



Innovative and pragmatic Solutions for the measurement and optimization of the QoS

Our Core business

QoS Tools and Services



LillyBelle in figures



Lancement
et mise sur orbite
en 2009

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CLIENTS
DANS PLUS
DE 25 PAYS



Our references





Measurement of Quality of Experience

Crowd Sourcing

What is the concept?

- " Deploy several thousands of software agents on the mobile of subscribers.
- " Measure the Quality of Service and the Quality of Experience on the telecommunications networks

For the regulators?

Regulator:

Conduct campaigns of regular measurements and annual surveys for the assessment of the quality of service of the telecommunications networks and control compliance by telecommunications operators with their obligations and commitments relating to the quality of service such as stipulated in their contract specifications
Inform the market on the Quality of Service provided.

How to measure the Quality of Service?

Drive Tests: vehicles fitted out that measure punctually with a suitable equipment

"

For:

- Many KPIs

Against:

- Ad hoc Measure

Software on Smartphones:

"

For:

- Permanent Measures
- View of the subscriber

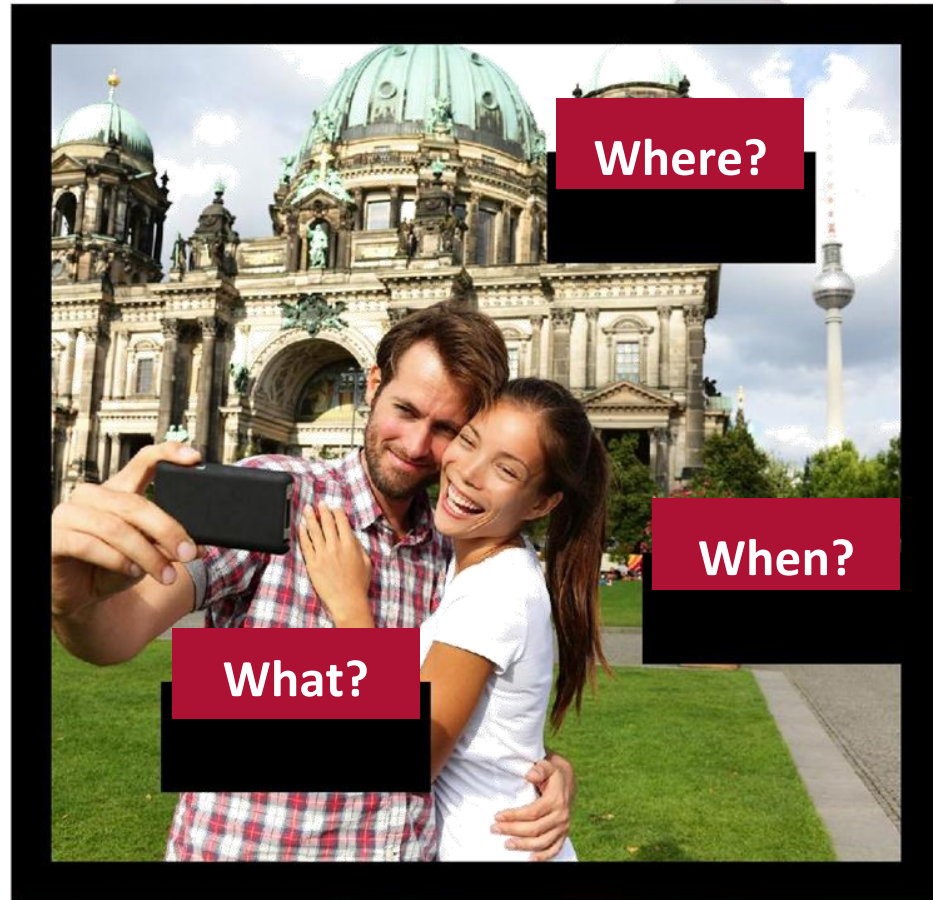
Against:

- Must be deployed on a sufficient number of mobile to be representative

The approach of incorporated agents

Analysis(based on mobile experience)

- " Measure the quality on the Mobile of the subscriber
- " Real end to end measure
- " Easy to deploy



What is needed ?

A software of Customer

- " Customized regulator
- " Available for customers on the site of the regulator



A Server

- " Measure more than 300 KPI's
- " Analysis /flexible and complete reporting
- " setting up reporting
- " Available 7/24
- " Hosted

How does it works ?

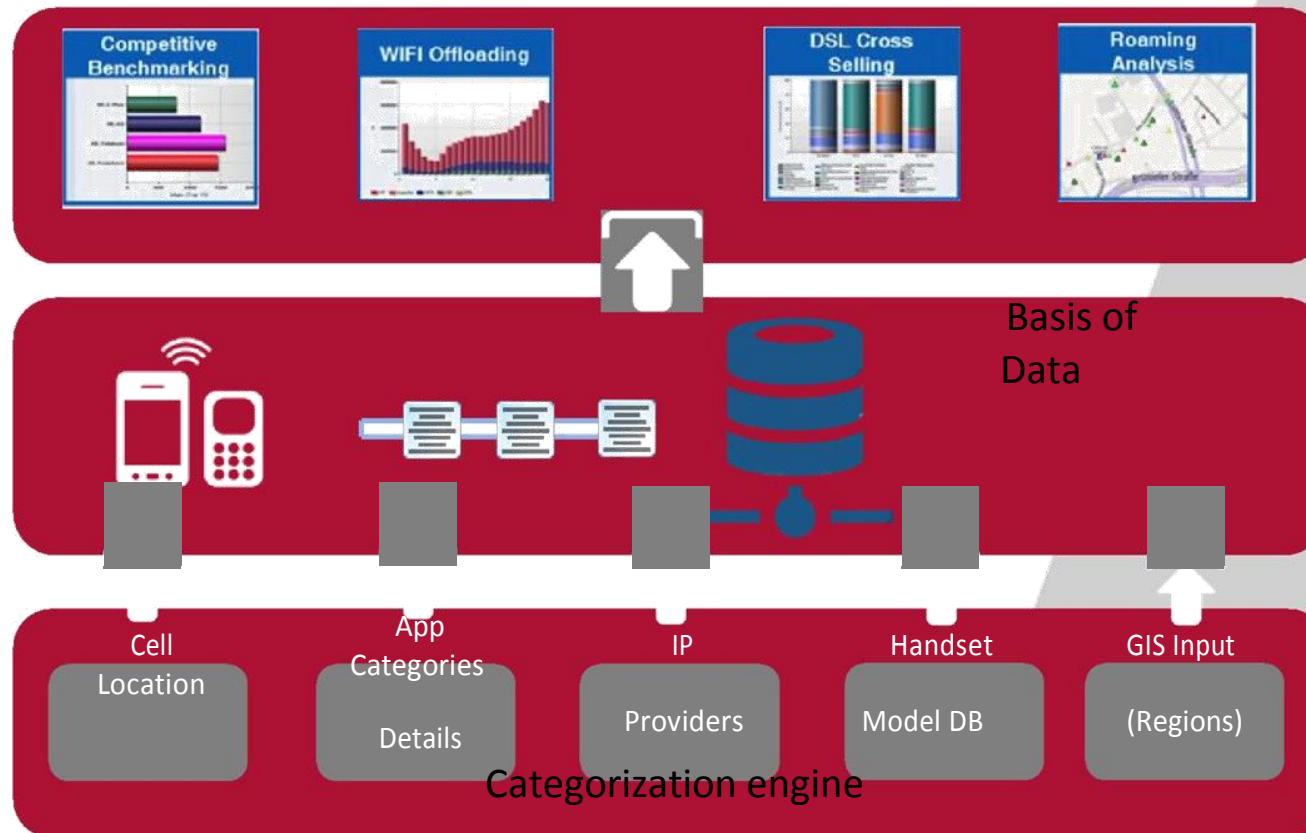
The Client software:

- " May be under the name of the regulator,
- " Installation on Smartphone: Android, IOS, Blackberry, Windows,
- " Available on the site of the regulator or on a dedicated site,
- " Can be incorporated into another more complete application.

The server:

- " The server may be hosted by the supplier or the regulator,
- " Secured Access to the system,
- " configurable and simple dashboard
- " Many KPI's

The architecture





What could I measure?
What KPIs are available?

Coverage

(Passive Measures)

Non availability of network

- App passively collects time Spent in coverage, in limited Service and out of coverage
- Track coverage per RAT During network rollout In disaster recovery case

Loss of coverage

- Dedicated ticket for each Coverage loss of at least 2mins (configurable)
- Timestamp, duration, Serving cell, location Information for loss and Recovery of service

Geo-location coverage

- Serving cell & signal level Collected with each KPI and each location fix
- Includes RxLev, RSCP and for LTE RSRP, RSRQ, CQI, SNR (RSRQ plot shown above)

Availability and Stability of Data Services

Data Services Availability

- Passive collection of data services connection state
- Track e.g. data service Availability issues in hotspots due to signaling layer overload

Data Services Stability

- Hourly test for Availability of internet connection
- Collects serving cell, RAT, geo-location and Device state info
- Differentiate RAN Access from Core network issues

Latency of Data Services

- Including DNS query, TCP handshake, HTTP RTT
- Conformance testing During 4G network rollout
- Evaluate heavy load situations e.g. at traffic hotspots

Performance Service Data

(Active Measures / Passive measures)

Throughput and latency measured by Speed Test

- DL/ULpeak & E2E throughput
- ICMP and HTTP RTT Latency
- Timeto load reference website (e.g. ETSI mobile Kepler)
- Fixed line performance testing (provider info via IP range)
- Benchmarking of network Performance during rollout
- Evaluate impact of device Capabilities on user experience
- Base station vendor benchmark (using cell plan information)

Start up per application

- Data Session ticket for each relevant cellular data burst
- Duration, data volume, peak speed of data burst measured
- Servingcell and geo" location information from device

Data Usage

(Passive Measurement)

SplitMobile/WiFi

- Data Usage per RAT incl. most used serving cell (hotspots)
Investigate WiFi offload across different regions, device types
- Usage of home/office and Public WiFi access points

Usage2G/3G/4G

- Automatic labeling of Users
e.g. in terms of LTE usage, # of calls, WiFi offload
- Investigate impact of 4G data availability on WiFi usage

Roaming Analysis

- Usage of data services by inbound/outbound roamers
- Identify WiFi vs. cellular data usage
- Identify SIM card switch in roaming scenarios

Application Insights

(Passive Measurement)

Usage of applications

- Full list of installed apps
Reported every 4 days
- Trending of footprint of newly launched apps (e.g. Neelix)
- Tracking of operator app Footprint (e.g. customer care)

Key factors of Data Usage

- Calculate monthly traffic per app and user in WiFi/mobile
- Check impact of promotions on usage (e.g. Spotify plan)
- Identify key traffic drivers
- Impact of events (e.g. soccer)

Split Mobile/ WiFi per app

- Data usage per RAT and app
- Evaluate apps with largest potential for WiFi offload
- Not relying on DPI, Working also for HTTPs
And different apps using Same remote IPs

Voice Services

(Measure Passive)

Call and HO geo-spotified

- Call tickets with serving cells, signal levels, geo-location information for call setup, end and each handover
- Identify call traffic hotspots and heavy handover locations

voice Analysis LTE (e.g. CSFB)

- LTE CS Fall Back Failure Ratios (see above) and Recovery KPIs
- Signal levels, handovers, etc. also for VoLTE calls
- Evaluate impact of Network changes during 4G rollout

Call Stability

- QoE centric KPIs: check For redialing after hang-Up (e.g. due to low Speech quality)
- Information on failed Calls incl. coverage Informa on, call setup times (see above)

Geolocation Technologies

Server cellular

- Minimum level of accuracy
- Available for all KPIs
- Automatic geo-location of cells based on collected data
- MNO can load cell plan with further details (e.g. BS vendor)

WiFi scans / WiFi DB

- Resolution up to 20-30m
- Passive collection of WiFi Scans with collected KPIs
- Automatic population of own WiFi hotspot location DB Using collected GPS traces

GPS Geo-Location

- Accuracy up to 2-5 m
- Passively collected whenever GPS info is available on device (e.g. maps / sporting Apps are Used by subscribers)
- Operate actively Query GPS

