

OVERVIEW OF MAIN EUROPEAN RESEARCH PROJECTS ON VIDEO QUALITY



VQEG Meeting

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MAIN RESEARCH PROJECTS



MONALIS

- [Monitoring and control of QoE in large scale media distribution architectures](#)
- Coordinators of the Eureka Celtic Plus project (2016-2018)
- Main partners: Orange Poland, Nokia, UPM



NOTTS

- [Next generation Over-The-Top multimedia Services](#)
- Coordinators of the Eureka Celtic Plus project (2013-2015)
- Main partners: Orange Poland, Portugal Tel., Alcatel-Lucent, Ericsson
- Awards: [Celtic-Plus Excellence Award 2017 category Services and Applications](#)
[Eureka Innovation Award 2018 category Competitiveness and Growth](#)



NFMD

- [Networks for Future Media Distribution](#)
- Scientific lead of the EIT Digital research project (2015)
- Main partners: Ericsson, Inria, VTT, Acreo



SAVAGE

- [IPTV multiservice QoE management system](#)
- Scientific lead of the Innpacto research project (2011-2012)
- Main partners: Alcatel-Lucent, Universidad Politécnica de Madrid



QUEEN
Quality of Experience Estimators in Networks

- [Quality of Experience Estimators in Networks](#)
- Scientific lead of the Eureka Celtic Plus project (2010-2014)
- Main partners: Orange France, Telenor, Volvo, Embou
- Award: [Celtic-Plus Excellence Award 2016 category Services and Applications](#)



IPNO SIS

- [IP Network Monitoring for Quality of Service Intelligent Support](#)
- Coordinators of the Eureka Celtic Plus project (2010-2014)
- Main partners: Alcatel-Lucent, Ericsson, Broadcom, Dyce
- Award: [Best Celtic-Plus Innovation Award 2016](#)



Leading the 6 main European research projects in the for improving the quality assurance of video services



- IPNQSIS: IP Network Monitoring for QoS Intelligent Support
- Coordinator: Indra Sistemas, S.A.(IND)
- Start date: 10/2010 Completion Date: 04/2013
- Consortium: 18 partners from 4 countries
- A Customer Experience Management System (CEM) was developed that monitors IP-based services from customer perspective to assure the optimal levels of Quality of Experience (QoE)



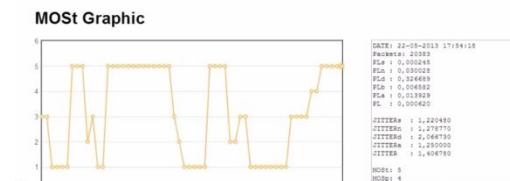
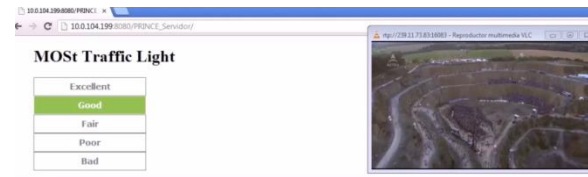
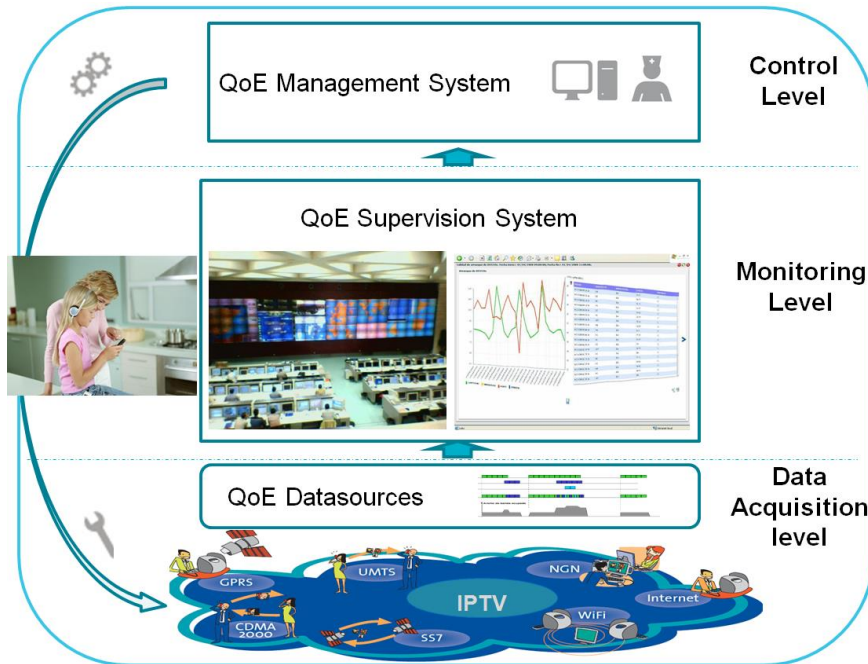
Project partners: Acron Swedish ICT AB (SE), Alcatel-Lucent Epsara SA (ES), Alkit Communications (ES), Broadcom Networks Spain S.L. (ES), Diagona y Consulting de Electrónica y Comunicaciones, S.A. (ES), Ericsson AB (SE), Indra Sistemas, S.A. (ES), Intellic Telecom (FR), ip-label newtest (FR), Lund University (SE), Nautic High Performance, Computing and Networking, S.L. (ES), Network City (FR), Net Technology (FR), PPO-Indra (FR), Prevera Networks (SE), SoftTelecom (ES), Vierling Communication (FR), Technical Research Center of Finland (FI), University Paris-Est Créteil (FR)

Stockholm, 28 April 2016

Jacques Maigen, Chairman of Celtic-Plus

Use case: IPTV

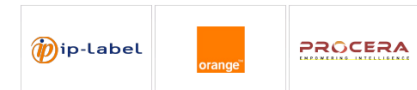
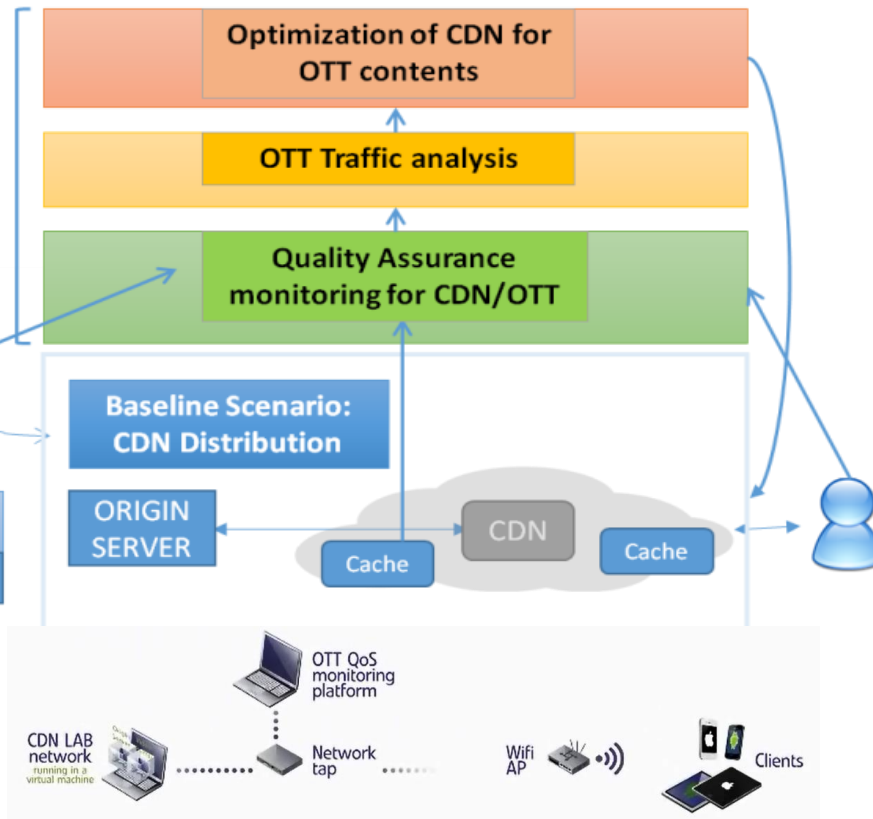
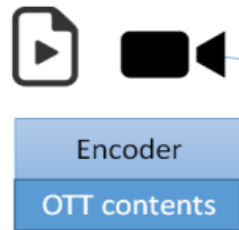
| Industrial Exploitation | Dissemination |
|--|--|
| <ul style="list-style-type: none"> • 26 products • 10 new products • 16 improved • 6 standards, 6 commercial presentations | <ul style="list-style-type: none"> • 55 publications • 17 Msc and PhD theses • 14 exhibit |



NOTTS



- NOTTS: Next generation OTT multimedia services
- Coordinator: Indra Sistemas, S.A.(IND)
- Start date: 05/2013 Completion Date: 03/2016
- Consortium: 20 partners from 6 countries
- Methods for QoS estimation and Quality Assurance monitoring tools for CDN/OTT



Industrial Exploitation

- ISO MPEG DASH Forum
- DASH Industry Forum
- VQEG (Video Quality Experts Group) & ITU
- TMForum Customer Experience Management

Total: 7 standards

Scientific Publications and MSc/PhD Theses

- IEEE Journal on selected areas in communication
- IEEE Transactions of Computers
- Annals of Telecommunications
- IEEE ICC, IEEE WCNC
- IEEE SaCoNet
- Etc.

Total: 77 publications and 17 MSc and PhD theses

Dissemination in events

- Celtic Plus Event 2014
- IWQM 2014
- QUALINET Summer School and regular meetings
- Streamingkollen
- Etc.

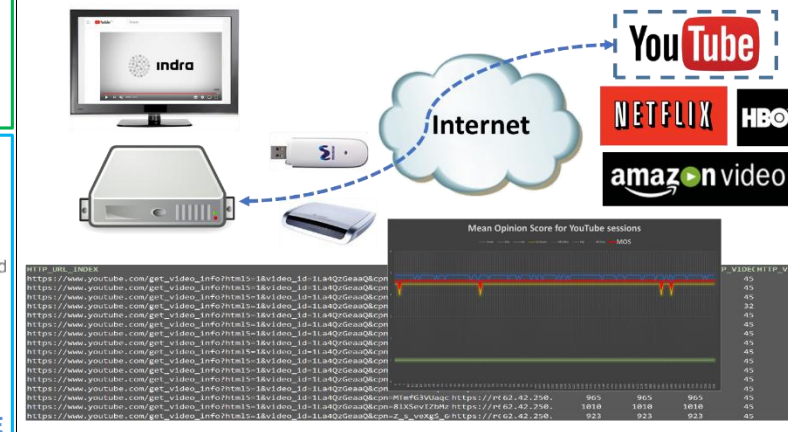
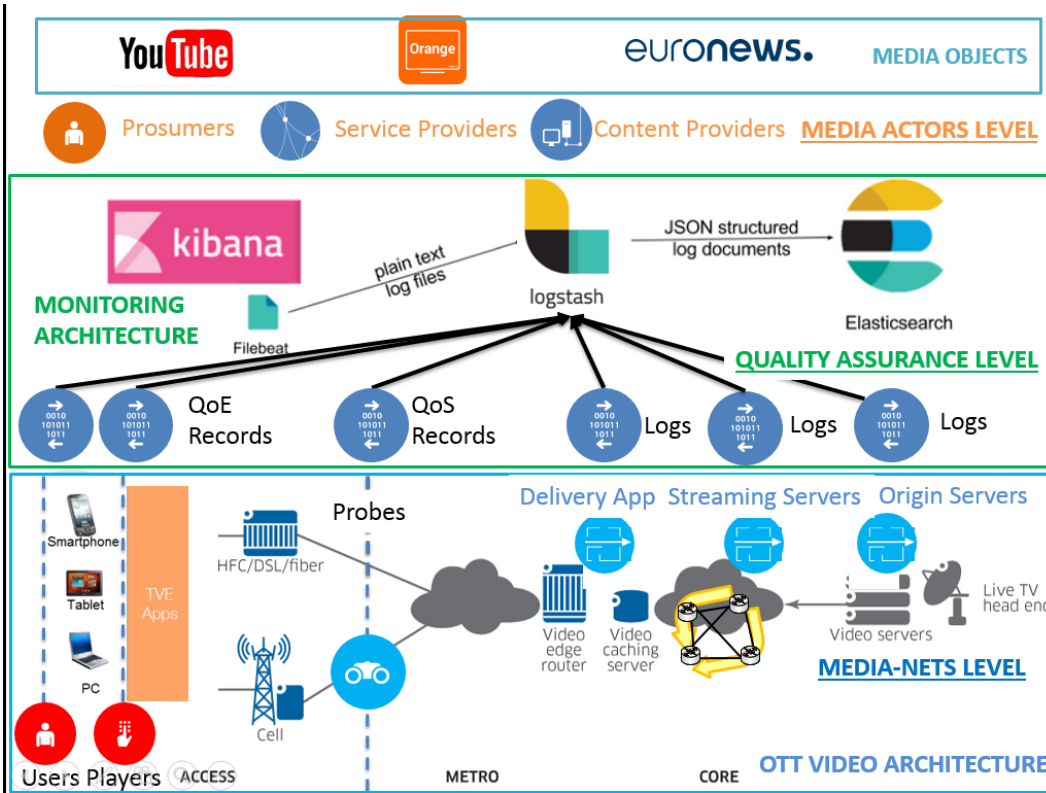
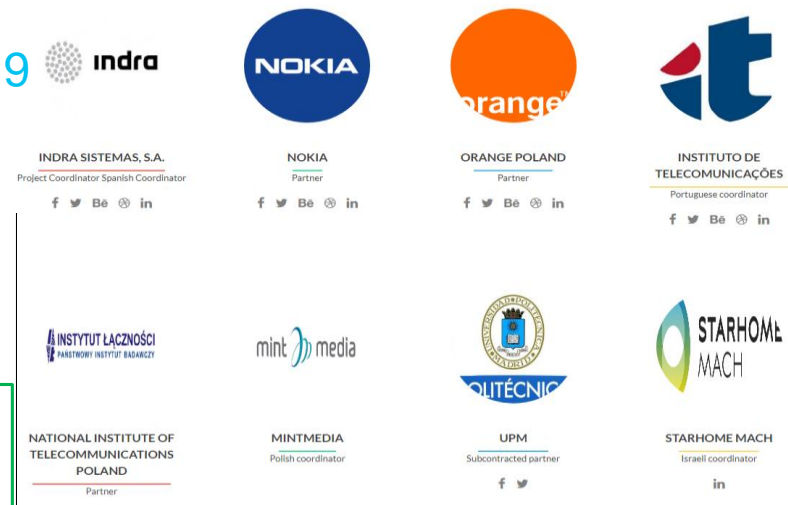
Total: 24 events

Use case: TV OTT





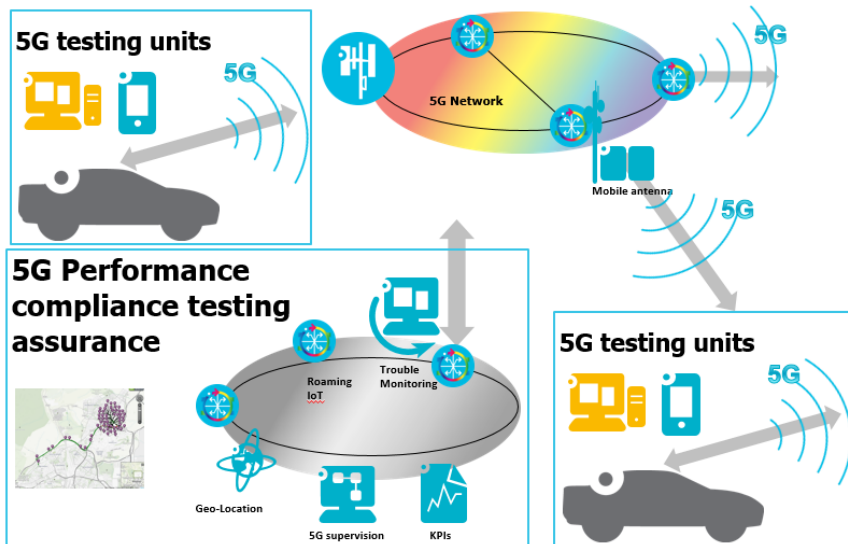
- Monitoring and control QoE in large scale media distribution architectures
- Coordinator: Indra Sistemas, S.A.(IND)
- Start date: 10/2016. Completion Date: 01/2019
- Consortium: 7 partners from 4 countries





5G & next gen. mobile performance compliance testing assurance

- Monitoring of 5G network quality and performance
 - Coordinator: Indra Sistemas, S.A.(IND)
 - Indra will analyze the KPIs of the 5G network in terms of active probes
 - Nokia will provide 5G infrastructure and devices
 - Orange Poland will validate the solution



| | | | |
|--------------|--|-------------------------|--|
| Radio | <ul style="list-style-type: none"> ✓ Network ✓ Cells ✓ Power ✓ Neighbour cells | Device & IoT | <ul style="list-style-type: none"> ✓ Manufacturer/version/OS ✓ IMEI, IMSI ✓ Technology ✓ Status |
| GPS | <ul style="list-style-type: none"> ✓ Coordinates ✓ Speed ✓ Accuracy ✓ UTC Time | Speed tests | <ul style="list-style-type: none"> ✓ Using reference server ✓ Stages: latency, download, upload ✓ BW UL/DL, delay, downloaded bytes |

DRIVE TESTING

Performance in moving scenarios

- ✓ QoS monitoring in different locations
- ✓ Monitoring and optimization of radio network moving and access network selection per service type
- ✓ Monitoring services as users use most of the time, and IoT services
- ✓ Measurement units in cars, vans, trains, briefcases, backpacks, ...

Real-time monitoring of communications infrastructure in emergency scenarios



**Mobile
Monitoring
Unit**



- Mobile Monitoring units
 - Low-cost, high-performance HW-based monitoring device
 - Multi-technology: GSM/UMTS/LTE/5G
- Drive tests in emerging scenarios
 - Located at emergency vehicles (ambulances, fire cars, police, etc.), briefcases, backpacks, ...
 - Testing the scenarios as users do
- Surveillance of communication services
 - Monitoring of network infrastructure in mobility
 - Map display of QoS and KPIs in multiple locations
- Real-time monitoring
 - Proactive way: detection of network anomalies related to emergency scenarios (e.g. lack/loss of communications)
 - Reactive way: follow up of available communications and network and service recovery after emergency situations



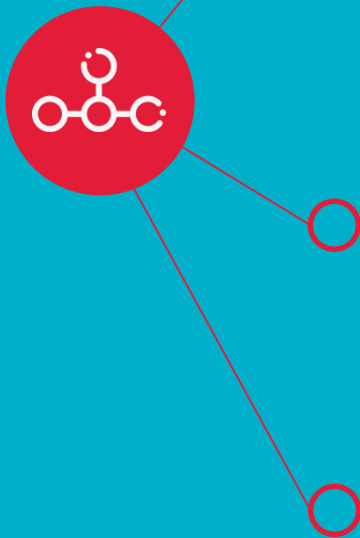
Coordinator: Nokia Spain
Indra: Monitoring of emergencies

Hispasat
Ubiwhere
Informa
Ericsson Turkey
Fraunhofer Institute

Since 2013 leading the

Customer Experience Management- CEM program at the TMForum

Indra is the coordinator of the “CEM Implementation Guide and use cases” workstream



Implementation Guide

Development of the Business Value Roadmap to help telco partners to implement the CEM Use Cases

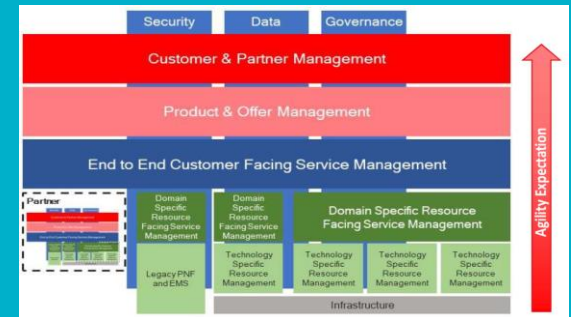
CEM Use Cases

Development of over 50 Use Cases for:

- Customer care
- Interaction
- Understanding
- Retention
- Personalization
- Revenue
- Business optimization
- Cost reduction

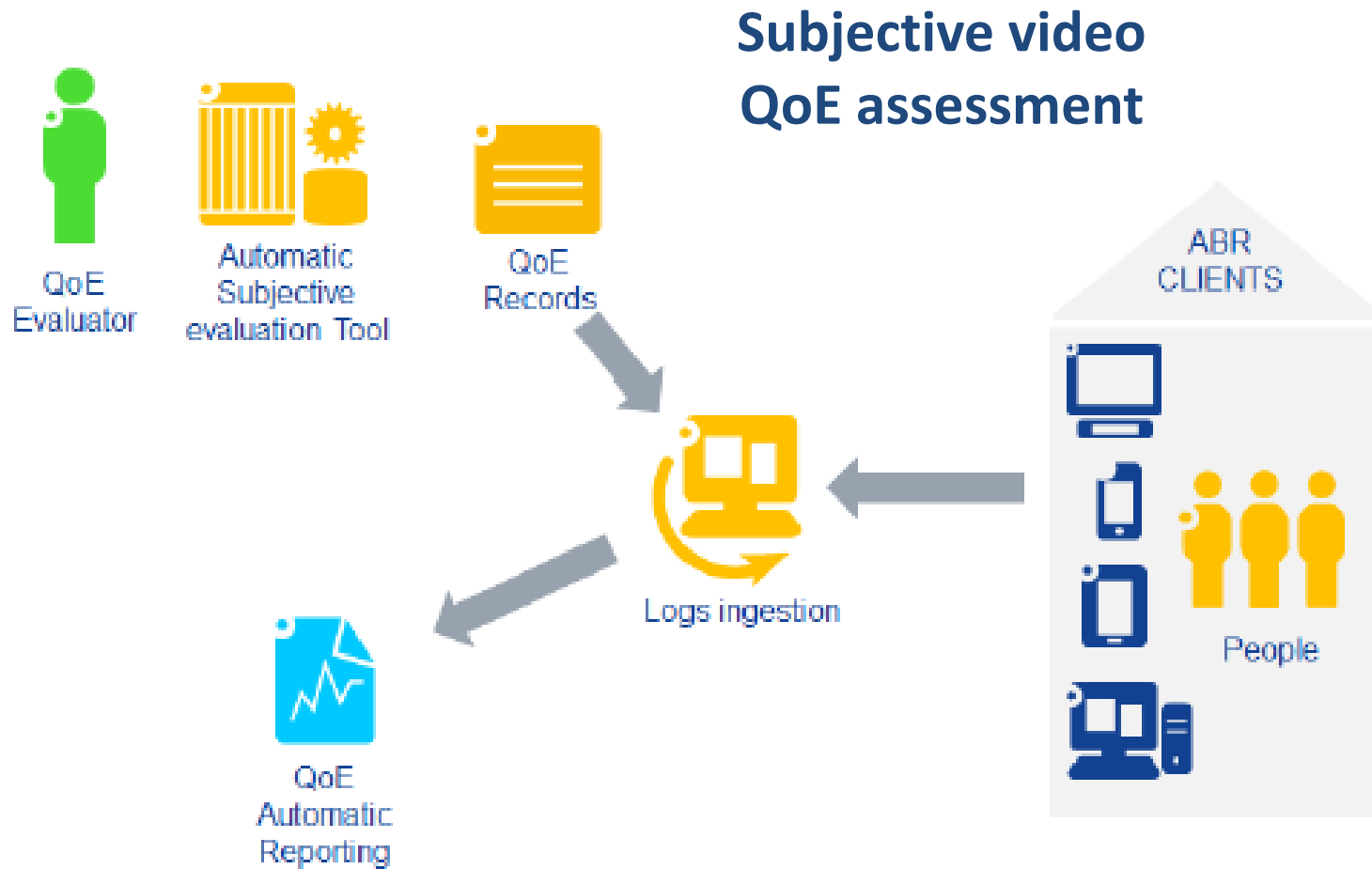
Open Digital Architecture

De facto standard in progress to design Open Digital Platforms as a review of traditional OSS/BSS.

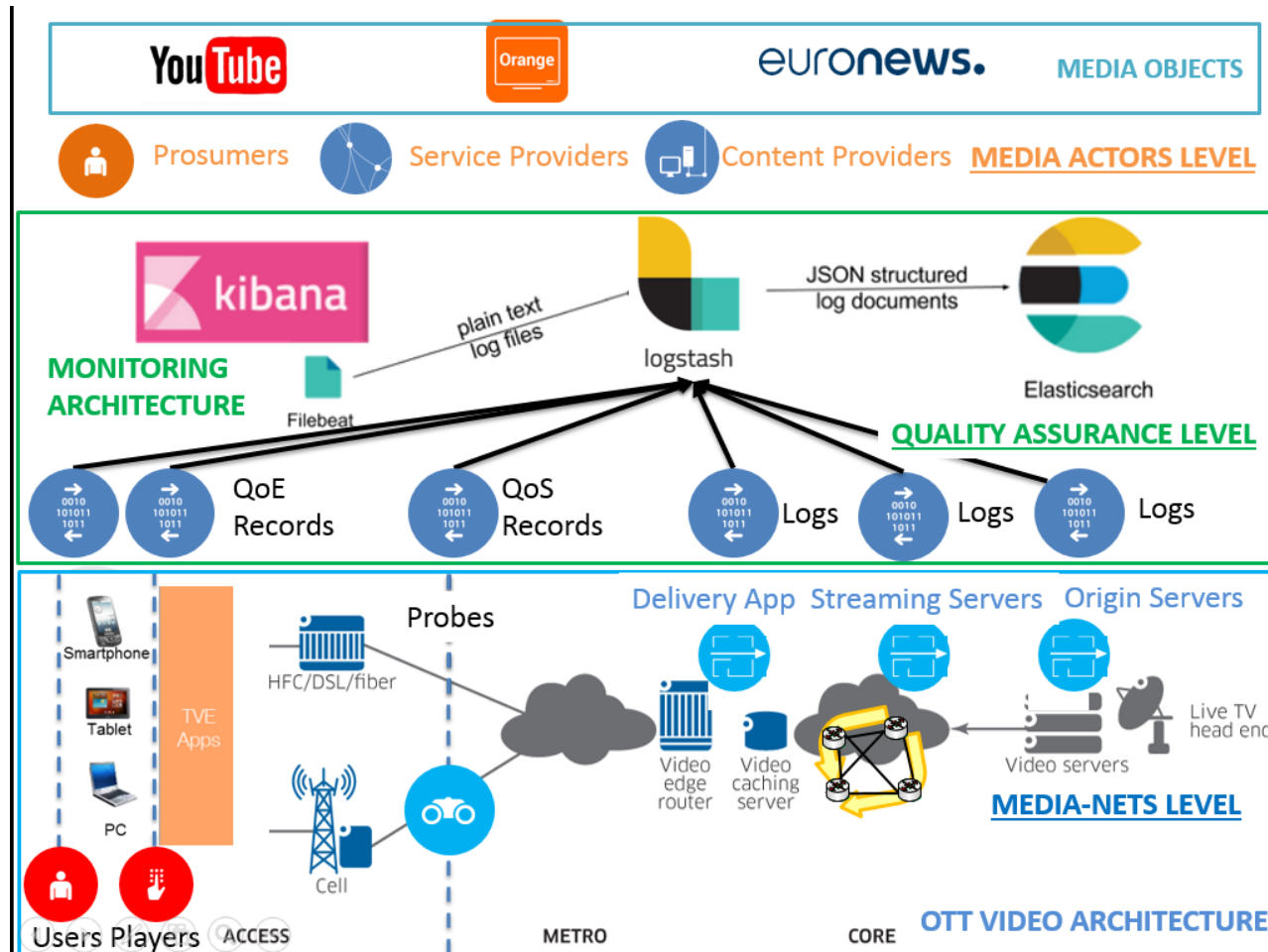


RESULTS AND ACHIEVEMENTS

QoE Assessment and evaluation techniques for Adaptive streaming



MONALIS RESULTS AND ACHIEVEMENTS



From the SoA of OTT video streaming architectures and monitoring architecture developed in WP3, we have designed the high-level OTT video streaming architecture and MONALIS ecosystem



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