# 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 16<sup>th</sup> -20<sup>th</sup>, 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



## 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

### 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 <u>cloud mode</u>, 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 <u>local mode</u> 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 <u>cloud mode</u> 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.

#### Game @Cloud Game @Local VS Web & Networks ട്ട് ... ... 211 ..... Hybrid Gaming Good Networking Smart Game Engine negligible latency smooth experience (switcher) user actions .... ... WebRTC Web Gaming WebAssembly **Cloud Gaming Bad** Networking WebGL great delay, jitter/wait unpleased experience

User-Case #1

### • 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 interference 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

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• Example (contd)

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

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### 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.

### 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.

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### • 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.



### • UHD video - Remote Education Service

• Example

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### • 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.

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



### • **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.

### • Example ("Chuanqi", one of the hottest web game in China)

UHD – MMORPG , sports, racing games

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#### 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



### • Virtual Reality -

In large or medium-sized cities, there are usually millions of renters who want to know about the apartment rental information monthly. The AR/VR platform can reduce the rush and bring multi-angle experience.

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# 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.