



QoS and Evaluation of QoE Monitoring

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Agenda

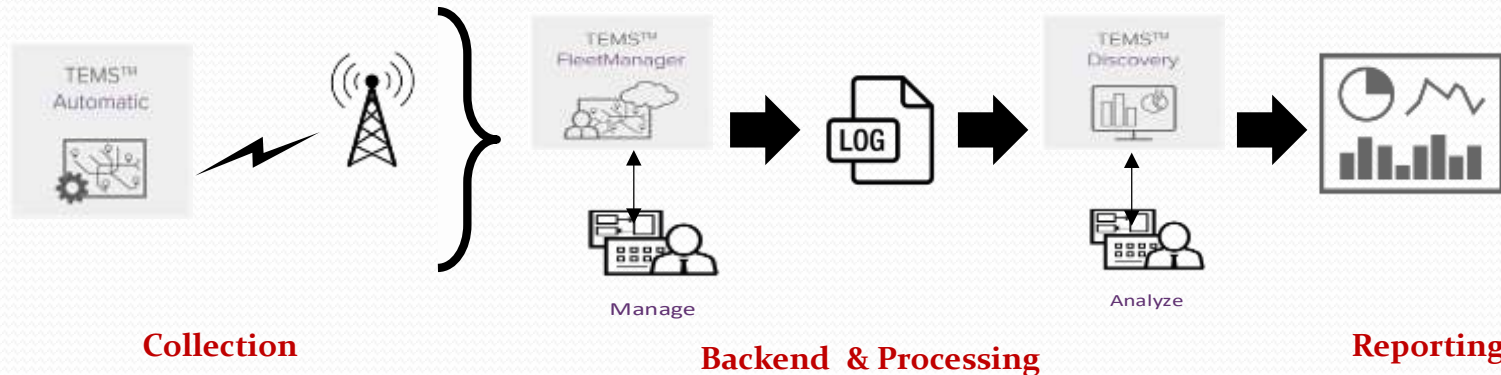
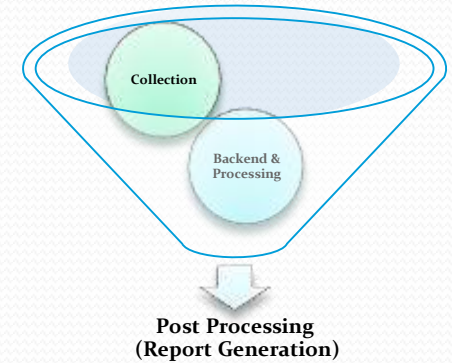
- QoS and QoE Definitions
- Mobile QoS Monitoring
- Mobile QoS KPIs
- QoE Model & Architecture
- Measuring QoE & Scoring
- QoE Monitoring
- QoE vs QoS
- Why QoE matters than QoS?

➤ QoS and QoE Definitions

- ❑ QoS : is the measurement of the overall performance of a service done by the network (e.g., jitter, delay, packet loss,)
- ❑ QoE : is a measure of the delight or annoyance of a customer's experiences with a service/application (e.g., web browsing, voice quality, video quality, TV broadcast,.....).

➤ Mobile QoS Monitoring (ascom's TEMS Solution)

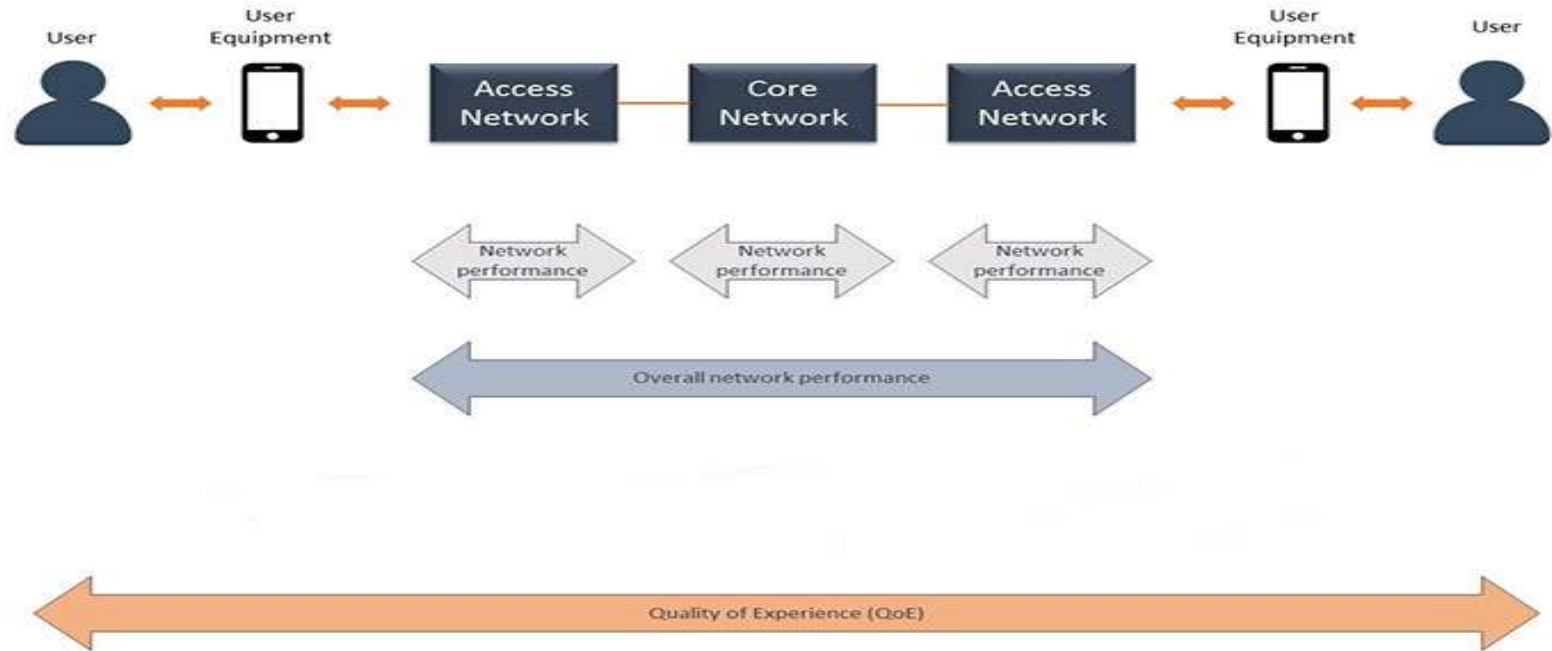
- We simulate actual subscribers using mobile services in all major cities in Egypt to evaluate service levels as perceived by real customers.
- To get the final assessment for each network we have to go through three phases:



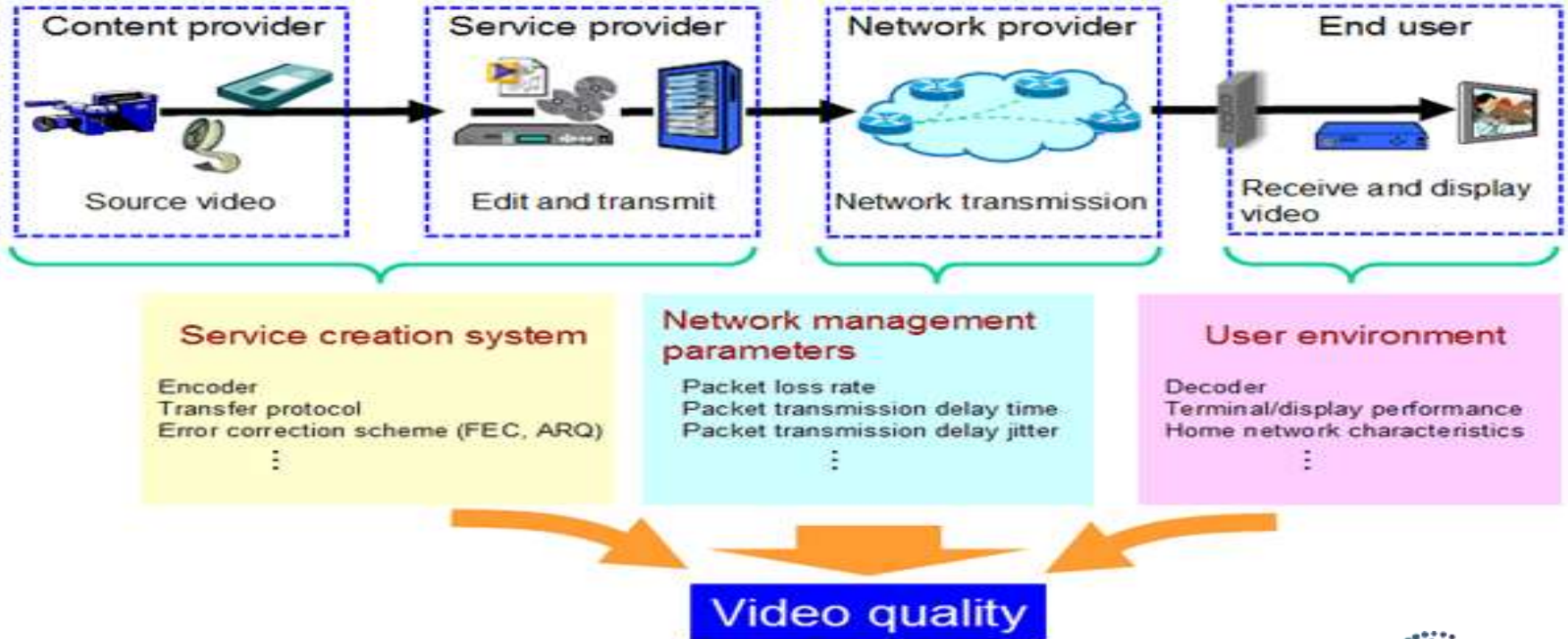
➤ Mobile QoS KPIs

Mobile Voice Networks		Mobile Data Networks	
Call block rate	2 %	Delay/Latency	150 msec.
Call drop rate	2 %	Jitter	1 msec.
Voice quality	MOS=2.8	Packet loss	1 %
Bad voice quality rate	10 %		

➤ QoE-architecture for voice



➤ QoE-architecture for data (for example video application)



➤ QoE Layers-model



End user



Application Layer

Environment Layer

Network Layer

Content Layer

➤ Measuring QoE

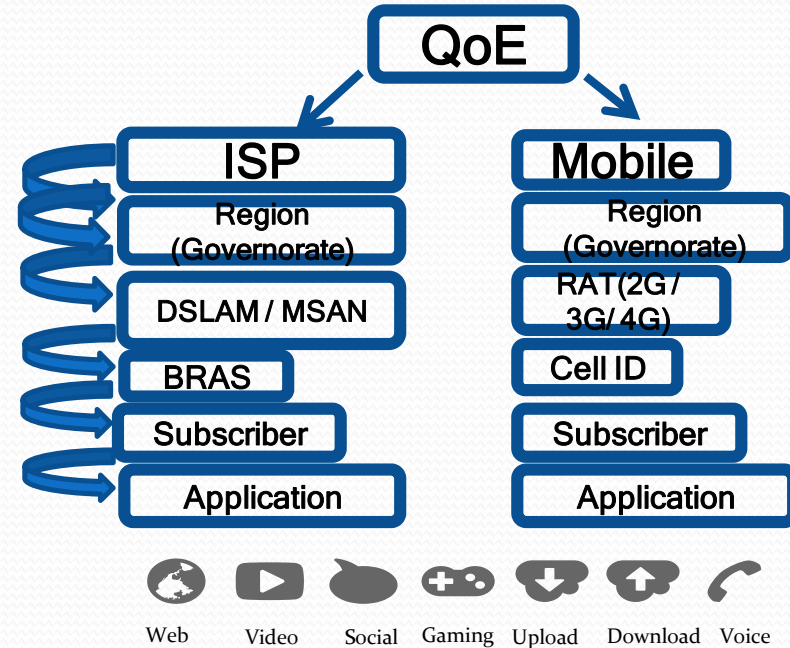
- ❑ QoE measured by Mean Opinion Score (MOS) (ITU-T P.800)
- ❑ Subjective Quality measurement from end user point of view (end-to-end).
- ❑ We can measure QoE by:
 - 1) manually by satisfaction's surveys
 - 2) or automatically by monitoring system using h/w and s/w with built-in multi-methodological approach or algorithm.
- ❑ True MOS values can only be derived from subjective tests.
- ❑ MOS can be determined from objective test as an estimated reference using an algorithm to predict the results of a subjective test.

➤ QoE scoring

User's Satisfaction	Quality	MOS (User's score)
Very satisfying	Excellent	5
Satisfying	Good	4
Slightly annoying	Fair	3
Annoying	Poor	2
Very annoying	Bad	1
Extremely annoying	Very bad(Unusable)	0

➤ QoE Monitoring

- ❑ We monitor QoE at operator side by visiting and make auditing on its measurement tool and output reports.
- ❑ The measurement tool can measure QoE for any application.



➤ QoS vs QoE

	QoS	QoE
Focus	Network	Service/application
Perspective	System's	User's
Scope	Typically telecom services	Broader domain(end-to-end)
Test type	Objective	Subjective
KPIs	Jitter, delay, packet loss, throughput, utilization....	web browsing, TV broadcast, voice quality, video quality....
Methods	Empirical or simulated measurements (Technology-oriented)	Multi-methodological approach
Outputs/Results	ITU-T/ETSI/IEEE Stander values	MOS from 0 to 5

➤ Why QoE matters than QoS?

- ❑ QoE is bigger than QoS (QoS is a part of QoE).
- ❑ It is end-to-end quality monitoring (broader domain).
- ❑ User's satisfaction priority .
- ❑ User can understand it.
- ❑ Always there are new QoEs due to new applications/services.
(Applications gross more fast than technologies).
- ❑ Multimedia-oriented (video-data-voice)
- ❑ Application-oriented (HTTP, VoLTE, VOIP, IPTV, Video Steaming, YouTube, Facebook, Netflix,)



Thank You