

DOWI

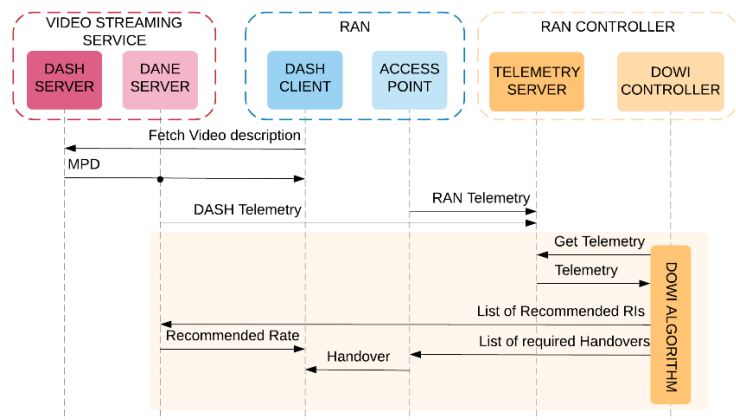
Dash Optimization Engine for Wireless Networks

DOWI is a novel solution to obtain a proportional allocation of resources among DASH clients in dense Wireless Networks, according to the properties of the video streams and the characteristics of the wireless channel. By means of its novel algorithm, which jointly optimizes fair airtime allocation and video rate recommendations, it maximizes the QoE of the DASH clients and improves the efficiency of the access network.

Framework architecture

The DOWI framework is composed by the following functional elements:

- **RAN Controller:** Allows the remote management and configuration of the Wi-Fi Access Points. Includes a Telemetry server, which gathers DASH and RAN telemetry, and the DOWI Controller.
- **DOWI Controller:** Obtains the parameters and telemetry needed by the DOWI algorithm and runs it. Manages the handovers according to the obtained list, and sends the required video rate recommendations to the DANE server
- **Video Streaming Service:** Includes DASH and DANE servers. Streams DASH videos, gets client IPs and MACs, and sets the recommended video rate from the Media Presentation Description (MPD) file.
- **Access Point:** IEEE 802.11a compliant; however, it can be adapted to newer amendments by properly modeling the bandwidth parameter.
- **DASH Clients:** Do not require any specific software to support DOWI



During video streaming:

1. DOWI gathers different telemetry from the APs and the SAND-enabled HTTP server (DANE), which feed its algorithm. The DOWI algorithm runs periodically, providing proportional fairness among the active wireless DASH clients.
2. According to the algorithm, DOWI generates a list of user-AP assignments, which are compared to the present associations to perform the necessary handovers, and a list of recommended Representation Indexes (RI), which are sent to the DANE server.
3. Finally, the DANE sends a message to each DASH client specifying the recommended video rate, and the APs manage the required client handovers

Problem solved

One of the most popular and bandwidth-demanding in nowadays networks, is Dynamic Adaptive Streaming over HTTP (DASH) video streaming, which prevalence as the main mechanism to consume on-demand videos from the Internet is expected to increase in the upcoming years.

However, although DASH players implement rate adaptation techniques to adapt video quality to network and playback conditions, in bottleneck scenarios, as is the case of dense WLANs, the fact that a client lacks a global view of the network, leads to

poor QoE and global performance, resulting in unfairness among clients, quality instability, and video stalls.



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About i2CAT

i2CAT is a nonprofit research and technology center that promotes R&D activities in advanced digital technologies. The center has pioneered a new model of innovation based on collaboration between companies, public administrations, academia and users.

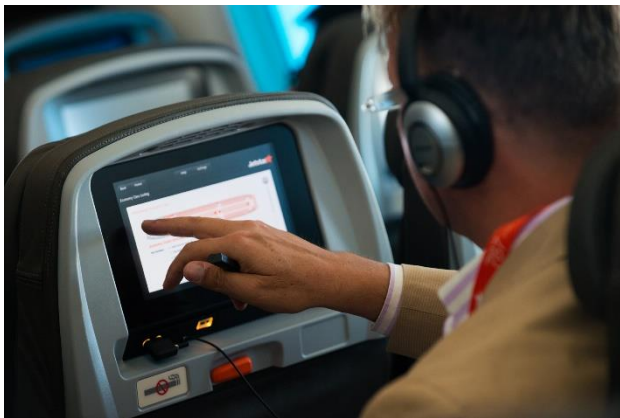
Our activities are focused on three objectives:

- **Research:** playing a key role in EU Framework Programme for Research and Innovation, participating in 23 H2020 projects.
- **Strategic projects:** leading local initiatives and projects to deploy digital strategies and policies of the public administrations.
- **Technology:** Fostering R&D collaboration with companies to develop innovative market-oriented solutions.

Applications & uses cases

Due to the increasing popularity of video steaming in nowadays networks, being one of the most demanded

contents during free time, improving its performance will significantly impact the satisfaction grade of the users.



The widespread implantation of DOWI will allow wireless network users consuming DASH video streams within high dense scenarios to have the best Quality of Experience possible. These possible scenarios include:

- Aircrafts
- Trains
- Music festivals

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- Fair allocation of resources between all connected clients.
- Control the association of clients across Access Points.
- Reduce dramatically quality instability and stalls during the video reproduction.
- Significant QoE improvement.