QOE Aspects of OTTs
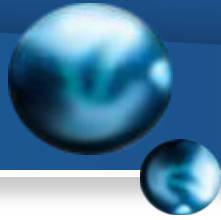
ITU Workshop on Performance, QoS and QoE for Multimedia Services

Dakar, Senegal, 19-20 March 2018

Ayoub Elhaddouj - Khalil Amiroune

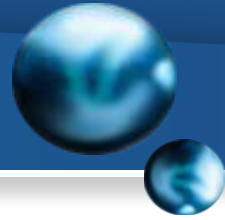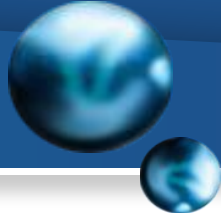# Your Technology Partner in Africa

MidWex

- Technology and Consultancy company

- Offices in Ghana and UAE

- Strategic alliances with industry leaders

- High level up-to-date offering
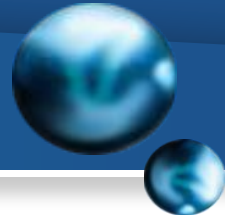
- Deep-set commitment to our clients

Main Solutions

QOE of OTTs
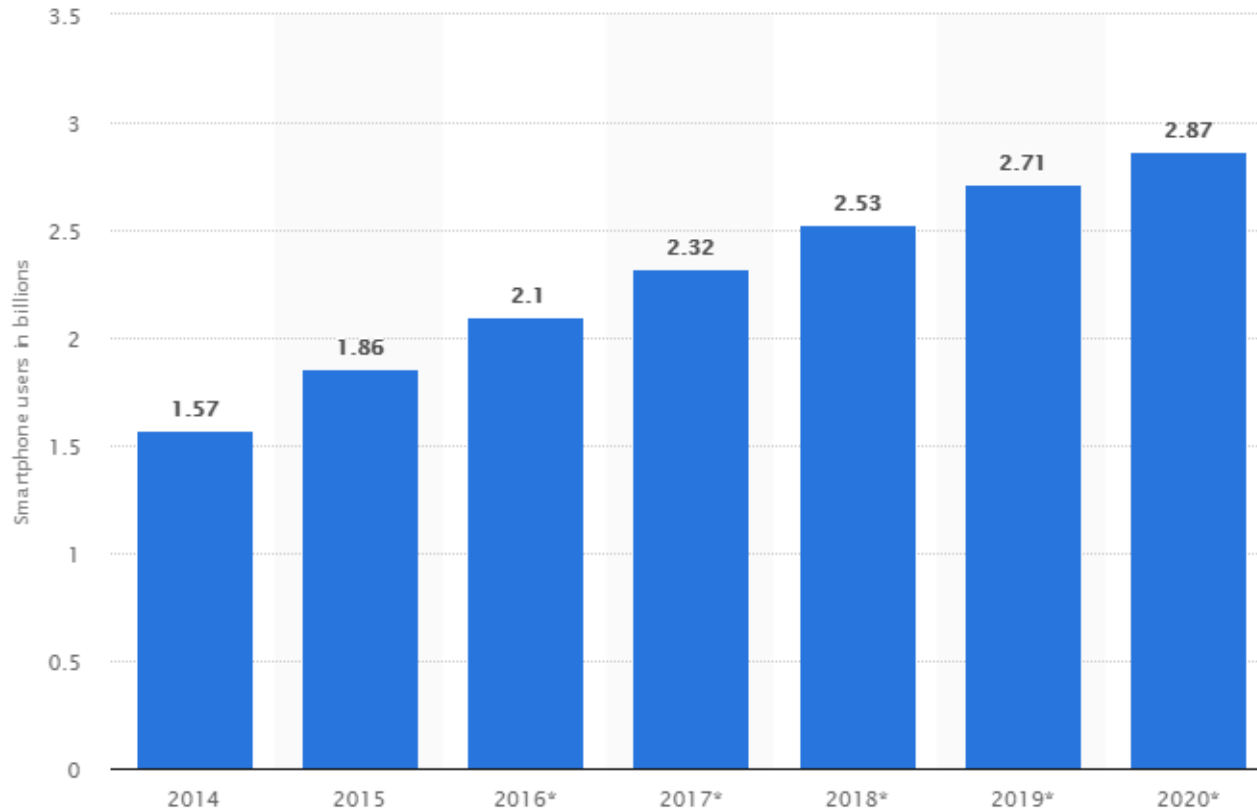
- Introduction

- Traditional QOS vs QOE Testing

- OTT and Social Media

- Summary

Introduction

More and more smartphones

- Number of smartphone users worldwide from 2014 to 2020 (in billions):

Data visualized by +tableau

© Statista 2018

Social Medial users growth

- 11 new people start using social media every second

- YouTube service takes up a major share of the internet traffic worldwide.

- Facebook has over one billion active users, more than half using Facebook on a mobile device

- Twitter has been ranked as the third most used social network

- Dropbox saves one million files every 15 minutes!

Source: https://www.smartinsights.com
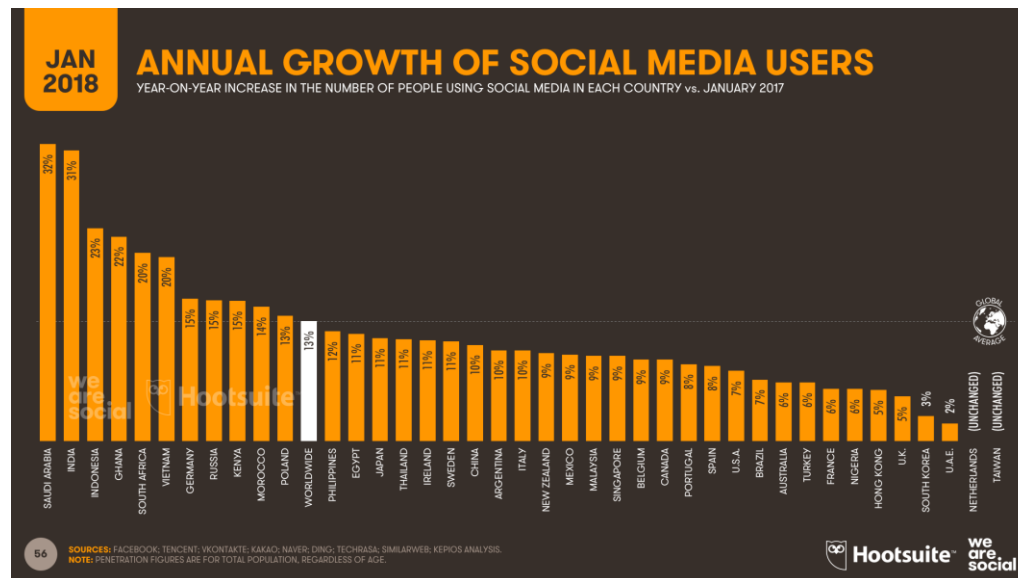
Importance of social media testing
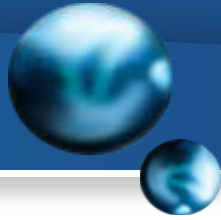
Availability and quality of the social media applications

is key interest to the provider of mobile internet access
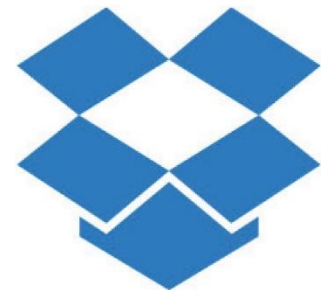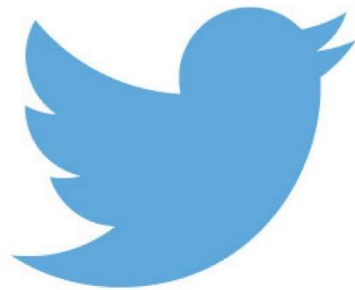
Traditional QOS vs QOE Testing

Traditional QOS Testing

Traditional Quality Network testing metrics are usually based on network related parameters:

Voice	Video	Messaging	Data
PESQ POLQA	PEVQ-S	SMS MMS	Throughput(s) Ping HTTP(S) Etc ...

This method is widely used for optimization and allow engineers users to identify technical

issues and bottlenecks in the network.
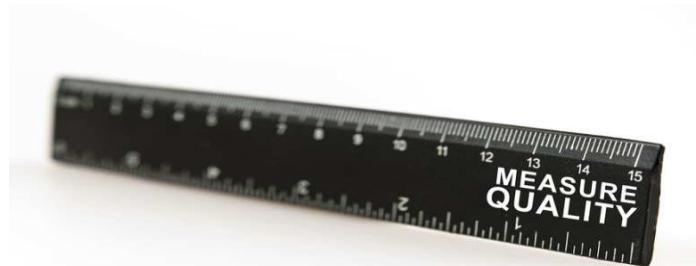
QOE Testing

- QoE (Quality of Experience) aims at getting an end-to-end view based considering human-like perception.

- It goes **beyond traditional** metrics and rather focuses on end-customer interaction with the device and the applications.

- QoE Testing offers real user-orientated optimization of networks.
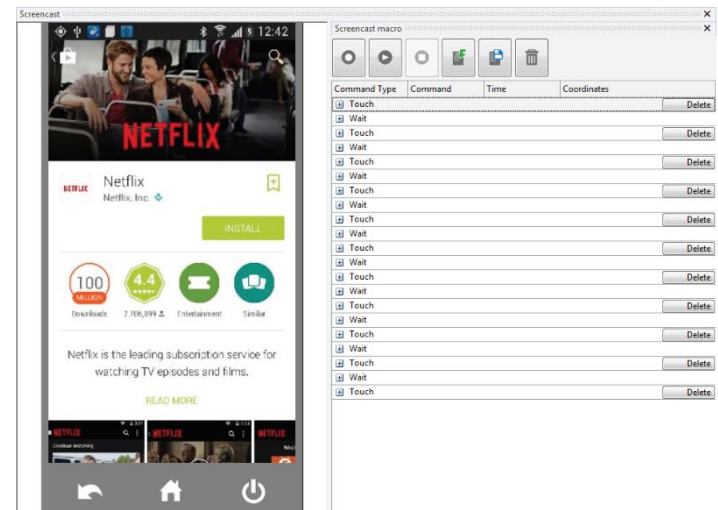
Challenges with Social Media testing

OTTs and Social Media services are different from standard Data connections:

- IP traffic between client device and service is usually encrypted

- The server hosting the service belongs to a third party and cannot be controlled by the network operator or the company conducting the measurement campaign.

- Apps are consumer software with certain instabilities and are subject to frequent updates.

- The services are subject to change and even with the same app version the network interaction may change suddenly due to server influences.

→ Throughputs, transfer and response times and other technical measures cannot be obtained with confidence and do not reflect the network performance.

QOS Testing Paradox (Example)
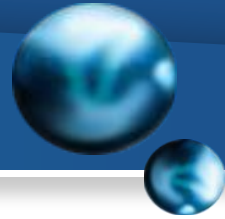
Benchmarking in Turkey using Nemo Invex II

Operator 3 has higher bitrate. But Operator 1, offer faster streaming with YouTube

Bitrate (Mbps) — operator 1, operator 2, operator 3. Source: Midwex

Streaming transfer success rate (%) — operator 1, operator 2, operator 3. Source: Midwex
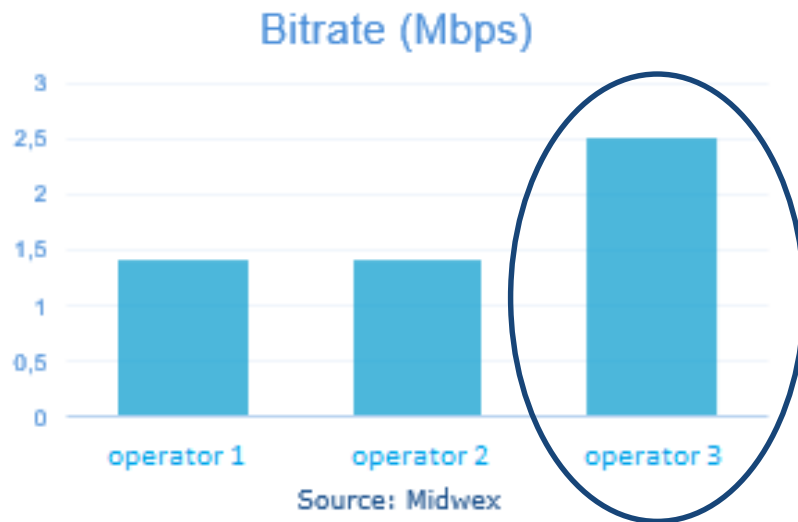
➔ Benchmarking Throughputs with traditional testing is not enough to reflect the real performance of Youtube perceived by end customers!!

Challenges with OTT Benchmarking

Number of tested scenarios is increasing

- Number of tested application/service, operator, and network technology combinations is growing

➔ Full matrix of scenarios should be tested with one drive to minimizes the number of time consuming test rounds

Amount and complexity of data a is increasing

- Scalable post-processing solution is needed to keep up with the data volumes

- Automated, customizable reporting to efficiently analyse the increasing number of test cases

QOS Testing Paradox - Example 2

Downlink Bitrate (Mbit/s)

	EMT	Elisa	Tele2
	43.9	24.3	20.3
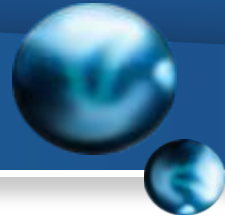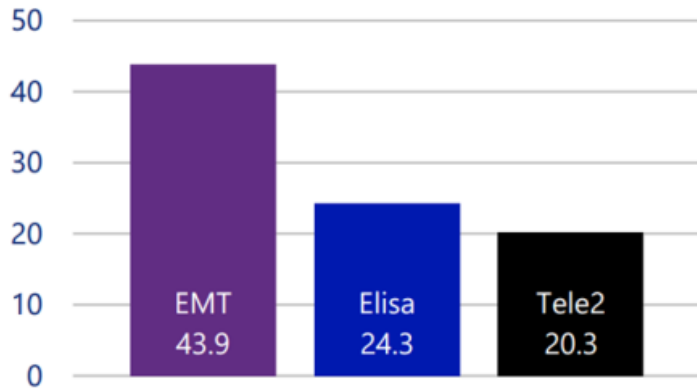
- A high data rate is not sufficient alone to guarantee smooth experience for smartphone applications.

- In order to capture the true smartphone application experience, from end user perspective, the tests must be performed in application level rather than only network level

- Data must be collected from both the application/service level and the NW level to capture the customer experience, NW performance, and the correlation between

WWW — 24%, 33%, 42%
FaceBook — 15%, 45%, 40%
Twitter — 22%, 41%, 37%
Instagram — 56%, 22%, 22%
YouTube — 28%, 42%, 30%
Dropbox — 33%, 48%, 19%
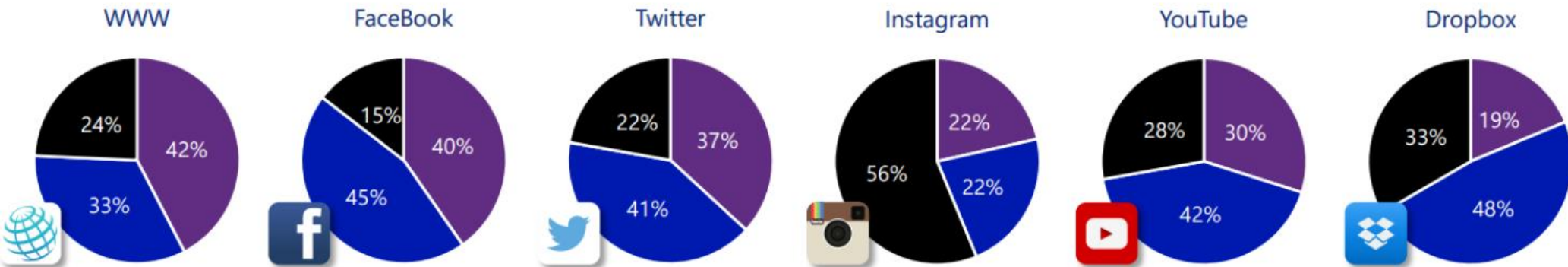
QOE Testing - How?
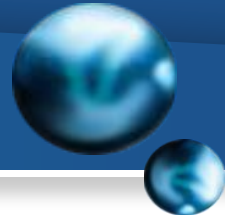
How to assess quality from the end user perception for OTT?

Service Accessibility	Measure whether the access to service account and access token is successful or not after the user request
Service Retainability	Measure the ability of the different operations to be completed
Service Integrity	Measure the delayed time experience

To Assess Quality for OTT services, we should measure from the Customer Experience side.

QOE Testing - On Device

It is necessary to measure the real customer experience directly in the UE, and not from network perspective

With NMR feature, we can perform on-device measurements where all services and data protocols are running in a smartphone (instead of computer or server):

- Performs measurements from real end-user perspective
- Provide insights to the real QoE
- Uses the real IMS/VoLTE protocols, settings and OTT applications of the UE in the very same way as the real consumer would use those
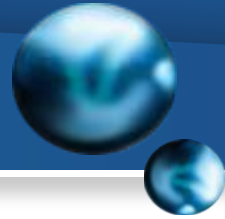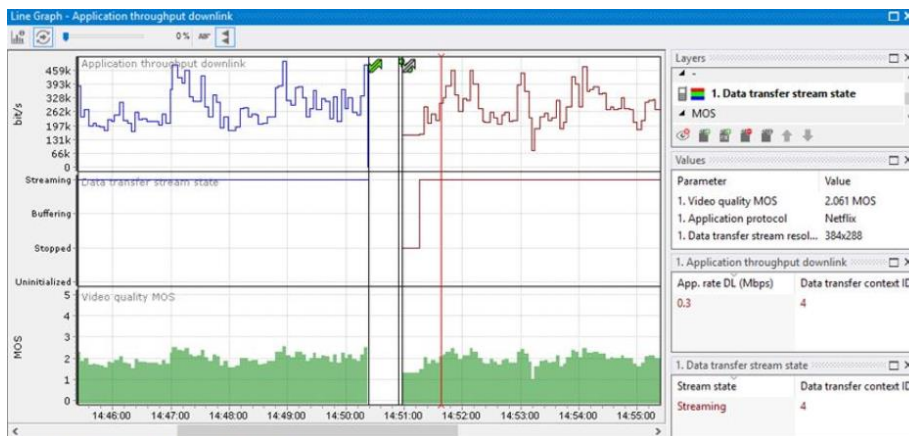- Cost-effective and simplified, preventing user errors as additional HW for audio MOS and other measurements is not needed
- Future proof solution

Netflix PEVQ-S Parameters	□ ×
Parameter	1. Qualcomm
Data transfer stream playback position	464000 ms
Data transfer stream resolution	384x288
Data transfer stream state	Streaming
Data transfer stream total duration	600000 ms
Netflix PEVQ-S buffering count	2
Netflix PEVQ-S completion success rate	100 %
Netflix PEVQ-S initial buffering delay	51 ms
Netflix PEVQ-S setup delay	17861 ms
Netflix PEVQ-S setup success	2
Netflix PEVQ-S setup success rate	100 %
Netflix PEVQ-S transfer attempts	2
Netflix PEVQ-S transfer failures	n/a
Netflix PEVQ-S transfer success	1
Netflix PEVQ-S transfer success rate	100 %
Netflix PEVQ-S transfer time	621650 ms
Netflix PEVQ-S video access time	17759 ms
Video frame rate	24.00 frame
Video quality MOS	1.539 MOS
Video quality average bitrate DL	171000 bit/s
Video quality buffer fill	2353.00
Video quality timestamp	14:58:55.268

OTT and Social Media

YouTube Testing

What to measure?

- The down-stream scenario, the probability to access and see a video and the quality of the video are the key KPIs

- If the video content is compressed during the transfer by a proxy hence the content arriving at the subscriber is not identical

- Best way to measure and verify the QoE is the competitive side by side benchmarking

2018 © Midwex
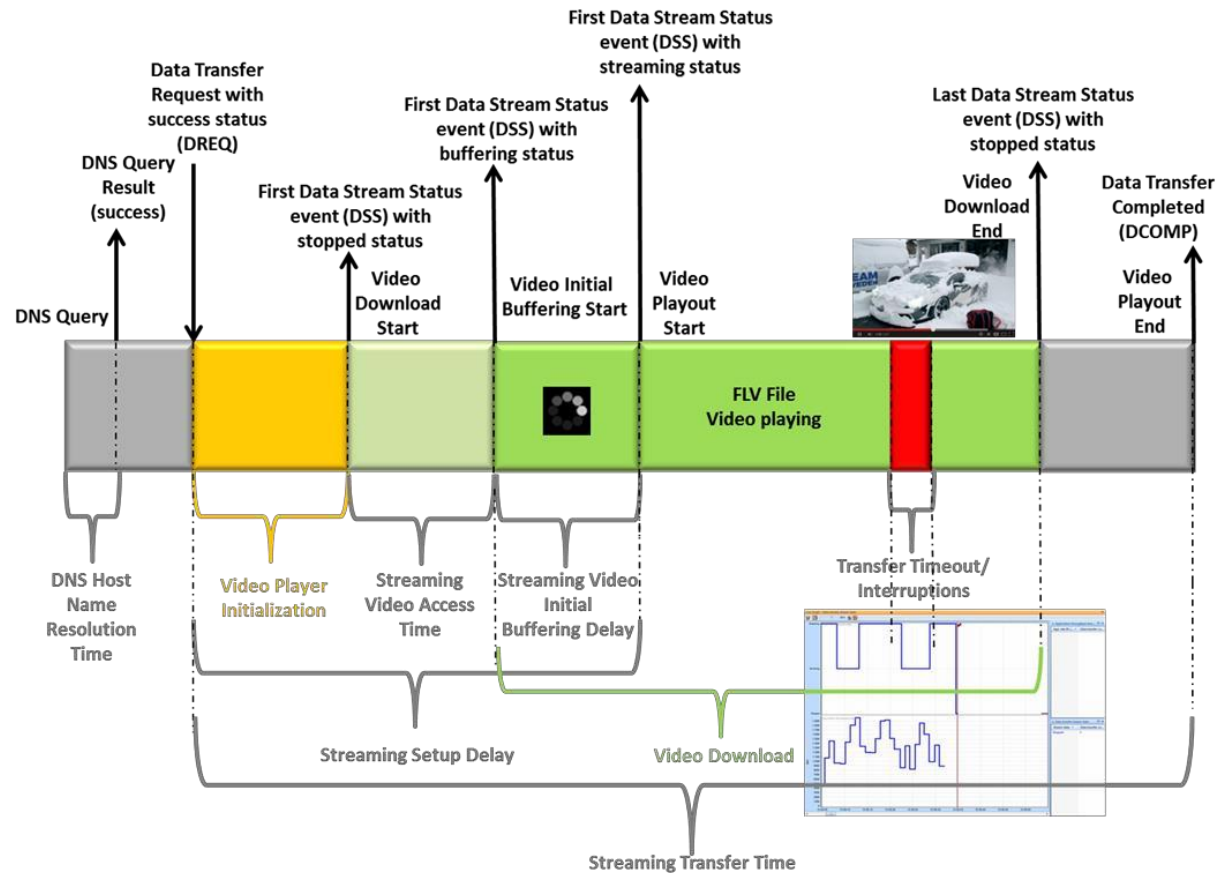
YouTube Testing

Service Accessibility:
- DNS host name resolution time (ms)
- Streaming video service access time
- Streaming setup delay
- Streaming transfer attempts
- Streaming setup success
- Streaming setup success rate

Service Retainability
- Streaming buffering count
- Streaming transfer failures
- Streaming transfer success
- Streaming transfer success rate

Service Integrity
- Streaming Transfer Time (ms)
- Streaming completion success rate
- Application data throughput DL

Statistics- Youtube

Parameter	1. SGS Note4_A	2. SGS Note4_B
Data transfer stream bandwidth	0	0
Data transfer stream playback position	55000	0
Data transfer stream resolution	1920x1080	1920x1080
Data transfer stream state	Buffering	Streaming
Data transfer stream total duration	60000	60000
Streaming buffering count	10	12
Streaming completion success rate	100	100
Streaming setup delay	14449	4780
Streaming setup success	5	7
Streaming setup success rate	100	100
Streaming transfer attempts	5	7
Streaming transfer failures	n/a	n/a
Streaming transfer success	4	6
Streaming transfer success rate	100	100
Streaming transfer time	156532	131386
Streaming video access time	12103	2386
Streaming video initial buffering delay	2146	2195

NETFLIX Testing

What to measure?

- Check video MOS and video resolution
- Check Service Accessibility, Retainability and Integrity
- Check network resource allocation and bandwidth usage for Netflix service

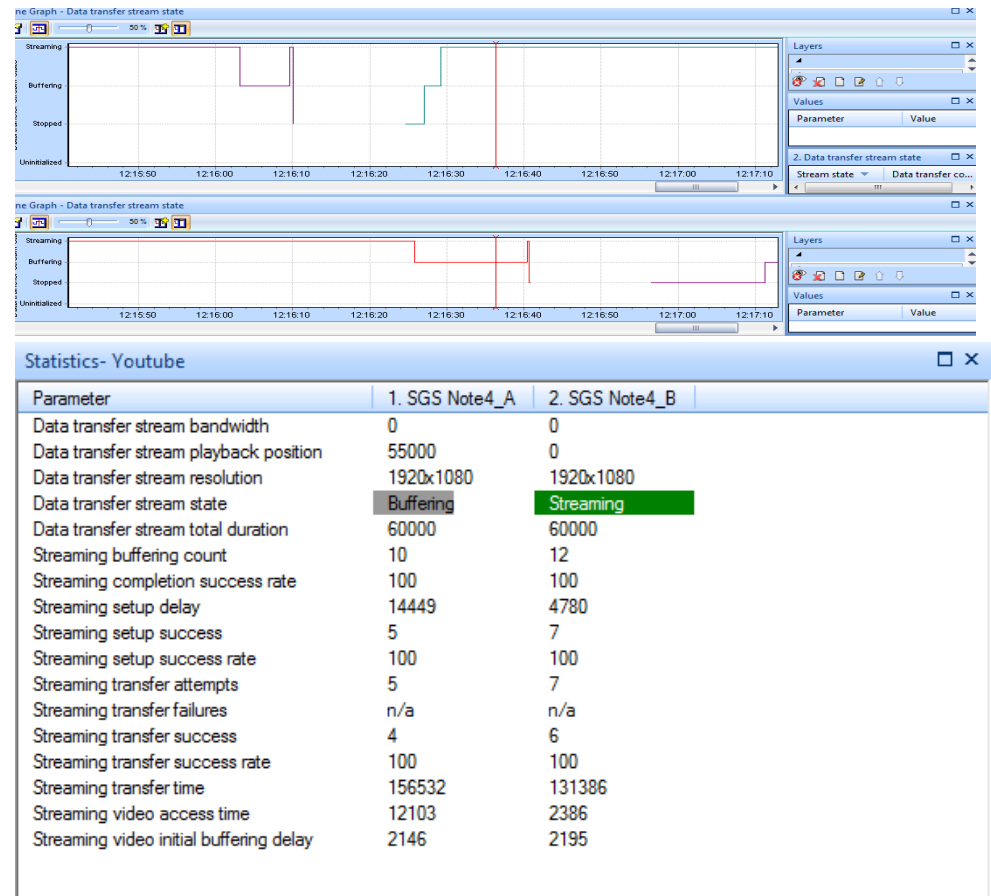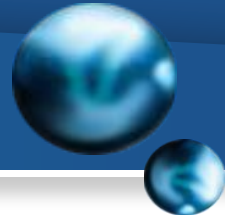| Netflix PEVQ-S Parameters	
Parameter	1. Qualcomm
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Facebook & Instagram & Whatsapp

What to measure?

Measure & Benchmark real user experience from different operators:

- Service Accessibility
- Service Retainability
- Service Integrity

WhatsApp Call statistics
1. call attempt failures
2. call attempt failure (system failure)
3. call attempt success rate (%)
4. call attempts
5. call connects
6. call disconnects (dropped)
7. call disconnects (normal)
8. call duration (ms)
9. call setup time
10. call success rate (%)
11. calls received

Service Accessibility
- DNS host name resolution time (ms)
- Service access time
- Facebook/Instagram connection attempts
- Facebook/Instagram connection success
- Facebook/Instagram connection failures
- Facebook/Instagram connection attempt success rate
- Facebook/Instagram connection success rate
- Facebook/Instagram connection time

Service Retainability
- Facebook/Instagram disconnects (dropped)
- Facebook/Instagram disconnects (normal)
- Facebook/Instagram transfer attempts
- Facebook/Instagram transfer failures
- Facebook/Instagram transfer success

Service Integrity
- Facebook/Instagram transfer success rate
- Facebook/Instagram transfer time
- Application data throughput DL/ UL

Summary

Summary
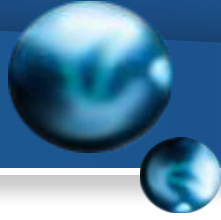
- The number of people using social media has grown exponentially.

- Mobile Users predominantly use and care about their experience with OTTs.

- Traditional Data Testing is no longer enough to measure QOS and QOE.

- It is mandatory to make on-device testing to measure the real customer experience.

- To assess the Quality of Service for OTTs, we should focus on the Customer Experience, i.e. Measuring Accessibility, Retainability & Integrity.

- HOWEVER: Traditional Data Testing cannot be completely neglected

  → Highly recommended to combine both methods

PS: There are other non-technical aspects which will come into play, such as regulatory framework of OTTs, impact of voice over OTTs on operators' revenue, etc.…

For more information please contact us on: <u>sales@midwex.com</u>

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Thanks