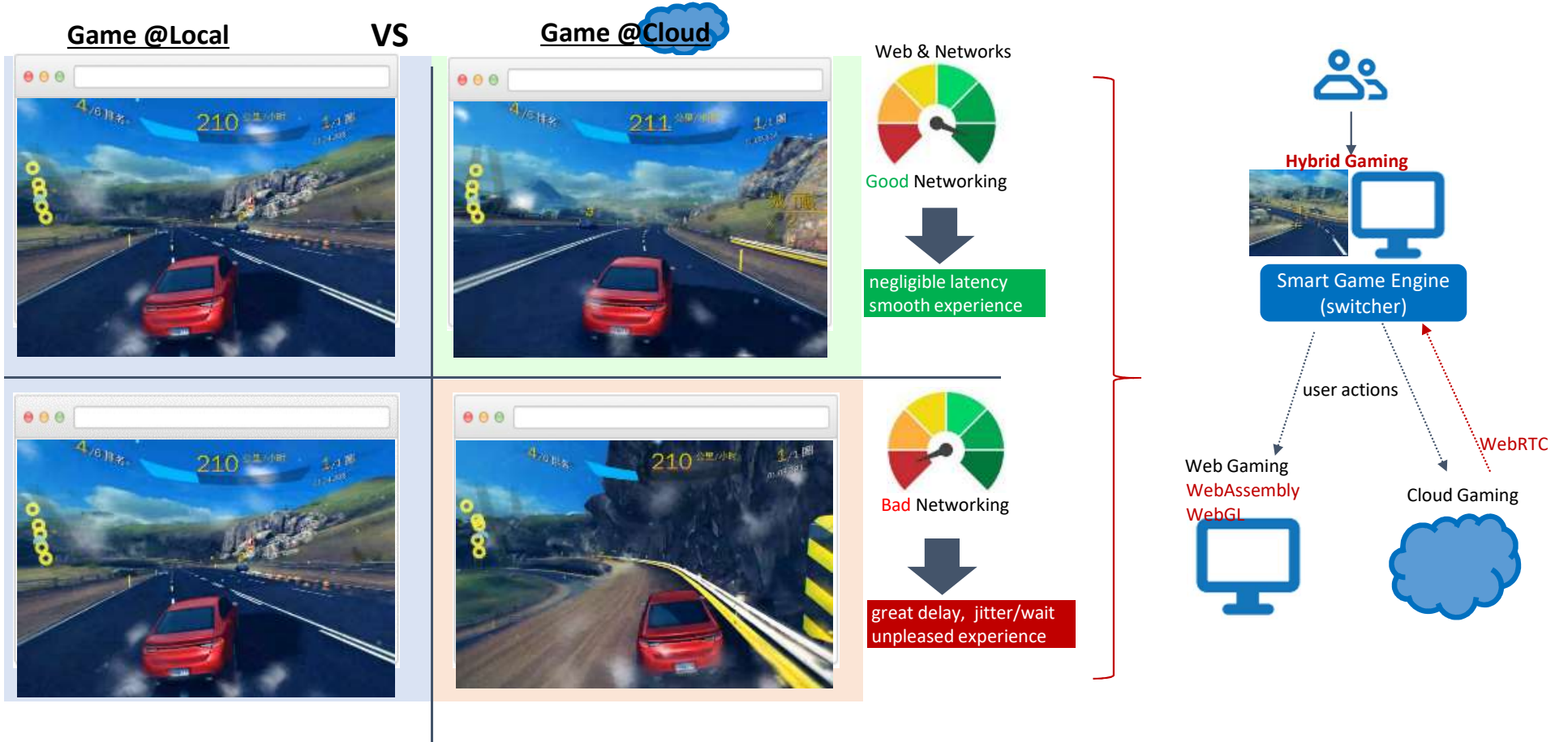
- Example

An illustration in next page.

- Requirements

- User agent could dynamically query network status / metrics
 - User agent could register events to be notified if certain network metrics exceed / below a threshold
 - Optional: User agent is able to pin to a dedicated network channel for a given web app. This allows cloud gaming to go through a special data plan.

User-Case #1



Use-Case #2

- ML Inference

- Use-Case Description

Machine learning inference via web apps can be done either on the cloud or on the edge/device. When it comes to deciding between the two options, there are trade-offs to consider such as quality of inference versus

- Result output delay or latency (due to network delay or processing delay either on device/cloud)
- Device Power Consumption
- Privacy
- Cost to user (e.g. Data usage costs)

Also, the size of the data vary depending on use-case (i.e., images and video resolution/size) and upload time depends on network bandwidth.

Currently, there is no effective way to decide in real-time, if inference is best done on the edge/device or on the cloud for different use-cases.

- Example

See next page.

Use-Case #2

- Example

ML App via Chrome Web Browser using Cloud ML Inference

Caffe Demos

The Caffe neural network library makes implementing state-of-the-art computer vision systems easy.

Classification

[Click for a Quick Example](#)



Maximally accurate

Maximally specific

bee eater 2.63384

coraciiform bird 2.36942

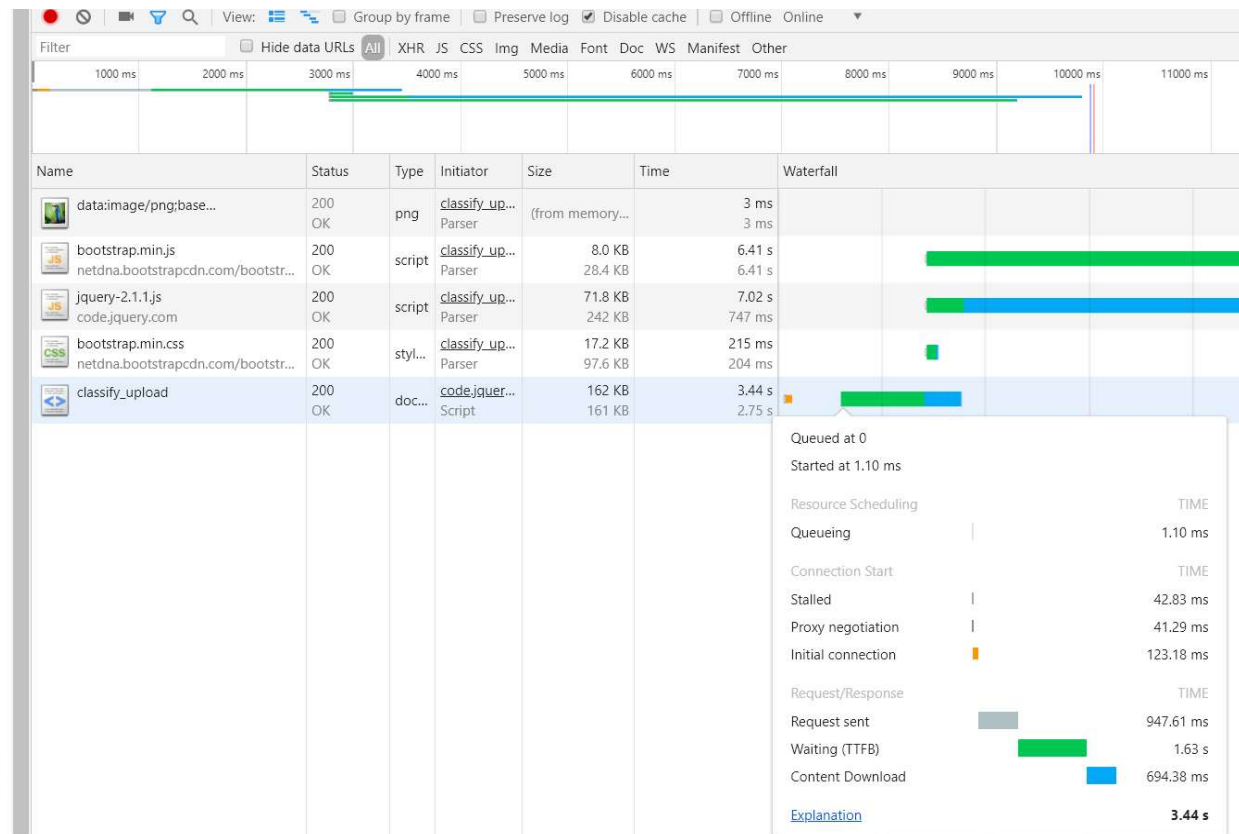
bird 1.74984

jacamar 0.86683

piciform bird 0.79682

CNN took 0.105 seconds.

Or upload an image:



Use-Case #2

- Example (contd)

ML App via Chrome Web Browser using Local Browser ML Inference engine

The screenshot displays a web browser interface on the left and the Chrome DevTools Network tab on the right. The browser shows a 'WebML MobileNet Demo' with a 'WebGL2' dropdown. An image of a kingfisher is shown with a 'Pick Image' button. Below the image, the inference time is 187.50 ms. A table lists the top three predicted labels: 'bee' (78.04%), 'jacamar' (21.58%), and 'indigo' (0.30%).

#	Label	Probability
1	bee	78.04%
2	jacamar	21.58%
3	indigo	0.30%

The Chrome DevTools Network tab shows a single network request for a JPEG image. The waterfall chart indicates a total time of 7 ms, with a 6 ms stall period. The 'Explanation' section shows a total time of 6.92 ms, broken down into 'Stalled' (5.51 ms) and 'Content Download' (1.42 ms).

Name	Status	Type	Initiator	Size	Time	Waterfall
29c070a3-17de-4b24-b910-ad3e6... blob:https://huningxin.github.io	200 OK	jpeg	main.js:113 Script	(from disk cac...	7 ms	6 ms

Waterfall details:

- Queued at 0
- Started at 0
- Connection Start: TIME
- Stalled: 5.51 ms
- Request/Response: TIME
- Content Download: 1.42 ms
- Explanation: 6.92 ms

Use-Case #3

- Web Browser Tools

- Use-Case Description

A Web Application developer develops an application whose quality of experience is dependent on factors such as network bandwidth/type, network latency, device power consumption, etc. The developer would like to profile the Web App under various external conditions. For example,

- Profile and test Apps under various Network conditions using different Network models
 - Compare performance of Apps running on Edge/Device vs that on the Cloud

- Example

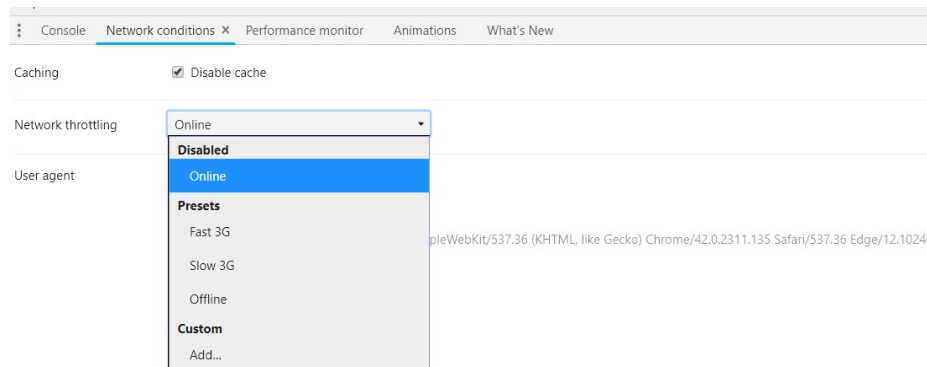
See next page.

Use-Case #3

- Web Browser Tools

- Example

Extend Developer Tools (similar to the one available in Google Chrome Browser) to include parameters like network congestion pattern profiles, simulate network type change during runtime, simulate sending of “hints” from network, etc.



Use-Case #4

• UHD video - Remote Education Service

• Use-case Description

In rural area, where fiber-based fixed broadband infrastructure is limited, remote education service via web is important 5G application for China or other developing countries.

Thanks to ultra reliable low latency communications(uRLLC) and enhanced mobile broadband(eMBB) technologies, the synchronized video streaming across different locations brings real-time education use experience。 The shared whiteboard is a platform for interactive in real-time within milliseconds.

• Requirements

The web is an ideal platform for resource-restricted computer environment in above scenario, and the video web application could be built on top of webRTC.



Use-Case #4

- UHD video - Remote Education Service

- Example

koolearn 新东方在线 教师资格证认定指南 客服热线: 400-690-5751 全屏

互动聊天

昨夜闲潭梦落花02 19:00:41
老师, 每个地区的教师资格证认定都是一样的吗?

学员1286865933dls 19:01:09
, 1

wx_qaxrp 19:01:11
1

学员452957 19:01:12
1

学员6869756 19:01:13
拿了合格证之后, 笔试成绩还有用么

学员3900159 19:01:13
1

学员1502489 19:01:14
1

wx_a7zh3 19:01:15
mac为啥放不了, 硬要网页放

(助教)助教-青青 19:01:39
1

dfxy刘瑞荣DLS 19:01:41
卡了吗

(助教)助教-青青 19:04:10

第1页
第2页
第3页
第4页
第5页
第6页
第7页

00:12 评价0: 画质(倍速 1.0X 同步校验

Elements Console Network Audits >> | 全屏

Filter Hide data URLs

All XHR JS CSS Img Media Font Doc WS Manifest Other

Name	St	Initi...	Si	Waterfall
crossdo...	20	...	Other 28	
chat	20	...	Other 4.7	
0001.swf	20	...	Other (frc ...	
cloud-rep...	20	j...	Other 46	
liveV4261...	20	...	Other 31	
chat	20	...	Other 4.7	
userdurat...	20	...	Other 22	
cloud-rep...	20	j...	Other 46	
0002.swf	20	...	Other 33	
chat	20	...	Other 2.1	
uservodpro	20	...	Other 22	
event	20	...	Other 22	
cry.png?...	20	...	Other 6.0	
cry.png?...	20	...	Other 6.0	
0002.swf	20	...	Other (frc ...	
cloud-rep...	20	j...	Other 46	
chat	20	...	Other 1.3	
0004.swf	20	...	Other 16	
cloud-rep...	20	j...	Other 46	
chat	20	...	Other 1.4	
0005.swf	20	...	Other 42	
0006.swf	20	...	Other 94	
cloud-rep...	20	j...	Other 46	
chat	20	...	Other 55	

67 requests | 33.4 MB transferred | 36.3 MB resources | Finish: 1.4 min | DOMCo...

Use-Case #5

- **UHD – Remote diagnosis**

Scenarios such as tele-consultation, tele-medical training, tele-pathological analysis, surgical teaching and so on can all be realized by Web-based tele-medical system. The requirement of high-definition video is more stringent in medical treatment, because it needs to check the patient's medical record and the patient's test sheet. With the support of 5G low delay and wide bandwidth, telemedicine has become a new way of doctor-patient diagnosis and treatment.

Because China and other developing countries have vast territory and poor infrastructure in marginal provinces, Web applications are the lowest-cost platform, and 5G wireless transmission over very long distances can greatly reduce the cost of fiber-optic fixed network deployment.

- **Requirements**

It needs the network to offer ultra reliable low latency and enhanced broadband, and to protect the privacy data of patient.

Use-Case #5

- Example (<http://mudu.tv/?a=scenearicle&id=107>)
- <http://www.hnsycyxx.com/page/telem-colla.html>



Use-Case #6

- **UHD - Massively multiplayer online role-playing (MMORPG)**

- **Description**

Real-time synchronization of game data to individual player, that's the key for MMORPG. The edge network computing can bring satisfaction for players with tens of thousands are online.

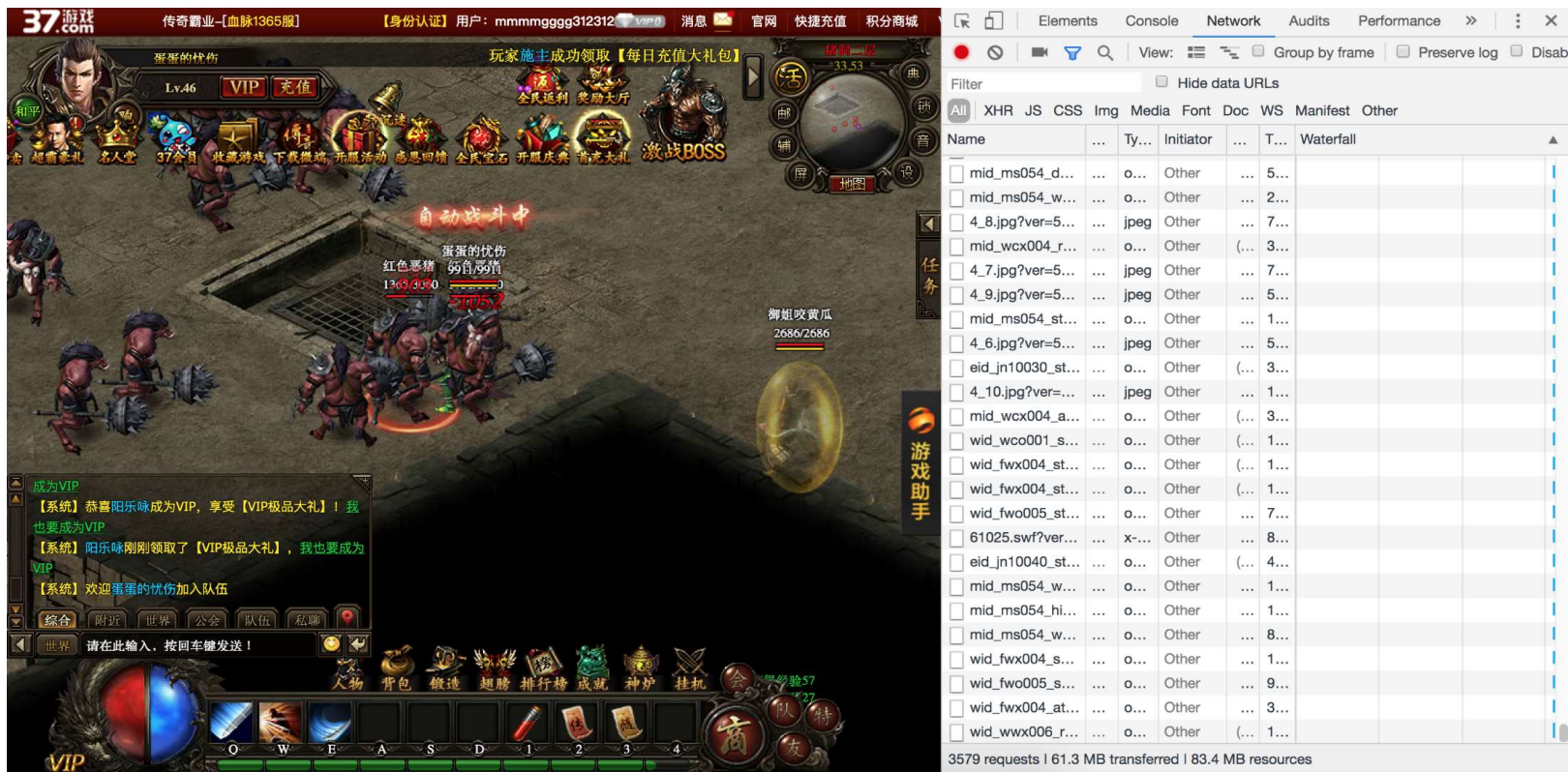
The magnitude and frequency of game data transmitted in the Web are larger and more frequent than those in general Web applications. 5G ultra-low latency can decrease the delay due to frequent request transmission from use experience perspective.

- **Requirements**

It needs the network to offer ultra reliable low latency and enhanced broadband, and to protect the game subscribers privacy data.

Use-Case #6

- Example (“Chuanqi”, one of the hottest web game in China)
UHD –MMORPG , sports, racing games



The image shows a screenshot of a web browser displaying a game interface on the left and a network log on the right. The game interface is for a MMORPG, showing a character named "蛋蛋的忧伤" (Dan Dan's Sadness) at level 46, with various UI elements like a chat window, a map, and a task list. The network log shows a list of requests, including images and scripts, with columns for Name, Ty..., Initiator, T..., and Waterfall. The log indicates 3579 requests and 83.4 MB of resources.

Name	Ty...	Initiator	T...	Waterfall
mid_ms054_d...	o...	Other	5...	
mid_ms054_w...	o...	Other	2...	
4_8.jpg?ver=5...	jpeg	Other	7...	
mid_wcx004_r...	o...	Other	3...	
4_7.jpg?ver=5...	jpeg	Other	7...	
4_9.jpg?ver=5...	jpeg	Other	5...	
mid_ms054_st...	o...	Other	1...	
4_6.jpg?ver=5...	jpeg	Other	5...	
eid_jn10030_st...	o...	Other	3...	
4_10.jpg?ver=...	jpeg	Other	1...	
mid_wcx004_a...	o...	Other	3...	
wid_wco001_s...	o...	Other	1...	
wid_fw004_st...	o...	Other	1...	
wid_fw004_st...	o...	Other	1...	
wid_fwo005_st...	o...	Other	7...	
61025.swf?ver...	x...	Other	8...	
eid_jn10040_st...	o...	Other	4...	
mid_ms054_w...	o...	Other	1...	
mid_ms054_hi...	o...	Other	1...	
mid_ms054_w...	o...	Other	8...	
wid_fw004_s...	o...	Other	1...	
wid_fwo005_s...	o...	Other	9...	
wid_fw004_at...	o...	Other	3...	
wid_wwx006_r...	o...	Other	1...	

Use-Case #7

- **Augmented Reality advertising and promoting**

AR may become a key component of marketing and consumer experience. Consumers can scan specific posters to display advertising information, scan specific logos to get red envelopes, and scan specific goods to get prices.

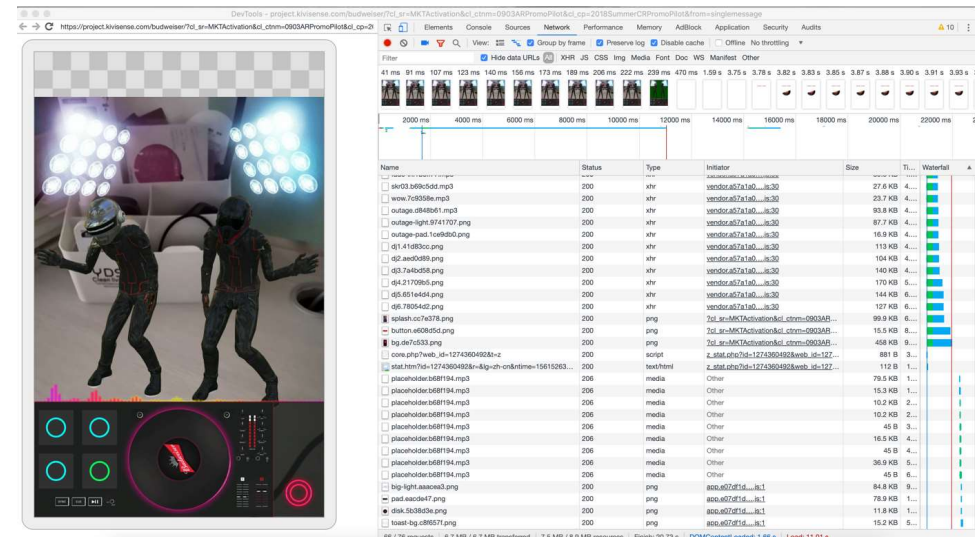
The computing power of edge devices is limited. AR recognition needs the support of cloud-based AI algorithm. Cloud-to-end delay affects the experience.

- **Example**

scanning QR-code with extended AR commercial information



- **Requirements**

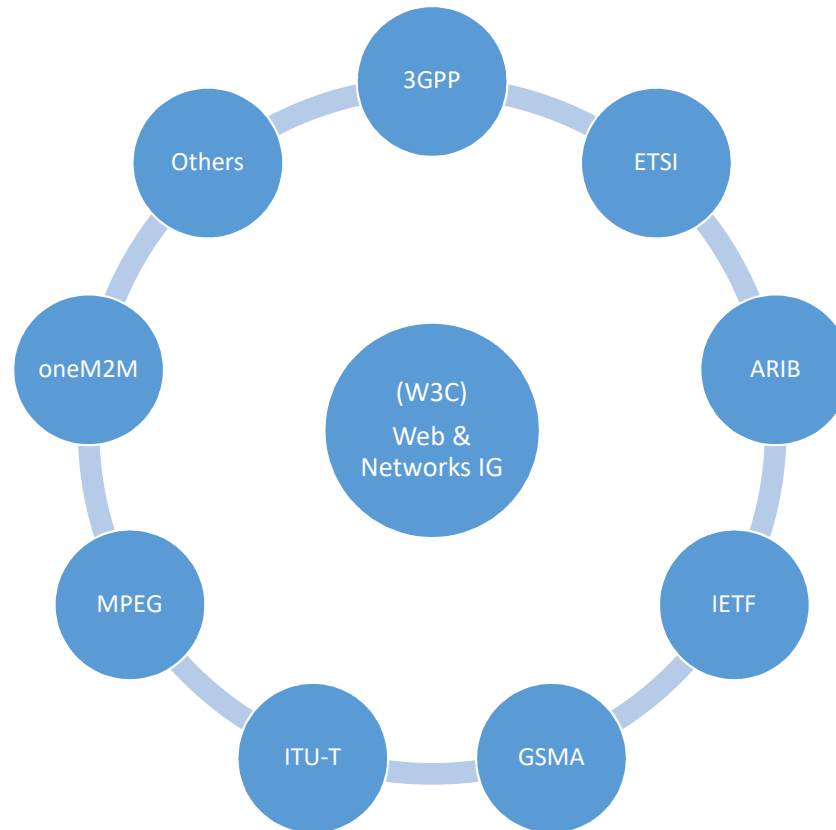


Backup

Coordination with W3C Groups



Coordination with External Organizations



Additional Details

- Web And Networks Interest Group Charter

<https://www.w3.org/2019/05/web-networks-ig-charter.html>

- About Web And Networks Interest Group

<https://www.w3.org/web-networks/>

- Join IG

[Join the Interest Group \(needs a W3C account\)](#)

- IRC Channel : #web-networks

<http://irc.w3.org/>

Tasks

- Provide guidelines to web application developers
 - Evaluate trade-offs between compute on the edge devices versus that on cloud for computation centric operations, to better quality of experience under different radio access type and quality conditions.
- Provide guidelines to browser developers
 - Improve web browser developer tools to profile application user experience impact under different network conditions using new pre-defined simulation models.
- Networking Standards and Technologies knowledge
 - Liaise and coordinate with relevant networking standards organizations (esp. 3GPP, IETF) and share latest developments.
- Propose incubation of new work
 - Propose work on exposing new Web APIs and new Control Messaging between device and network
- Provides use cases and requirements to guide other groups at W3C.

Deliverables

- Interest Group Notes
 - Identify requirements for existing and/or new technical specifications
- Maintain a public list of the network-related features
 - Ex. identified gaps, stable features deployed in browser implementations, features under development in W3C and external groups.
- Other non-normative documents
 - Primer or Best Practice documents to support web developers when designing applications.