ENTHRONE Pilot Validation.

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Bernhard Feiten

Deutsche Telekom
Laboratories

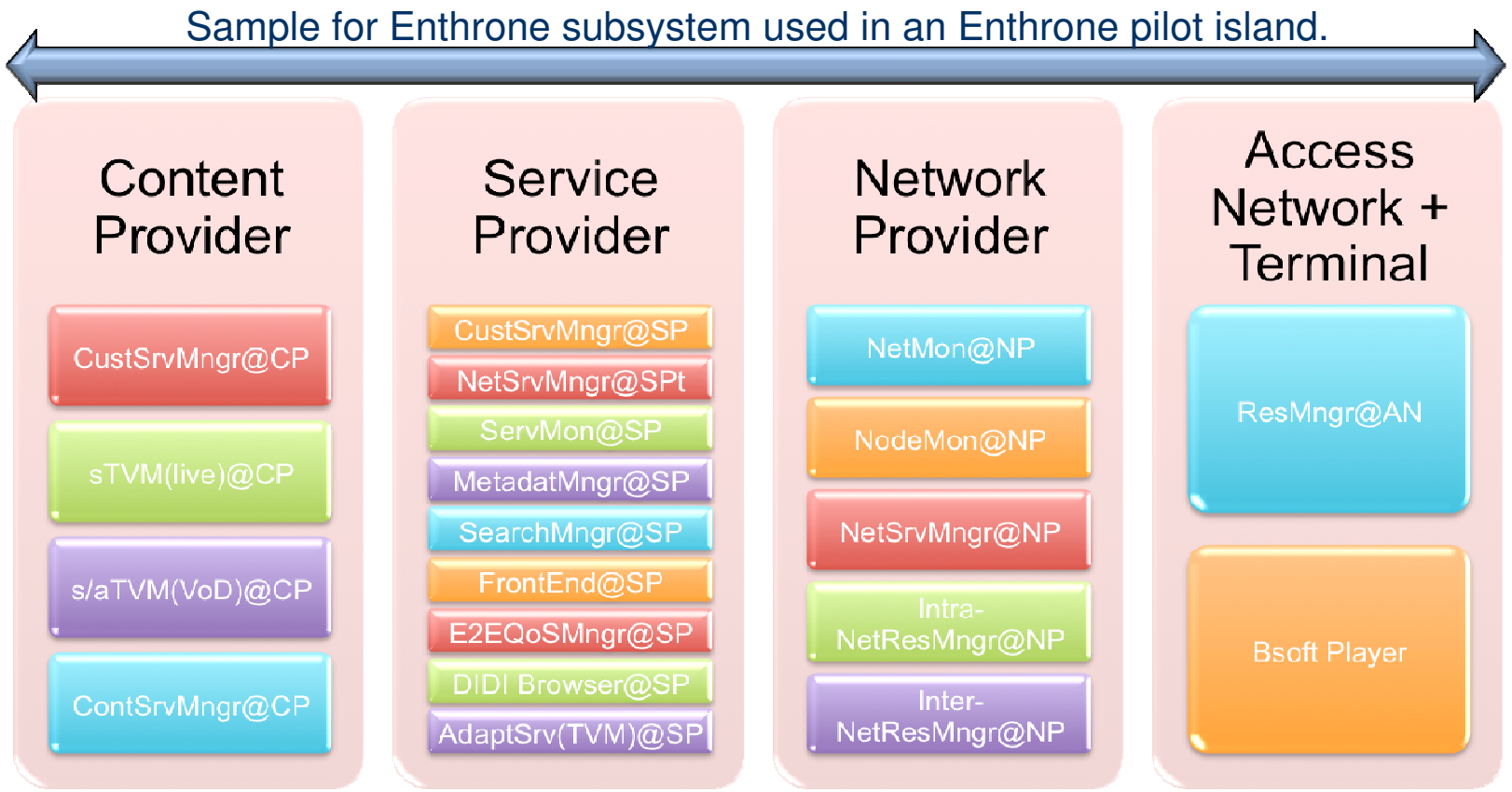
Test and Validation Methodology

Types of tests

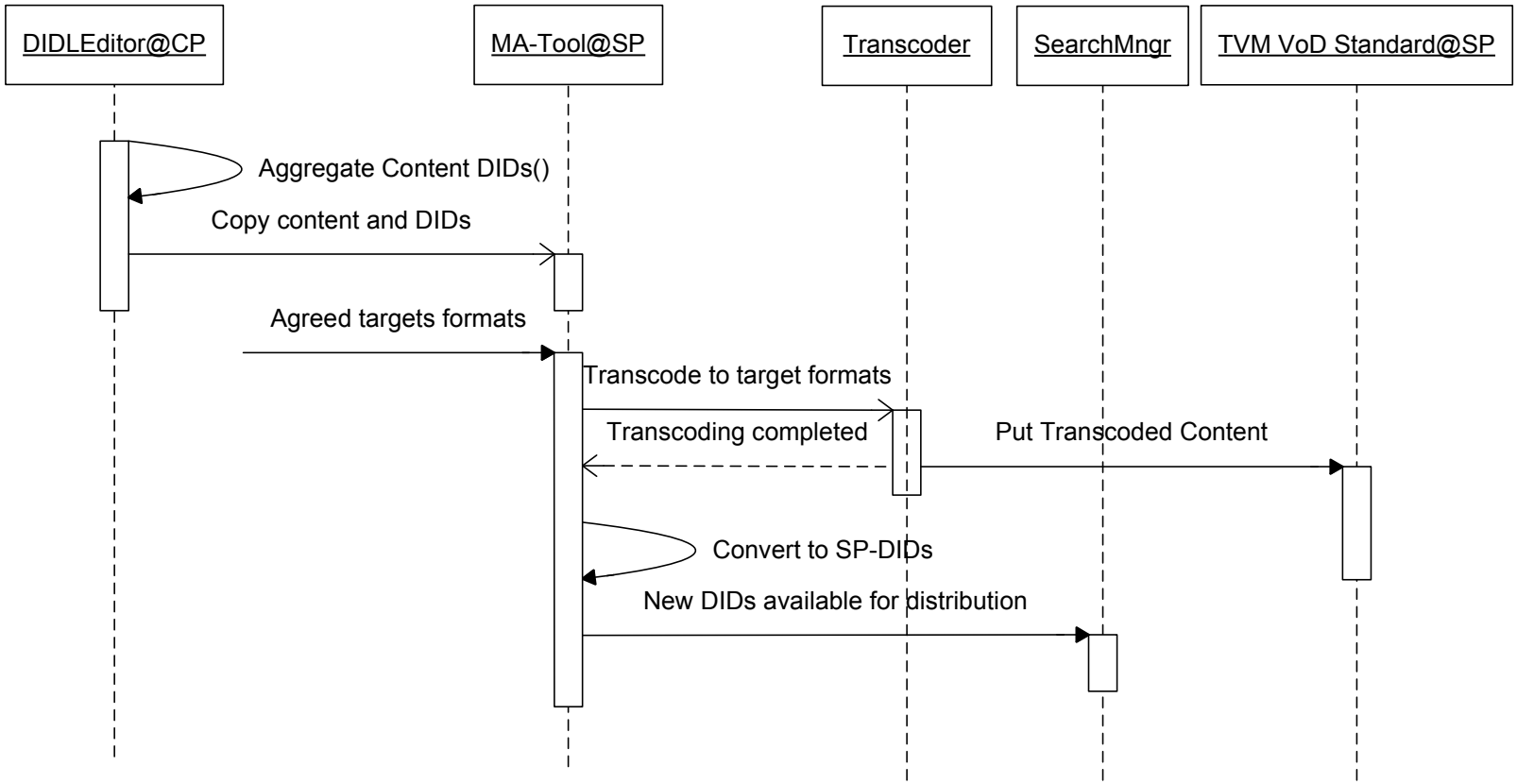
- Verification/Validation/Integration Tests
  - proving the functionality and validating the correct behaviour of components/sub-systems under test.
- Algorithm/component level Performance Assessment Tests
  - efficiency of the algorithms or components, measure the computing resources consumed by the algorithm during its execution, etc.
- Overall system level Performance Assessment Tests
  - to determine whether the overall objectives of the ENTHRONE end-to-end integrated QoS management system have been realized. Different aspects can be emphasized: benefit/cost, quality, scalability, reliability, usability, etc

Verification/Validation/Integration Tests.

Test the communication between subsystems based on Use cases.



Verification/Validation/Integration Tests.
Sample Use Case Sequence: CP provides On-Demand Content.

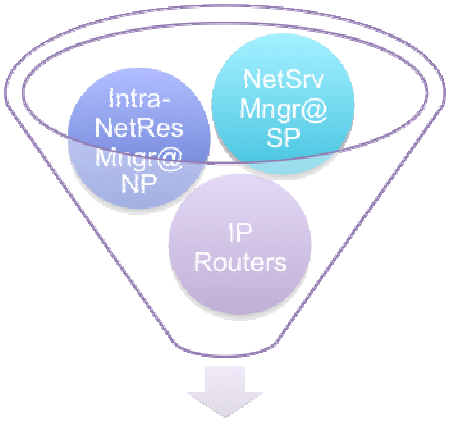


Verification/Validation/Integration Tests.
Work through of test cases.

Test Case Name (covered Use Case):	CP provides On-demand Content	Involved Pilots :	Germany
Date:	29.02.2008	Tester:	Carsten Dethloff
Description:	This test case covers the upload of on-demand content and metadata from the content provider to the service provider and the subsequent processing of the content at the service provider.		
Test procedure: initial conditions	Content and corresponding metadata are available at content provider in a MPEG-21 DID structure.		
Test procedure: checks to be performed in the test	Availability of content and metadata in the involved subsystems.		
ENTHRONE involved subsystems:	CP DIDL Editor, SP-DIP MA Tool, TVM VoD Standard, CustSrvMangr@SP, SP-FE DDI Browser		
Test equipment used:	Computer, SW for Bitrate and Video parameter assessment		
Expected result:	On-demand content and metadata are available for content search and consumption by the end user		
Metrics:	n.a.		

Test case name						
Test Step	Description	Performed Test	Expected Result/Goal	Remarks	Status	Error Class
1.1	Upload of content from CP to SP	Upload of several DI's into the input folder of the SP-DIP by FTP	Content is available at SP-DIP for further processing	*To be filled during the actual test*	*OK/ Not OK*	2

Walkthrough of pSLS establishment use case.



pSLS establishment

SUITE1_1/DEM/GrP/pSLS-establishments

- Validate of the implementation behavior relative to pSLS establishment at IP routers

SUITE1_1/DEM/GrP/cSLS_inv

- Validate of the Intra-NetResMngr implementation behavior relative to pSLS

pSLS forward

- NetSrvMngr@NP forwards pSLS request to Intra-NetResMngr@NP

pSLS establishment at IP routers

- Intra-NetResMngr establish pSLS (in terms of QoS Parameters (traffic classification at egress router.

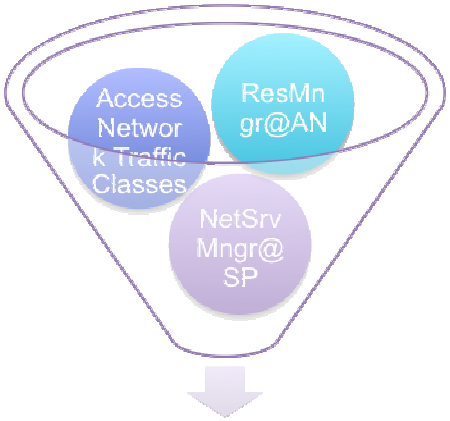
Fast-Rerouting

- Re-establishment of pSLS traffic tunnel in case of link failure (fast-rerouting capabilities in MPLS paradigm)

Monitor traffic

- Monitro Traffic at each pSLS using monitor capabilities of Intra-NetResMngr

Walkthrough of cSLS establishment use cases.



cSLS traffic deployment and AN management

SUITE1_1/DEM/GrP/cSLS_AN

- Validate of the ResMngr@AN implementation behaviour relative to cSLS at Access Network

SUITE1_1/DEM/GrP/AN_mngt

- Validate of ResMngr@AN relatve to Access Network Management

- ResMngr@AN accept the cSLS-requests

Accept

Request a cSLS subscription

- Configures Access Network (802.11e) according to cSLS QoS parameters

- Responds to NetSrvMngr@SP about the deployment of cSLS at Access Network.

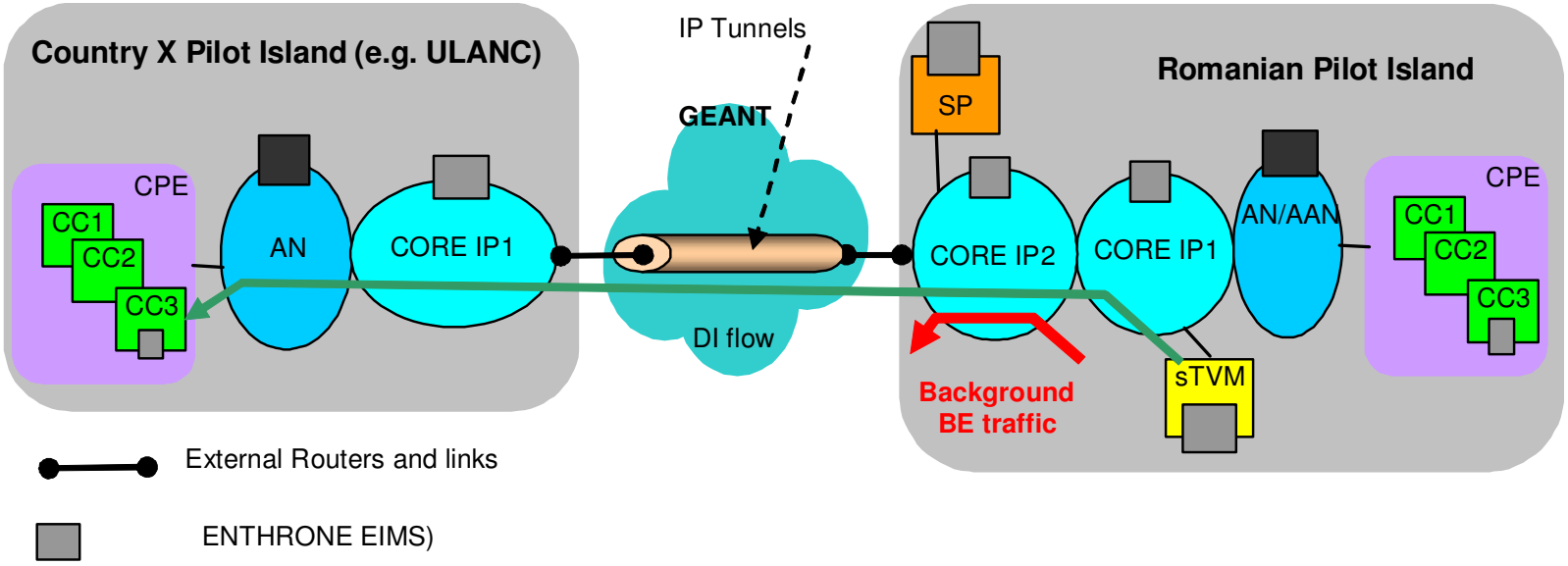
ResMngr@AN Response

User traffic Monitoring

- Monitor user traffic for a specific cSLS.

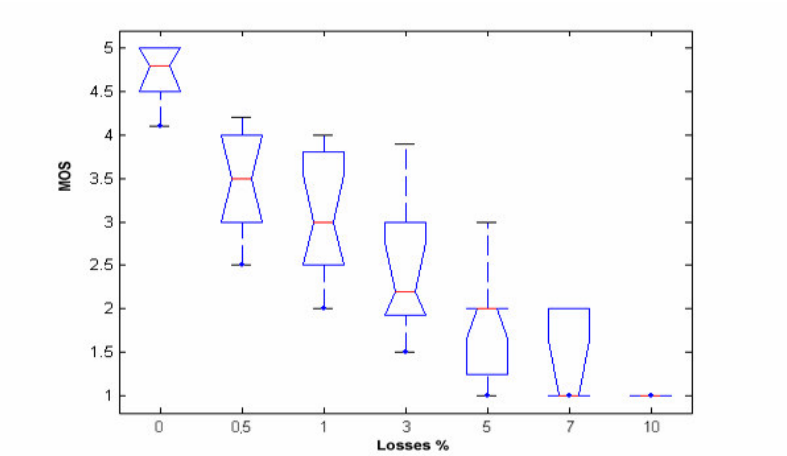
Walkthrough of use case
Overall Performance evaluation of high level services (E-learning).

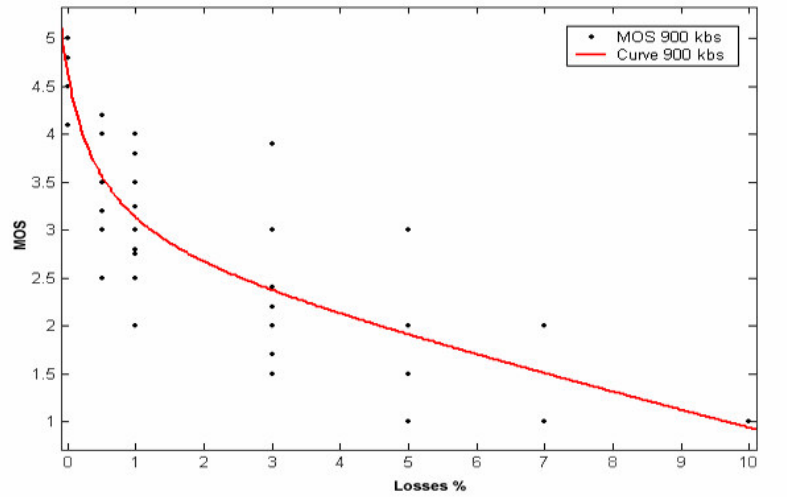
- Environment
  - ENTHRONE infrastructure – complete, in place (SP, CP, NP, CC)
  - Reservation activated in the network for E-learning flow (pSLS, cSLS, lat mile, etc.)
  - (Over) Load a middle segment of the pSLS-link with high background traffic
  - Play DI with network loaded
  - Make measurements on A/V overall quality at reception (TBD)
- Expected result: OK again



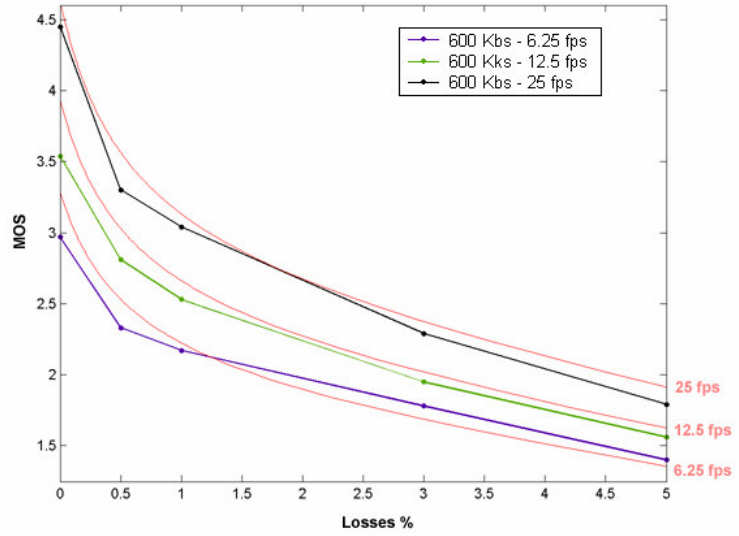
Algorithm/component level Performance Assessment Tests.

Telefonica QoS Probe on Terminal estimating the perceived quality from packet loss.





- Video AVC test content: frame rate [6.25,25] fps; bit rate [150,1500] kbps; packet loss [0,10] %
- Public survey (across EU) – bottom-up approach



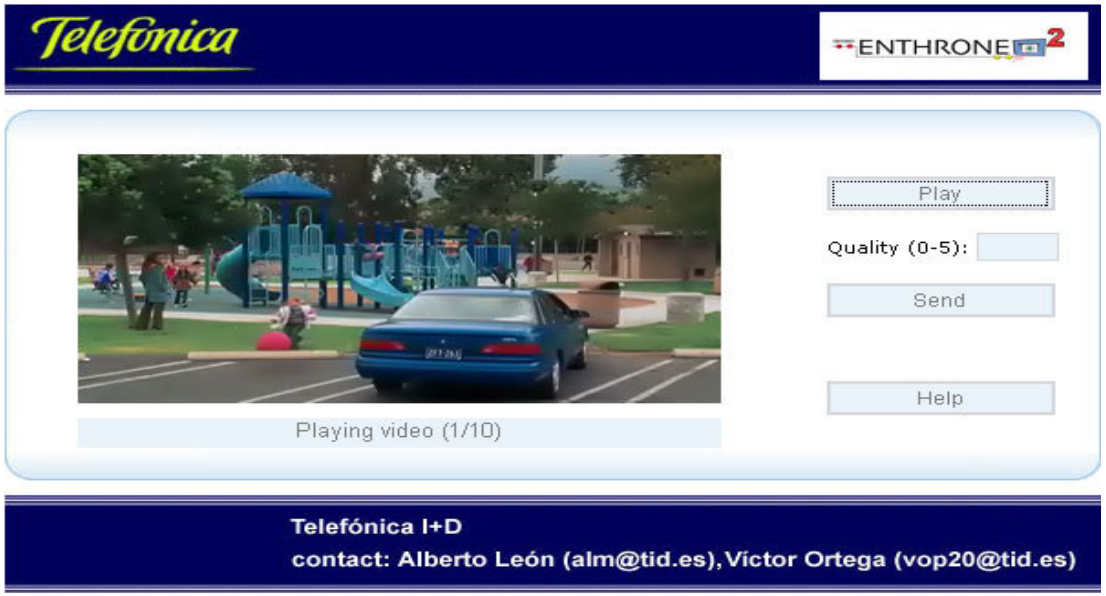
Telefónica I+D Public Survey

A public survey on an internet website (www.enthrone2.tid.es) has been. Its objective is to collect as many subjective QoS measurements on video applications as possible, as requested for a professional QoS model validation and promotion, contributing to project dissemination and related exploitation activities.

1.Phase: Internal subjectice tests: Telefonica Corporation and Enthrone2 Consortia.

2.Phase : External Level to be done in related R&D Projects and further interested parties.

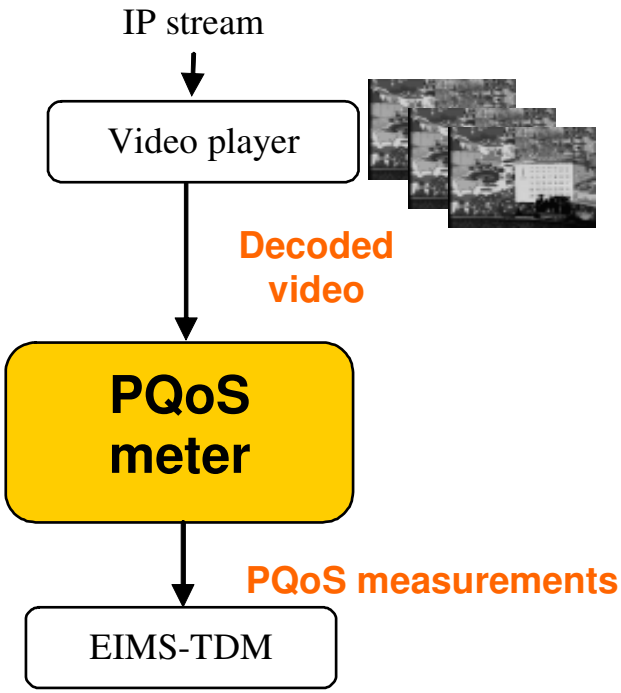
From Industry, Vendors, Operators and SMEs…



…to Academia & public / private Research Centres

Algorithm/component level Performance Assessment Tests.
Perceived Video Quality Meter (TDF).
Goal

- Predict the quality assessment of a multimedia service, as perceived by a population of human beings
- Working at the application layer: using video signals
- Provides instantaneous PQoS (typically every second) and alarms
- Reports to EIMS-TDM (Terminal Device Manager)
- Optimised for mobile TV applications

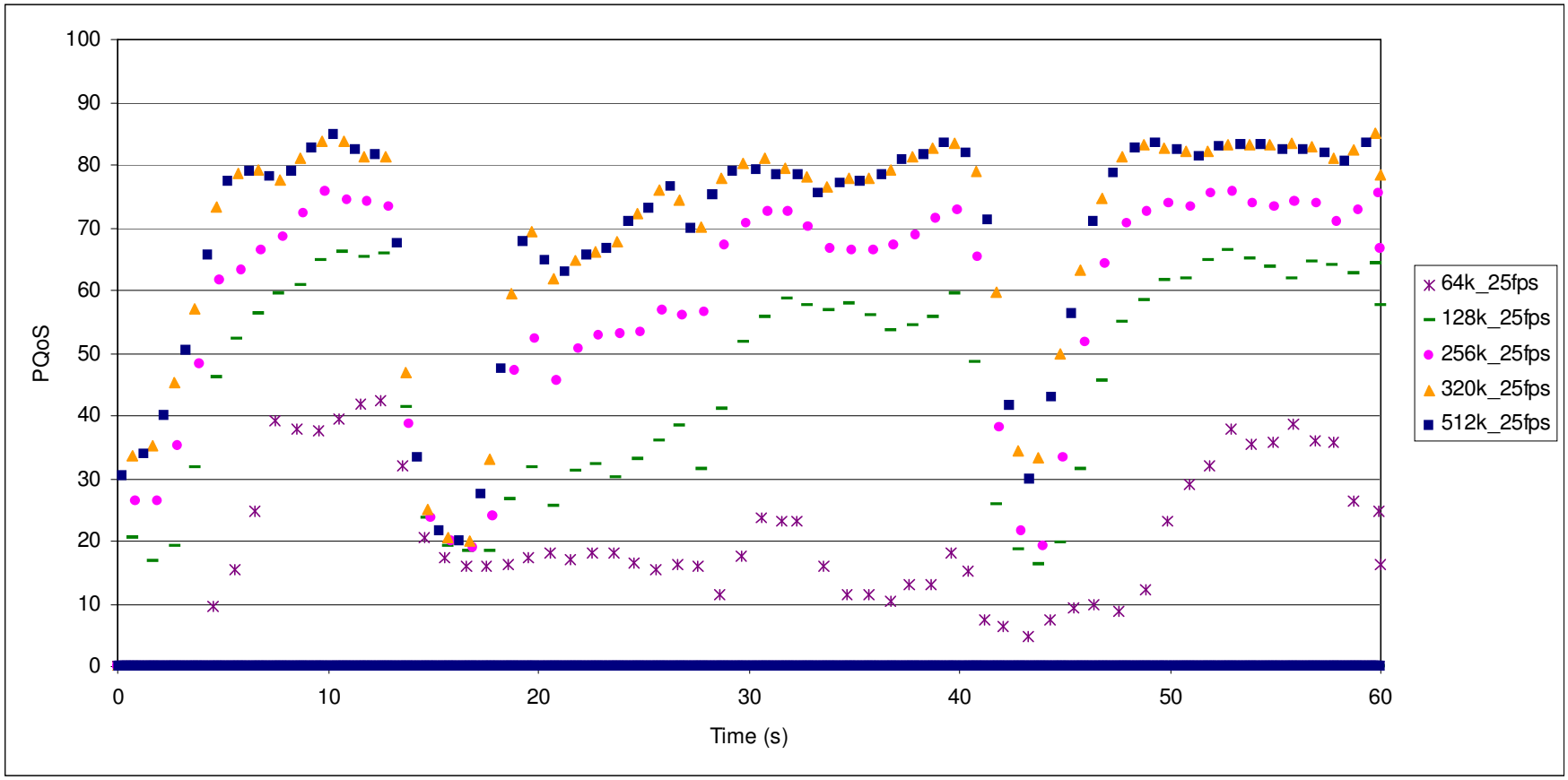


Algorithm/component level Performance Assessment Tests.
Perceived Video Quality Meter (TDF).
Test Conditions

- H.264 encoder, baseline profile.
- CIF spatial resolution (352x288).
- Constant frame rate: 5, 10, 15 and 25 frames per second.
- Constant data rate, from 64 to 512 kbit/s.
- Various content types and genres: news, sports, entertainment...

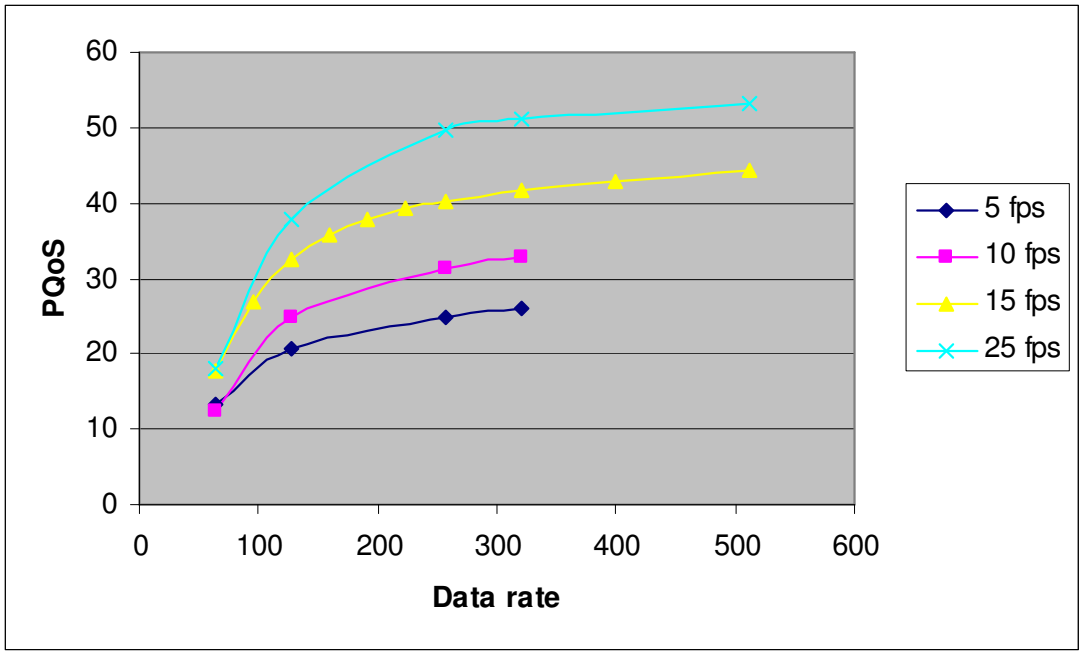
Sequence	Genre	Enc. Complexity
Paint	Documentary	Low
BD	Cartoons	Medium
Volley	Sports	High
JTFR2	News	Medium (Varying)
Bois	Advertisement	High
Susie	Reference sequence	Low
Foot	Sports	High
Park	Entertainment	Medium

Algorithm/component level Performance Assessment Tests.
Perceived Video Quality Meter (TDF).
Sample PQoS measurement results.



Continuous measurements, for different encoding data rates 64 .. 512 kbit/s
Clear impact on PQoS ; PQoS average is well correlated to subjective tests results

Algorithm/component level Performance Assessment Tests.
Perceived Video Quality Meter (TDF).
PQoS mapping.



- Sample PQoS mapping to video encoding configuration (encoding data rate, frame rate) for a given content type

Overall System Level Performance Assessment Tests.

The quality enhancement will controlled with subjective testing.

Perceived Quality testing

- ENTHRONE II enabled services are compared with Best-effort services.
- By conducting formal assessment tests the perceived quality improvements will be evaluated.
- These subjective tests will be conducted corresponding with ITU-R BT.500.

Conclusions.

Enthrone Validation

- Comprehensive test suites in the ENTHRONE pilot islands are foreseen.
- Verification/Validation/Integration Tests are ongoing. The integration is finalized soon.
- Algorithm/component level Performance Assessment Tests have been carried out by the related work packages.
- The quality of the pQoS measurement probes are further enhanced by including results of further subjective tests.
- The overall system performance will be assessed in final subjective quality tests to prove the enhancements that the ENTHRONE end-to-end QoS management supervision will provide.