

LTE Network QoS Optimization

Evolution of Mobile Networks in Europe

Kimmo Aaltonen
Wireless Development Manager

November 2013

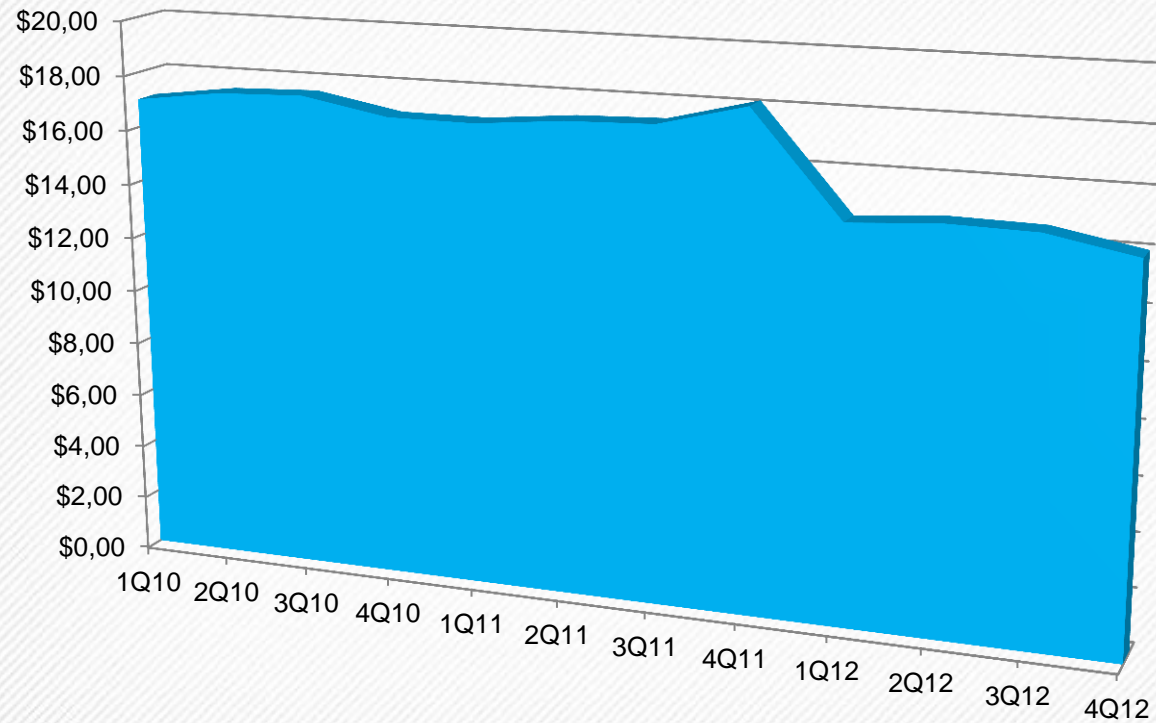
EXFO



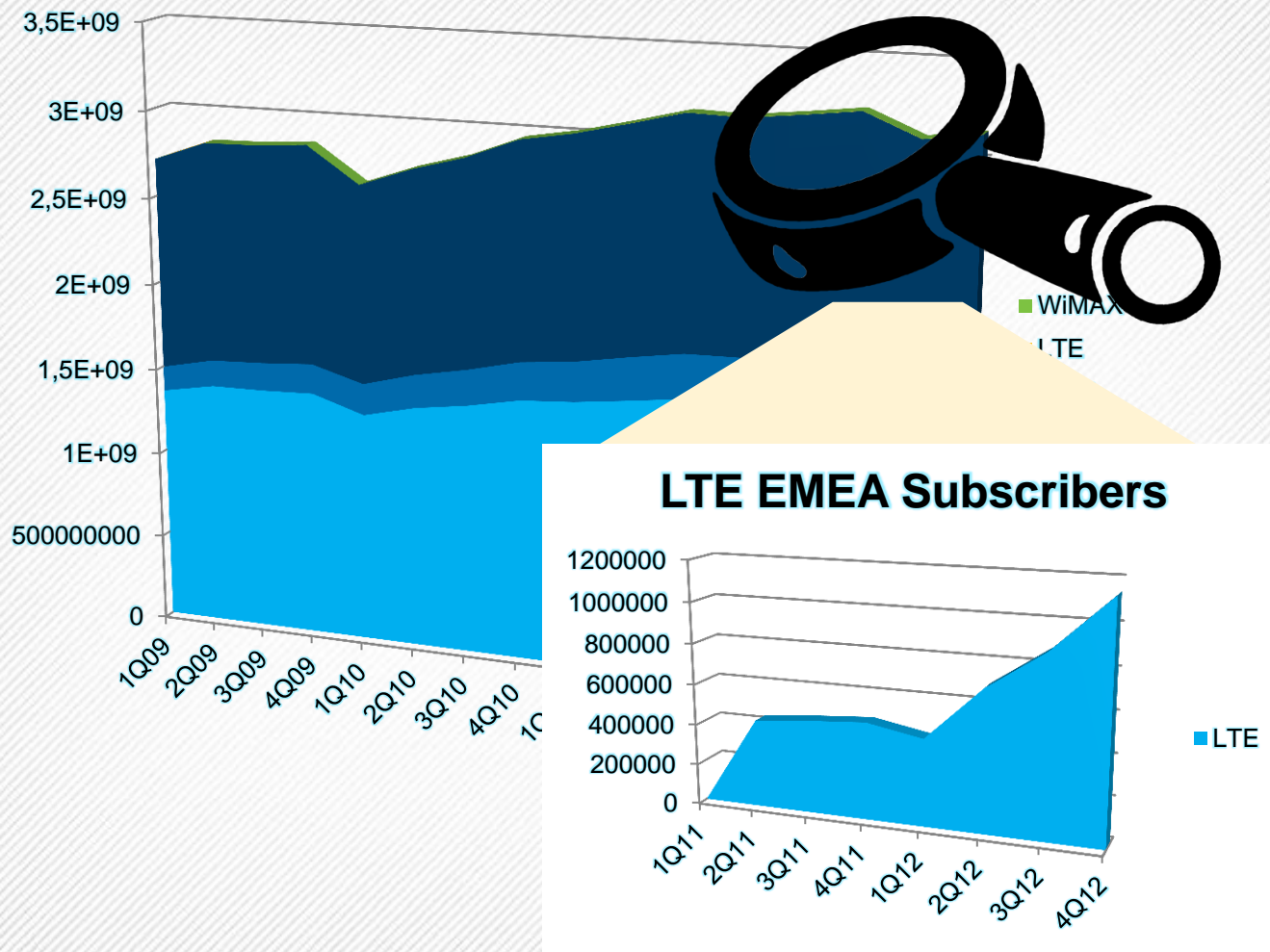
Can you afford to be
unsure about your
network performance?

Mobile Subscriber ARPU Keeps Going Down

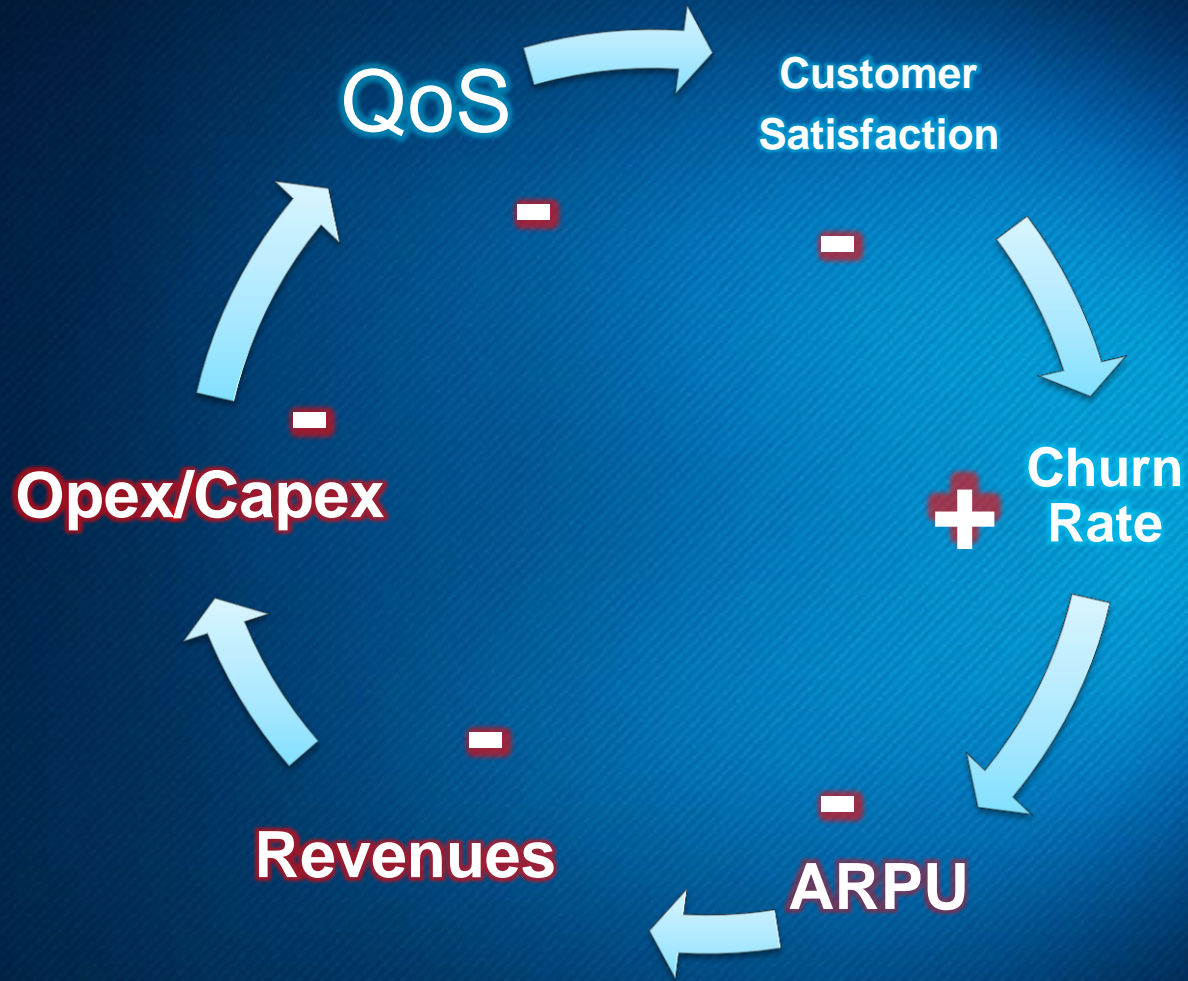
EMEA incumbents avrg Arpu



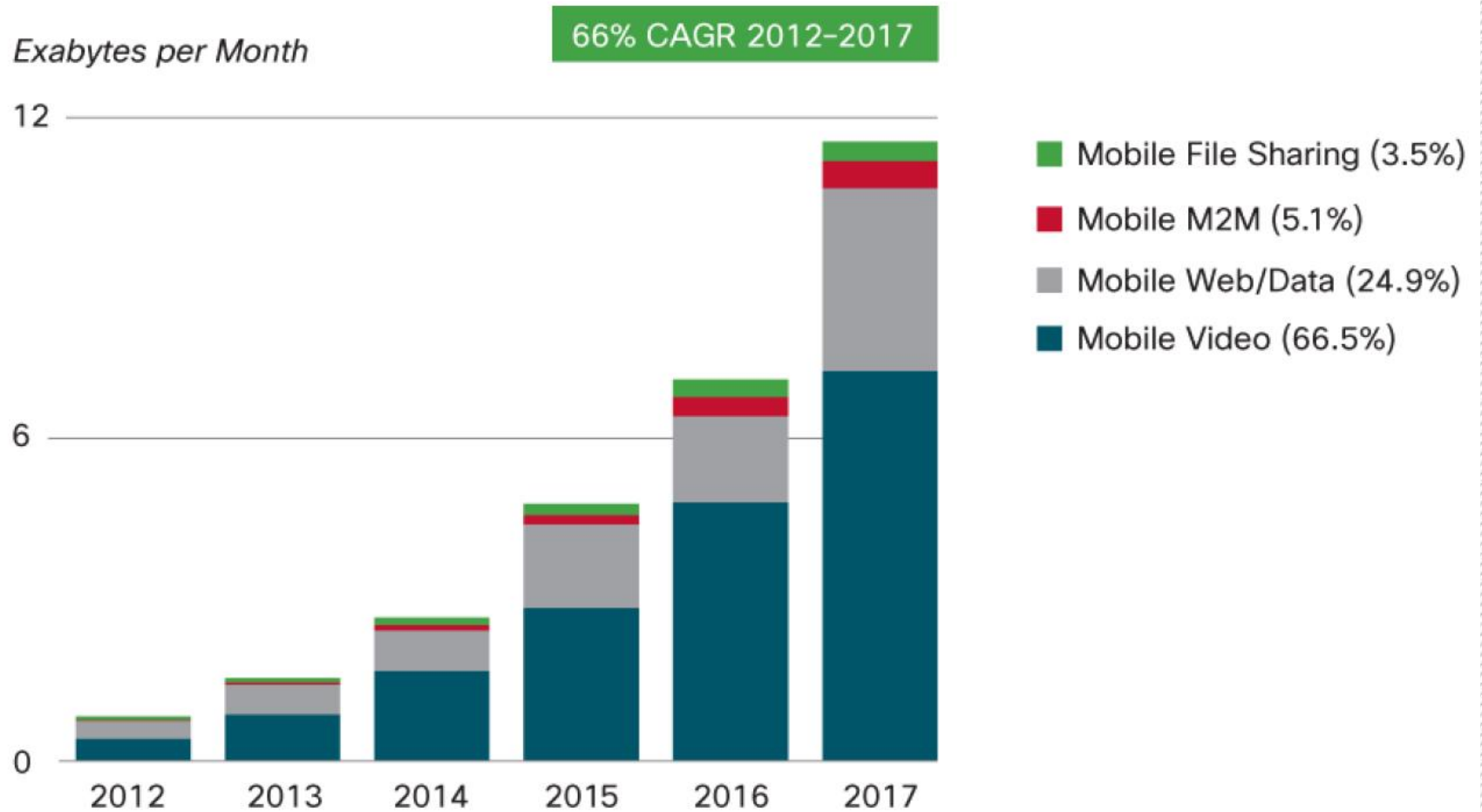
... But on the Subscribers Side



Actual Market Pressure in Telecoms Industry



Mobile Video Will Generate Over 66 % of Mobile Data Traffic by 2017

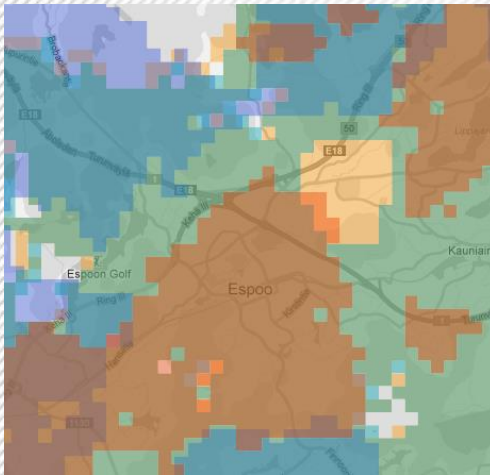


Figures in legend refer to traffic share in 2017.

Source: Cisco VNI Mobile Forecast, 2013

Mobile Throughput - Theory vs. Reality

Coverage Map of Mobile Operator in Helsinki Capital Area



GSM

EDGE

UMTS 900

UMTS 2100

UMTS Dual Carrier

LTE

Max 50 kbit/s

Max 200 kbit/s

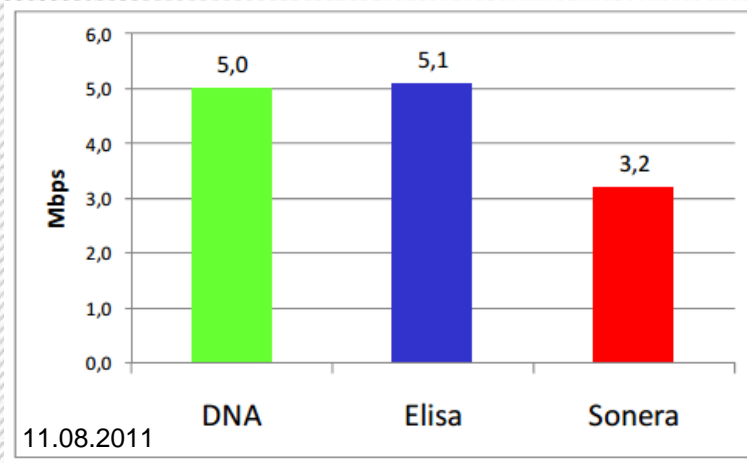
Max 21 Mbit/s

Max 21 Mbit/s

Max 42 Mbit/s

Max 100 Mbit/s

Average Data Speed of 3G Mobiles in Helsinki Capital Area



11.08.2011

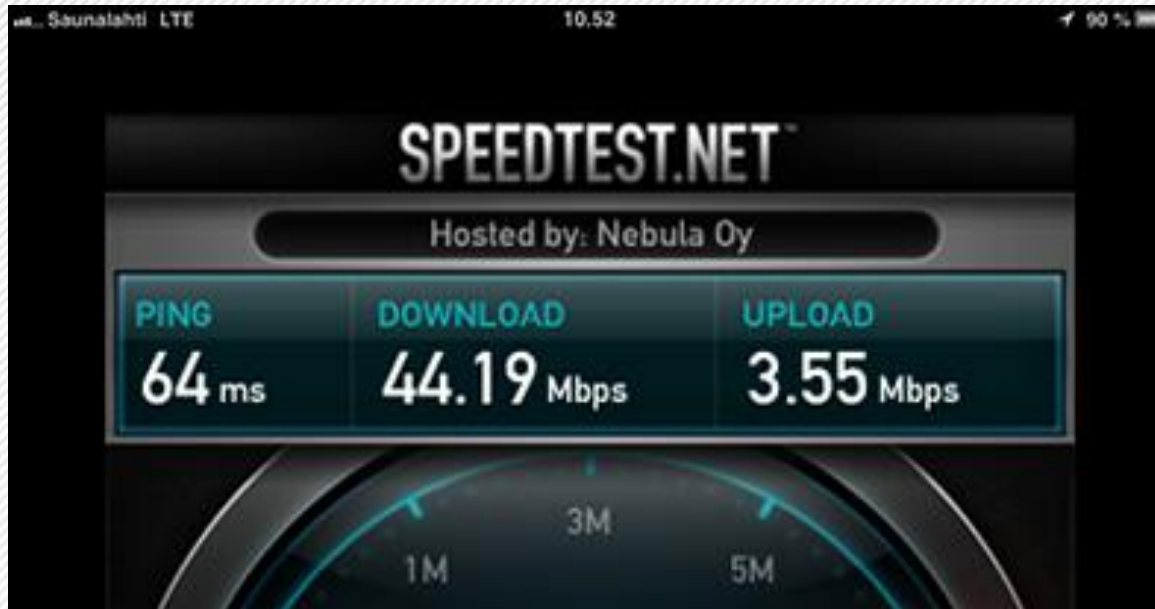


I didn't buy this!

I want my
money back!



LTE Throughput Tests in Downtown Helsinki



If somebody could please enlighten me what is status of these technologies in Helsinki, and when, if ever, are we getting those 100 Mbps speeds?

QoS Problems Lead to Lower ARPU and Revenues



[News](#) [Article](#) [Mobile Gallery](#) [List of countries](#) [Forum](#)

[mobile H](#) > [7-Day News](#) > [2011](#) > [Week 48](#) > [Telecom advertises slogan "O2 can not do"](#)

For news 30/11/2011 17:55

[« Previous](#) | [Next »](#)

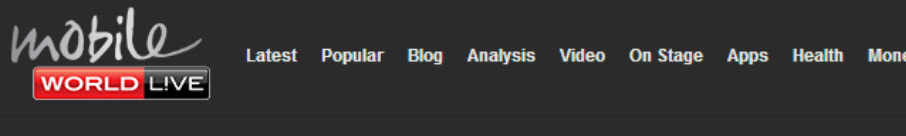
Telecom advertises slogan "O2 can not do"

[vorlesen](#) / [MP3-Download](#)

Entirely new strings pulls the German Telekom in its online advertising. It is aimed specifically at customers of the mobile competitor O2 and uses the current negative coverage of bottlenecks in the mobile network. The naughtiest subject is in blue, the color of O2 held companies. The slogan of the competitors: "O2 can not do" in which the operator collects the data of numerous in the past two weeks, re individual advertising - "for frustrated

with snappy slogans attacked the telecom competitors O2.

Liebe O2 Kunden, mal wieder keinen Empfang?
Für alle, die „O!“ denken, weil ihr Handy kein „TUMM!“ macht.
O₂ can't do.



[Home](#) > [Featured Content](#) > [Home Banner](#) > [Telefonica Germany hit by falling post-paid ARPU](#)

3rd May 2013

Telefonica Germany hit by falling post-paid ARPU

[f Like](#) 2 [in Share](#) 2 [+1](#) 1 [Tweet](#) 2

Declining ARPU from its post-paid customers helped squeeze revenues at Telefonica Germany's mobile operations (O2), which fell by 3.3 per cent to €733 million for the three months ended 31 March.

As contract customers have sought cheaper tariff deals in an increasingly competitive market, post-paid monthly ARPU slumped by 9.5 per cent, to €19.3, compared with Q1 2012.

Overall ARPU, which includes pre-paid customers, fell by 7.1 per cent, to €12.5.



[HOME](#) [MOBILE & WIRELESS](#) [INTERNET](#) : [GENERAL](#) : [FIXED](#) : [IT](#) : [BROADCAST](#)

MOBILE & WIRELESS

O2 Germany suffers mobile network disruption

Tuesday 16 April 2013 | 14:38 CET | News

O2 Germany is experiencing problems with its mobile network in several regions across the country, telstar.de reports. In a posting on its Facebook page, the company said that it was data services in carious areas, and that it was

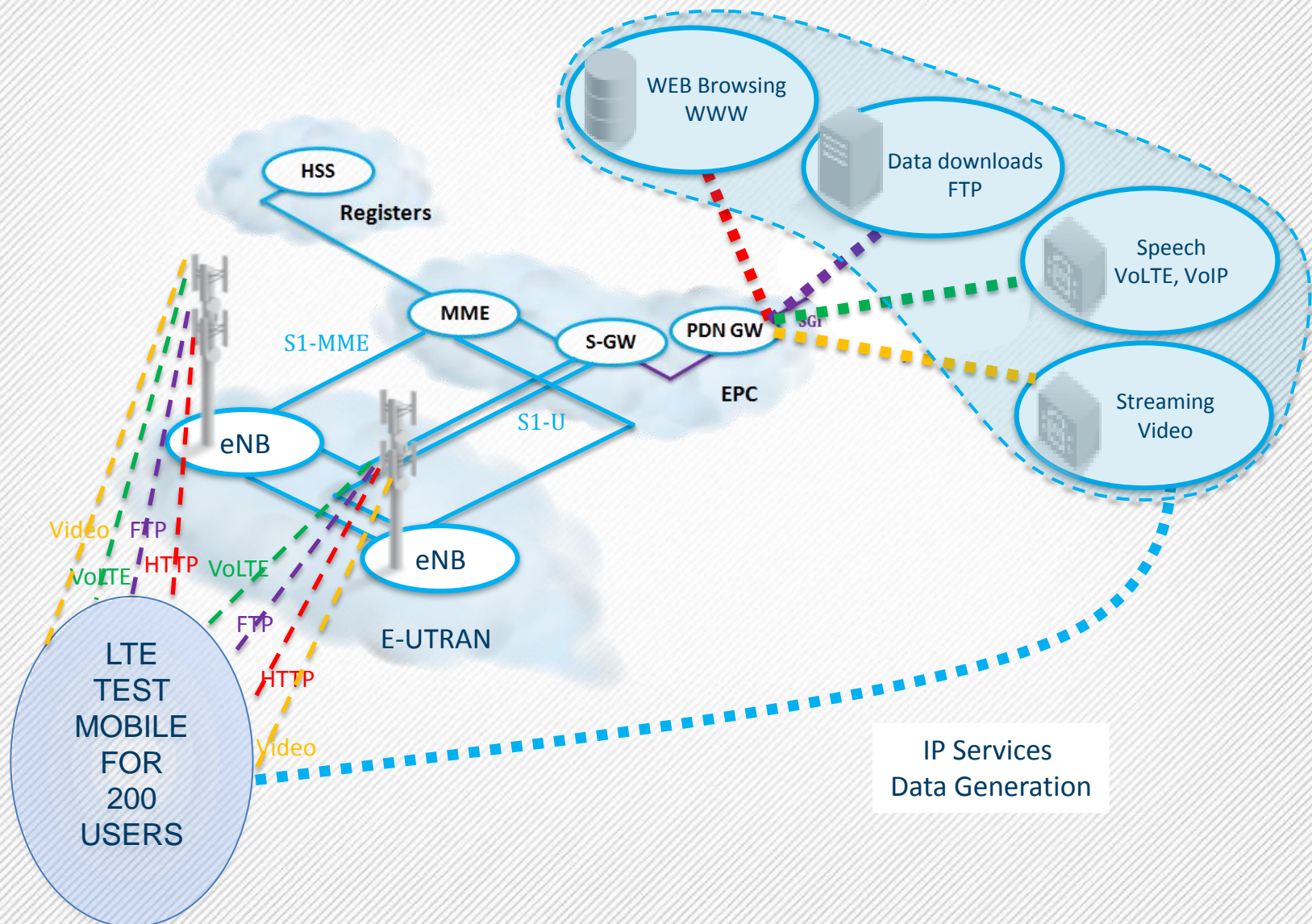
for about two years now...



by **Ken Wieland**

Ken has been part of the MWC Mobile World Daily editorial team for the last three years, and is now contributing regularly to Mobile World Live. He has been a telecoms journalist for over 15 years, which includes eight...[More](#)

Real E2E capacity test of LTE eNB (Base Station) with Simulators



Balanced Network Performance – Equal throughput for all Mobiles

60 UEs with FTP download
Stabile eNB Scheduler



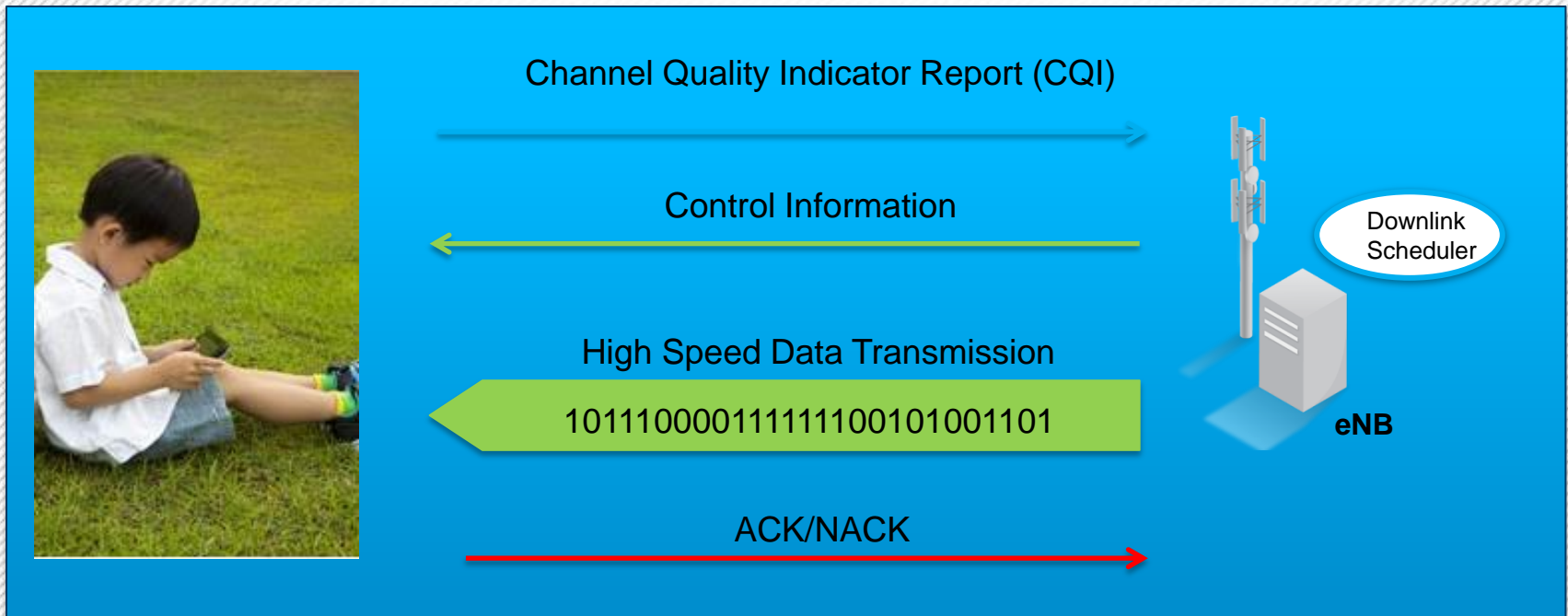
Unbalanced Network Performance – No More QoS for Mobiles

160 UEs with FTP download
Unstable eNB Scheduler

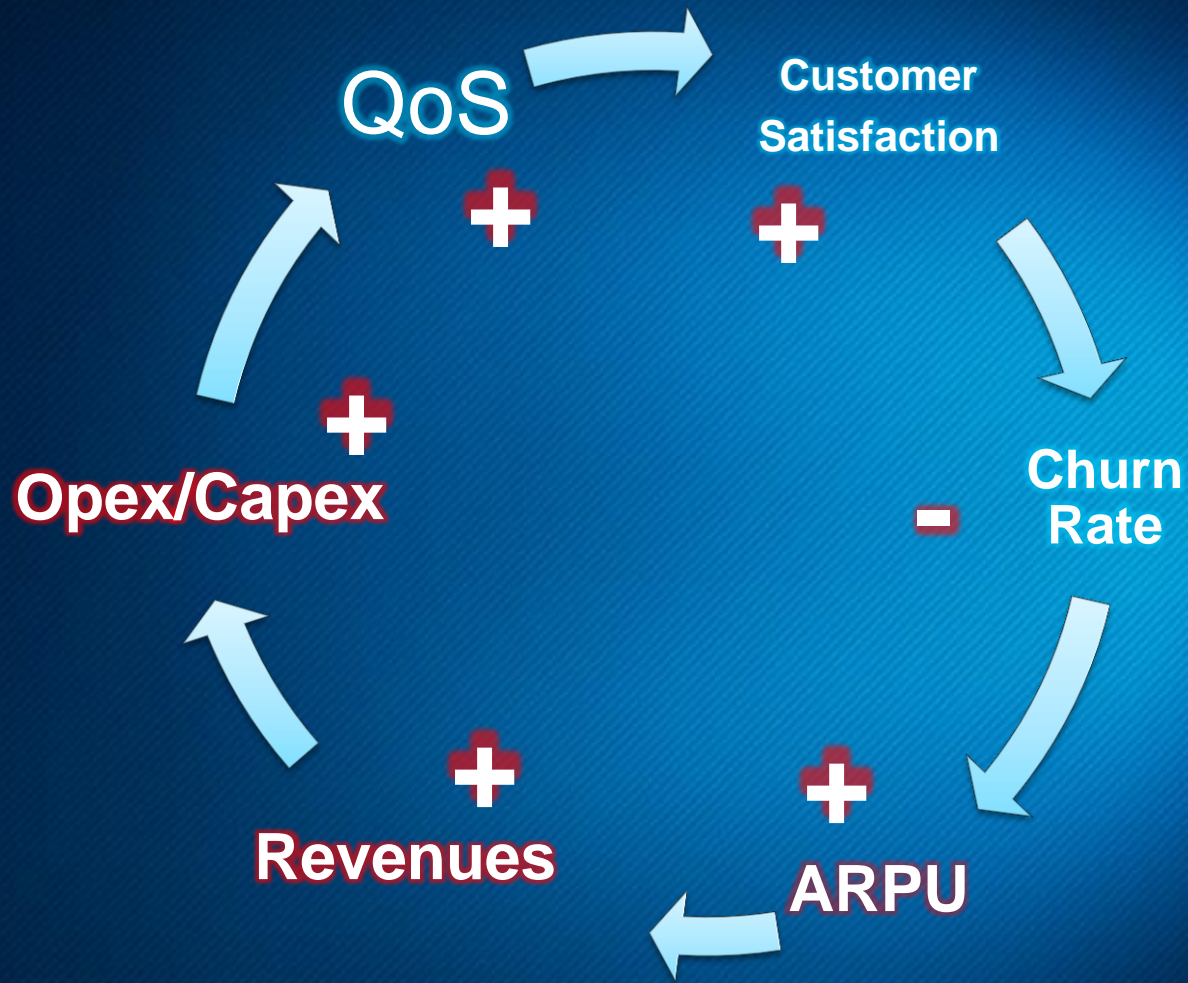


Bad eNB scheduler performance = Bad Mobile QoE

- Scheduling functionality is not a part of the 3GPP specifications
- Do you know how many mobiles subscribers your eNB scheduler can handle inside one millisecond?



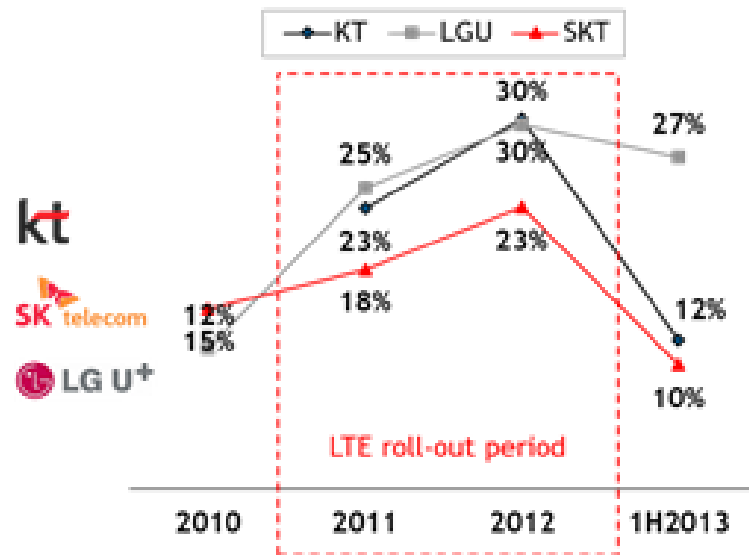
How to Increase ARPU and Revenue with LTE?



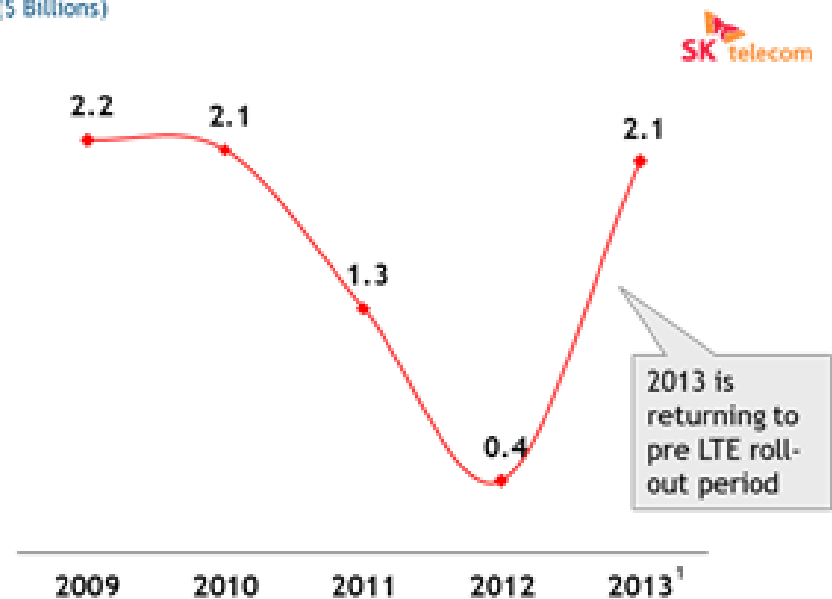
LTE Rollout Increases CAPEX – Focus Should Be on Smart Rollout

EXHIBIT 2: IMPACT OF LTE ROLL-OUT ON OPERATORS' FINANCIALS

CAPEX intensity
(CAPEX as % of revenues)



AFCF (EBITDA - CAPEX)
(\$ Billions)

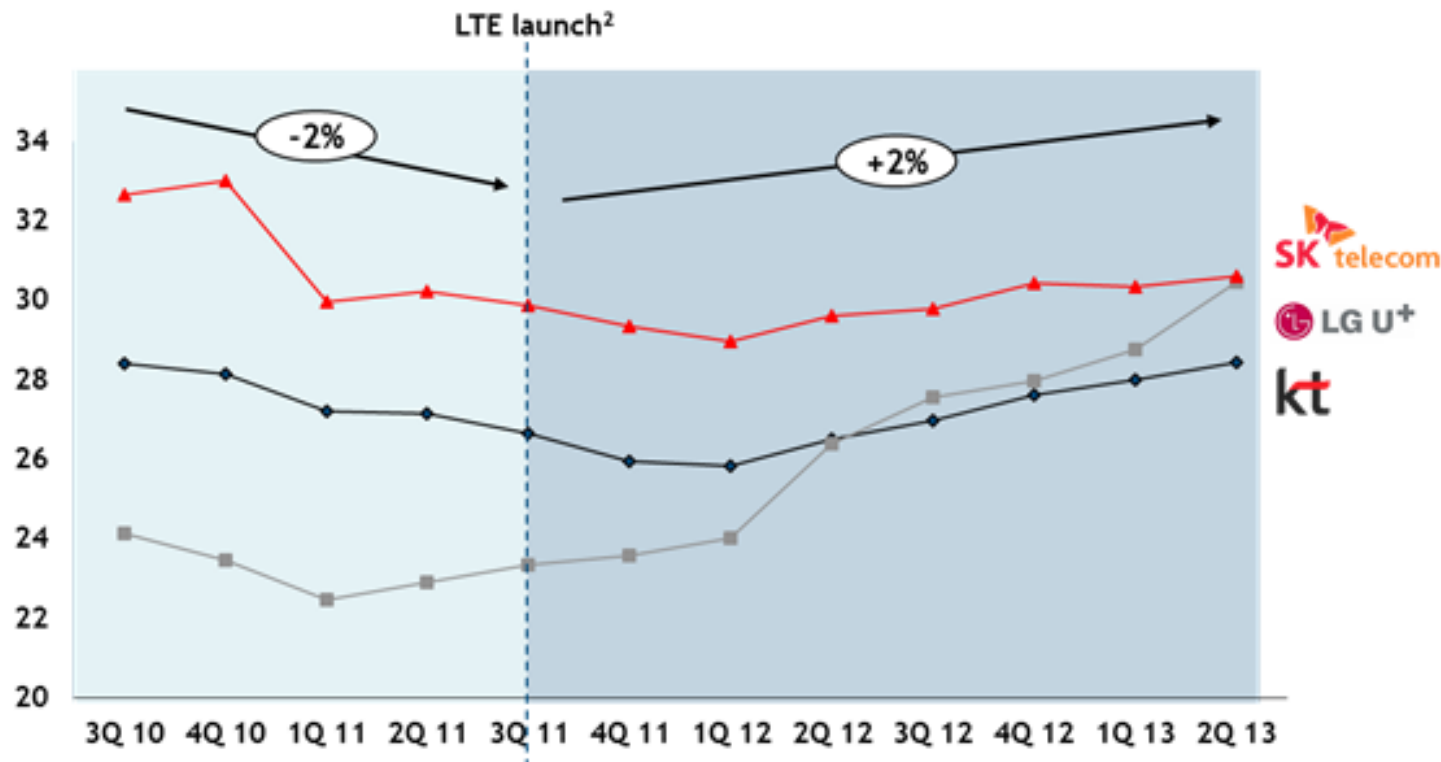


¹2013 AFCF annualized based on 1H2013 figures; Source: Operators annual reports; Delta Partners analysis

LTE launch increases ARPU

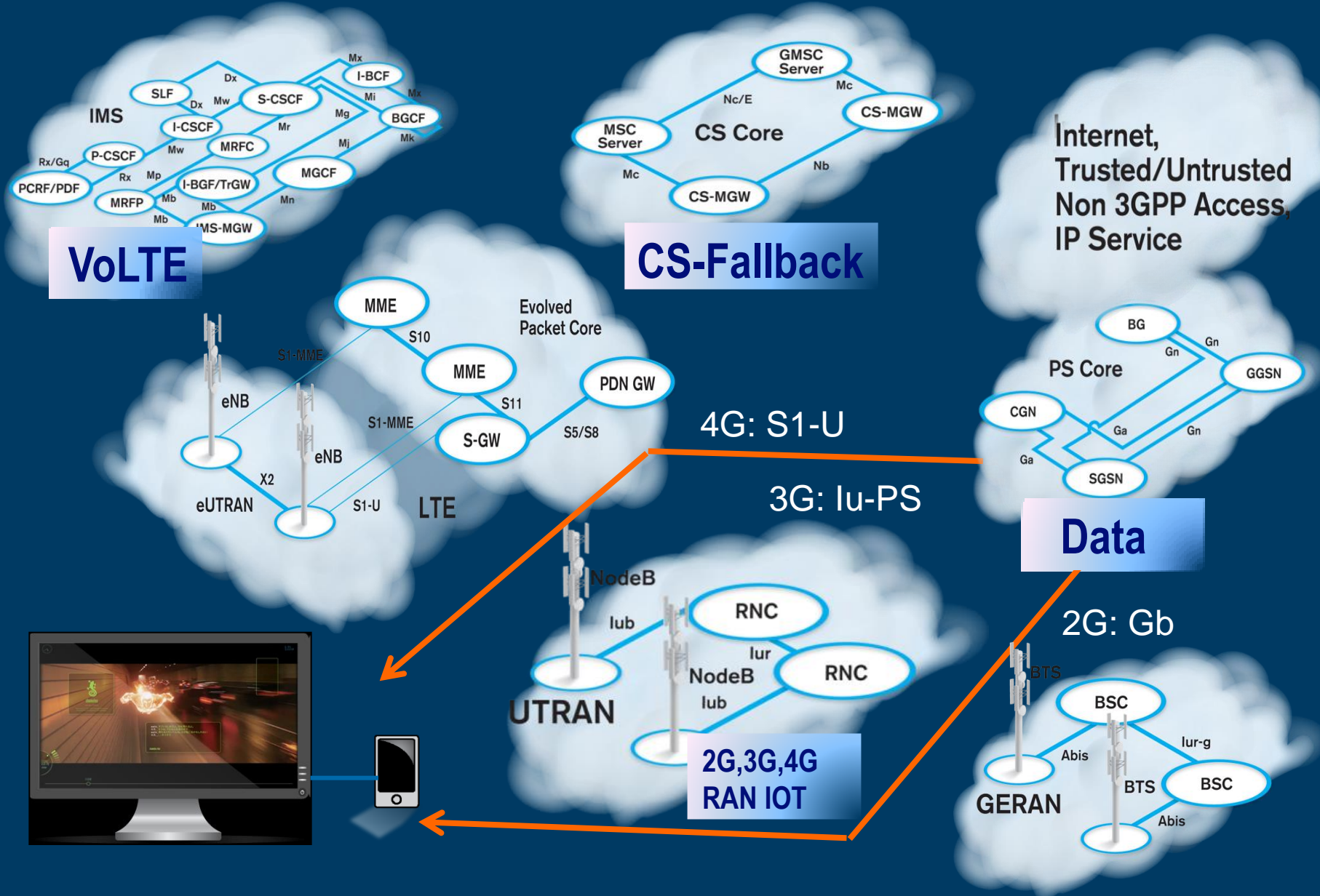
EXHIBIT 1: LTE UPLIFTING ARPU

ARPU evolution by player¹
(\$, CQGR)



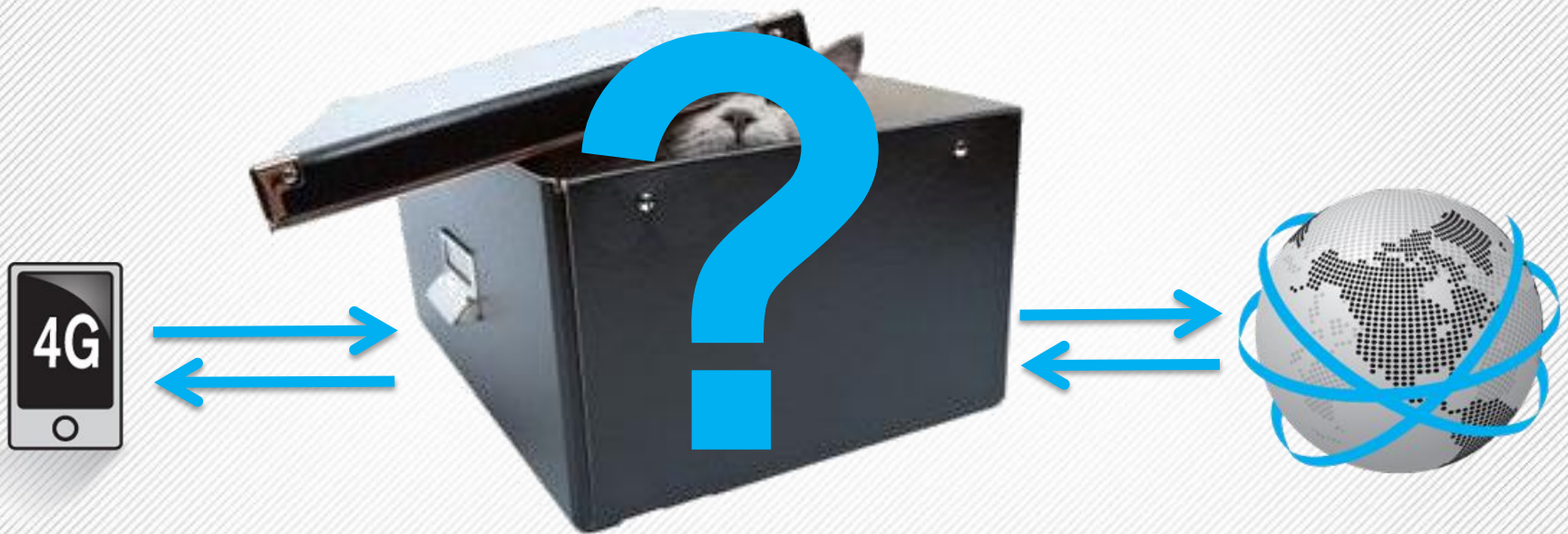
¹Includes billed ARPU for Sktelecom and service ARPU for LGU+; SKT and LGU+ launched LTE services in 3Q2011, while KT launched in 1Q2012. Source: Operators annual reports; Delta Partners analysis

Multi technology Wireless Network Optimizing Challenges

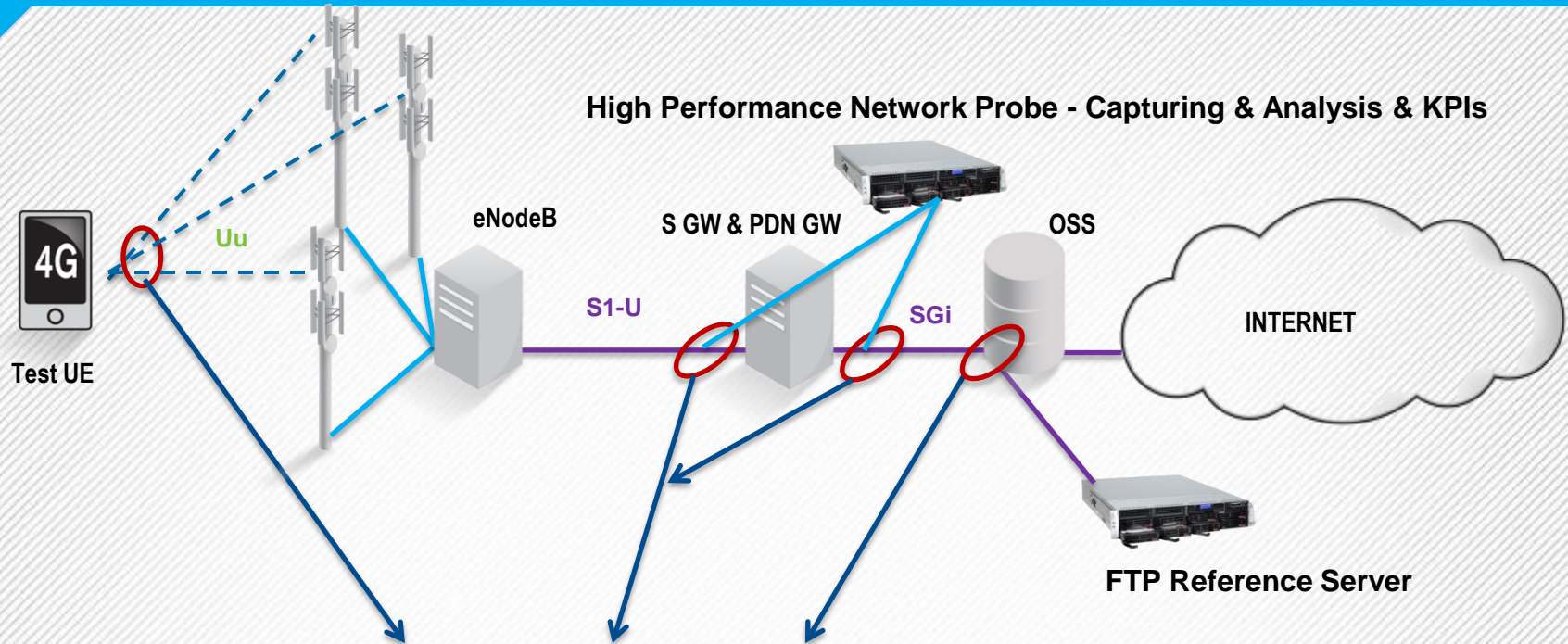


Black Box Dilemma During Network Benchmarking Tests

- It is not possible to see with test mobiles what happens inside the network



Cost Effective Network QoS Optimization



Needs data from:

- **Test Mobiles - Air Interface Information (CQI ...)**
- **Network Probes – Mobile Data Information (Application delay ...)**
- **OSS Data - Network Statistics (Success & Failure Rates ...)**



EXFO Wireline and Wireless Solutions for LTE Rollouts



REDUCE OPEX/CAPEX

FTB Ecosystem + EXFO Connect

- › Automatically gather and send test reports



RESOLVE MOBILE NETWORK ISSUES

LTE and 3G Analyzers and Simulators

- › High performance mobile application analysis for QoS optimization



SPEED UP ETHERNET ROLLOUTS

The revolutionary EtherSAM turn-up methodology

- › Single-button test that is 8x faster and guarantees first-time-right results

PUTTING INTELLIGENCE INTO LTE ROLLOUTS

Worldwide Customer Base

Network Equipment Manufacturers



Worldwide Customer Base

Network Service Providers



Thank you for your time!

