

## Operator profits CAN be sustained even with twentyfold surge in mobile data traffic – a case study

Market saturation, eroding voice ARPU and climbing data capacity upgrade costs are threatening the sustainability of mobile operators' historically high profitability. We show that by taking timely actions on both the retail and network cost fronts smart operators can sustain their profitability while redefining their business to serve the increasingly data centric life style of their customers. This paper is focused on the network cost side. We will explore the customer propositions and introduce the concept of QoS tiered pricing plans in a follow up paper.

### A CONCRETE CASE: Incumbent mobile operator in a big European country

We present a concrete case study of an incumbent mobile operator in a big European country. By analyzing the financial reports we captured the revenue and cost structure of the operator up until end of 2009. From 2010 onward, we used our business modeling framework to project the impact on key financial indicators caused by external market factors and internal decisions. External markets factors shape device proliferation (smartphones, tablets, etc.), usage profiles, ARPU erosion and spectrum availability. Internal decisions on tariffs, tariff conditions, subsidies, network structure, technology and vendors have direct impact both on top-line revenue and operational and capital expenditures.

We used our modeling methodology to isolate realized network expenditures based on the annual financial reports and we made fairly accurate 5 year projections of the variable expenditures (driven by customer numbers, traffic, customer devices, etc.) broken down into coverage and capacity related Capex and Opex. The accuracy of the projections is directly related to the deviation of our estimations of key modeling parameters such as; ARPU, connections, average data usage per subscriber, daily traffic distribution, spatial traffic distribution over base stations, quality of service targets, network equipment hardware and software prices, and many other commercial and cost parameters.

### MARKET BRIEF: Saturated mobile voice market, growing mobile broadband and low overall broadband penetration

The operator modeled is a market leader in a big European country with four full-fledged MNOs. The voice market has reached saturation (>100% active SIM penetration) and ARPU erosion has decelerated during the last two years. The mobile data and broadband markets have been growing exponentially since 2007 and the broadband penetration

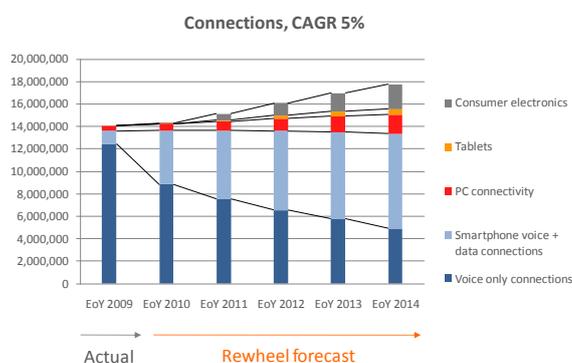
(broadband lines as percentage of population) in the country was below 20% in 2009. The modeled operator connection and revenue market share is above 30%. By the end of 2009 the operator had achieved 100% GSM and 35% 3G/HSPA indoor population coverage.

### BASELINE SCENARIO: Invest in expanding 3G coverage to 76% of population and expand the national and metropolitan fiber backbones. Grow data revenue, defend market share and prevent further ARPU erosion

In the baseline scenario the operator would invest in expanding the 3G/HSPA coverage up to 76% of the population by 2014 using the 2100 MHz frequency band, invest the required Capex and Opex to meet the growing capacity demand and expand the reach of their self-owned national and metropolitan fiber backbones. The above mentioned investments are considered to be essential prerequisites of sustaining data revenue growth, defending market share, preventing further ARPU erosion and sustaining single digit (3%) top-line revenue growth in the next five years.

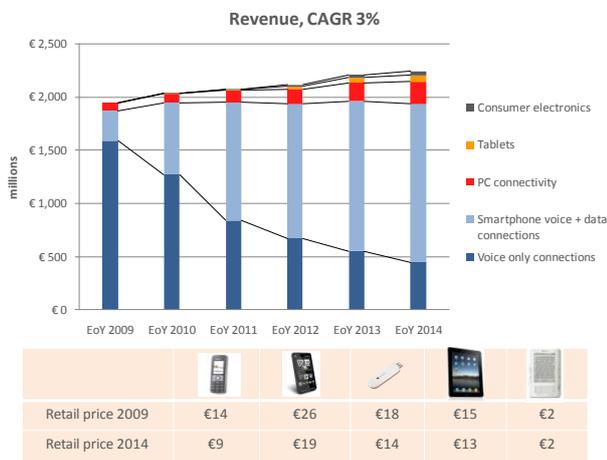
### MARKET PROJECTIONS: 5% annual growth rate in active SIM connections driven by dongles and add-on devices such as tablets and consumer electronic gadgets. Top-line revenue grows by 3% annually. Handheld data offsets the ARPU decline and add-on devices grow the top-line

Our market model suggests that by expanding beyond the basic handheld and PC connectivity ("dongle" or "large screen") markets into add-on devices such as tablets and other connected consumer electronic gadgets (like iPods and cameras) the operator will be able to sustain a steady 5% annual growth rate in terms of number of active SIM connections.



It is apparent from the projection (above) that starting from 2010 the mass market adoption of smartphones will dramatically squeeze the size of the lower end of the customer segments that can be satisfied by “plain old” voice (and messaging) only connections. This outlook underscores that a mobile operator aiming to achieve or maintain significant market share simply cannot afford not to invest into a wide area high capacity mobile data network.

In a saturated and fiercely competitive market the growth of SIM connections cannot translate into the same rate of revenue growth. The proliferation of add-on devices belonging to a single customer will inevitably dilute the average revenue per SIM. Nevertheless we are fairly optimistic that customers will be willing to slightly increase their overall mobile telecom spending for the tangible benefit of physical add-on devices, such as e-books, tablets or connected iPods.

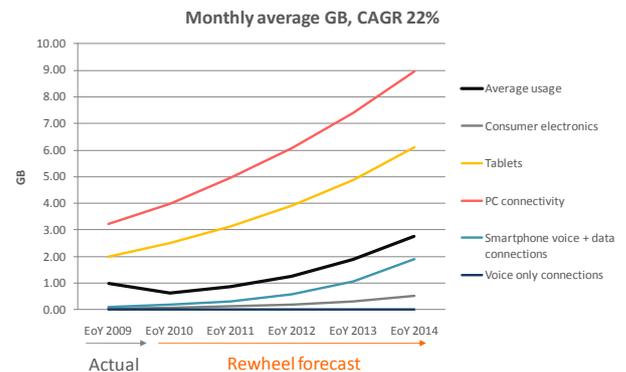


**TRAFFIC PER SUBSCRIBER: blended average usage for all devices grows annually by 22% but does not exceed 3 GB/month in 2014. Monthly average smartphone traffic in 2014 will be similar to dongle average usage of today (2 GB/month)**

The average traffic usage per data subscriber has come to the centre of the attention of the industry since the first 3G/HSPA networks started to run into capacity bottlenecks about one to two years ago. Being the key driver of variable costs of mobile broadband services, it is important to understand where it is today and where it will go in the future.

The usage trends we see across our operator clients’ customer bases indicate that the problem associated with extremely heavy users is not so burning any more thanks to the gradual withdrawal of full unlimited data plans and the introduction of various traffic management techniques such as throttling speed above a certain monthly gigabyte quota.

However, as operators manage to handle “extreme” users, the same time it becomes apparent that the “long tail” nature of usage distribution was only the tip of the iceberg and there is a much more sizeable issue unfolding below the surface: the mass market adoption of streaming video on various device categories from PCs to smartphones. As video is becoming a mainstream ingredient of internet “consumption”, it keeps pushing up the monthly usage of the average subscriber.

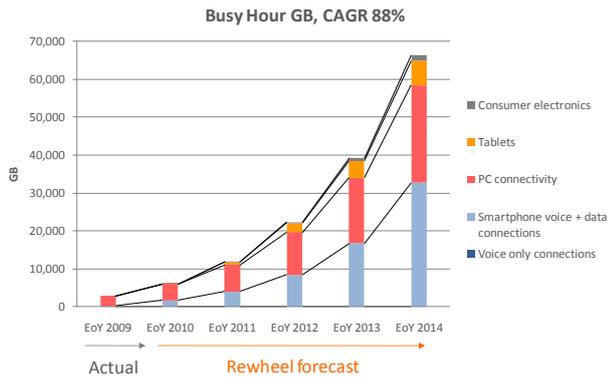


In the chart above we depicted the average monthly data traffic demand that our model forecasts for various device categories. The model predicts that the blended average usage across all devices stays below 3 GB per month in 2014. We believe that as the demand of average customers keeps growing, operators will need to keep lifting the GB allowances, otherwise significant customer churn will occur.

It is interesting to notice that while usage is expected to increase steadily for all categories, the blended average usage dips in the beginning. This is a typical trend that we have observed across European networks during late 2009 and 2010. It is a usage “dilution” effect caused by the fast growth of smartphones that today generate in average ten time less traffic than USB modems.

**NETWORK TRAFFIC: Busy Hour traffic grows by more than 20 times by 2014. Smartphone aggregate BH traffic will overtake the PC connectivity traffic by 2014**

Our capacity dimensioning model captures network load in terms of the amount of gigabytes transferred in the busy hour of the network, which falls predominantly into the evening hours.

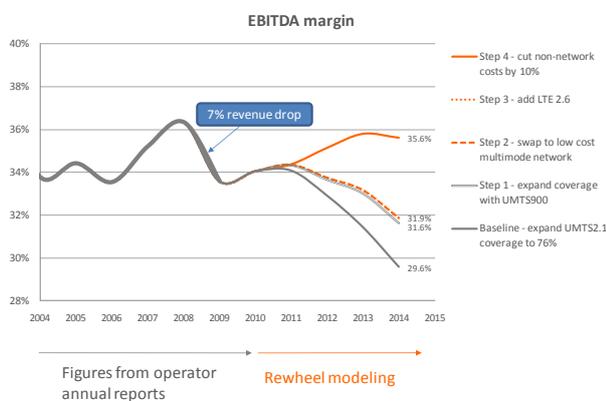


In Europe, today over 90% of busy hour mobile data traffic is generated by PC connectivity (“dongle”) users. But this pattern is set to reverse due to the mass market adoption of smartphones. Our models predict that by 2014 the aggregate smartphone traffic will overtake the traffic generated by PC connectivity.

Based on our models we forecast a striking 88% compound aggregate growth rate of busy hour traffic, driven primarily by the increasing appetite of PC connectivity users and the diffusion of smartphones into the majority of the handheld subscriber base.

**EBITDA MARGIN: Driven by backhaul fees and vendor support costs, EBITDA margin drops by as much as 4 percentage points in the baseline scenario. Significant but not detrimental to the profitability**

Historically EBITDA margin has been the profitability bellwether of mobile operator business. And indeed it used to be a fairly good financial performance proxy despite the fact that it excludes the impact of any capital investments. Mobile operators’ steady state (outside rollout ramp-up phases) Capex to sales ratio varied between 10 - 15% with APAC operators leading the pack.



Our model predicts about four percentage points drop in EBITDA margin for the baseline scenario: significant although not detrimental.

**Baseline – Opex growth eats revenue upside.** The baseline scenario includes the positive revenue impact gained from the growth of data centric connections. The main Opex drivers dragging down EBITDA will be the increased leased line fees to connect base stations outside the reach of the self built high capacity access transmission network as well as the climbing support and maintenance Opex paid to the radio and core network vendors, which according to the typical support agreements in place today scale with the capacity of the network.

**Step 1 – UMTS 900.** By using UMTS 900 MHz instead of 2100 MHz, less base stations will be required in the rural areas in turn reducing the required number of leased line connections as well as the support and maintenance fees paid to the radio network vendor.

**Step 2 – Swap to low cost multimode network.** Further vendor Opex cuts can be achieved by swapping the old standalone 2G and 3G networks to single multi-mode boxes and at the same time negotiating a more favorable support agreement for the new equipment.

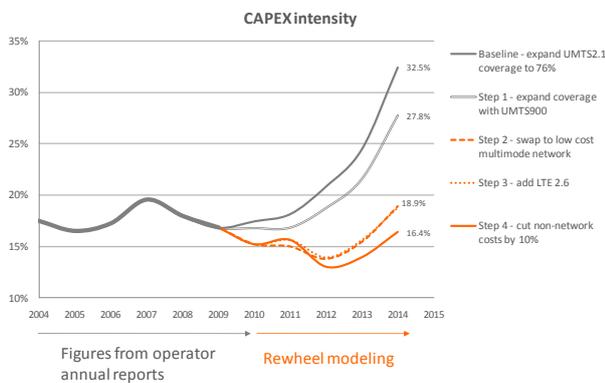
**Step 3 – LTE 2.6.** LTE will have no impact in the EBITDA margin within the modeled timeframe, for three reasons. Firstly, we take the pessimistic stand point and forecast practically no revenue upside for LTE, secondly our experience shows that smart operators will be able to make a functionality and radio-technology agnostic support and maintenance deal with the vendors of their multi-mode GSM-UMTS-LTE infrastructure, so they can switch on LTE without increasing their vendor Opex. Thirdly, in Step 2, while modernizing the old network, the operator has already deployed a high capacity IP access transmission network to all cell sites that will be upgraded to LTE, thus LTE deployment will not add backhaul Opex.

**Step 4 – Cut non-network Opex.** The EBITDA projections suggest that Opex reduction measures on the network side alone will not be sufficient to prevent EBITDA margin from dipping. As such, it seems unavoidable to cut from non-network related variable Opex drivers such as terminal subsidies and sales commissions and fixed Opex items. There is already a visible trend of operators stimulating the sales of “SIM-only” subscriptions (to avoid expensive terminal subsidies) and expanding into non-traditional sales channels such as online (to avoid sales commissions) and external IT-centric retail chains. This trend is set to accelerate with the proliferation of connected devices that consumers would less likely buy from the operators (e.g. iPod, camera, navigation device, e-book) but rather from their respective specialist retailers. Clearly, it is not evident that an operator will be able to cut terminal subsidization and sales commissions without negatively impacting its sales and retention results. Nevertheless, the sales channel transformation driven by the

uptake of data centric devices opens an opportunity for reconsidering acquisition and retention investments. The good news is that – at least in the case of our example operator – 10% reduction of overall non-network Opex, if combined with network Opex reduction can be sufficient to stabilize EBITDA margin at historic levels.

**CAPEX TO SALES: Unsustainable in the baseline scenario but recovers and does not impact profitability if the necessary actions are taken**

Operators’ Capex to sales ratio has been in the centre of attention of telecom investors since the outbreak of the mobile broadband fever. The upward movement of this indicator combined with a stagnation or a fall in top-line revenue (which is forecasted for Western European operators from 2010 to 2015) would be an omen of renewed rounds of cost cutting, falling dividends and shareholder dismay.



Our projections (see graph above) confirm that with the current network equipment prices and especially the existing traffic-linked software licensing mechanisms the capacity and coverage expansions will not be financially viable.

The single most important, and according to our experience unavoidable, step of controlling Capex is to swap the outdated low capacity radio, core and transmission network platforms to modern, scalable equipment (often combining the previously standalone GSM and UMTS functionalities into a single multi-mode network layer) ready for handling the exponential traffic growth. In order to disconnect Capex from traffic it is critical to negotiate transparent software licensing mechanisms that are not linked to traffic and make the total cost of ownership of the network predictable.

Recently, when the Telenor Group announced a group-wide network modernization program swapping the old and non-scalable radio and core platforms to high capacity multi-mode equipment, their CEO Jon Fredrik Baksaas compared the importance of this technology transformation to that of

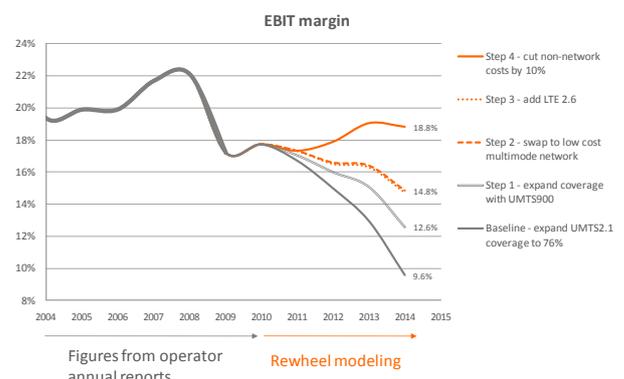
the digital switchover in fixed telephony back in the early nineties – we could not agree more with Mr. Baksaas.

Another interesting observation that can be made on the Capex to sales chart is that adding hot-spot LTE coverage once the radio, core and transmission platforms have been modernized (in Step 3) will not require substantial incremental Capex, in fact practically not at all after the first few years. The incremental Capex spend in equipping hot-spot multimode base stations with LTE functionality will be partially offset by the savings in expanding HSPA capacity.

The steps identified here lead to a dramatic increase in network capacity without raising Capex. While they might appear straight forward in practice they are quite difficult to implement and any financial savings will depend on the prudence of past network investments, the quality of legacy network assets and the operator’s existing vendors’ power to lock in its customer to outdated technology and pricing mechanisms.

**EBIT MARGIN: Grim outlook if no cost efficiency measures taken**

The flow of the EBIT margin projections is similar to the pattern seen on the EBITDA graph.



However, by looking at the scale of the vertical axis it is apparent that the amplitude of the EBIT margin curves is much more dramatic than the EBITDA making the baseline outlook far too grim. The deep dip of the baseline scenario is primarily caused by the prohibitively high Capex to sales ratio that keeps pushing up the annual depreciation of capacity and coverage related investments.

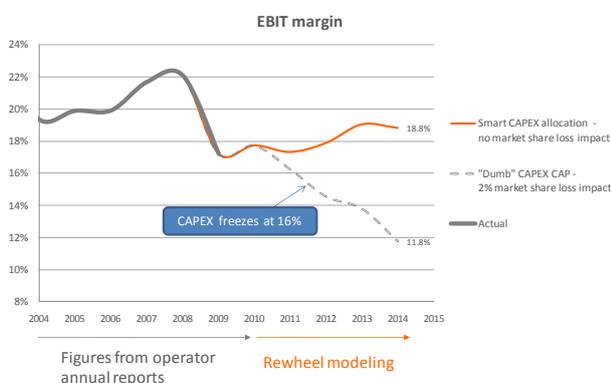
**AVOID “DUMP CAPEX CAPS”:** Some operators might choose to freeze Capex, sit still and let customer experience deteriorate. But it will not pay off: they will risk their top-line revenues and profits by putting their highest value customers up for grabs

Throughout the analysis we assumed that the operator has free hands in increasing annual Capex and Opex spending as the traffic grows. However, this is seldom the case in markets where the top-line revenues are not growing with high single digit or double digit figures. In anemic growth or stagnated markets, shareholders enforce strict Capex discipline and cost savings measures. As discussed earlier so far most CTOs managed to keep the total Capex spend under control by holding back non capacity-related investments e.g. 3G coverage rollout.

But the new wave of soaring smartphone traffic and resuming coverage rollouts (UMTS900, LTE) will further increase the Capex pressure and soon there will be a point where operators will face a difficult dilemma; increase total Capex and see cash flow deteriorate or freeze Capex by starving the network from the needed capacity and risk top-line revenues. The latter can manifest in many forms:

- Leaving the network congested in the peak hours causing overall customer distress
- Throttling customer traffic at such a low monthly consumption level that disrupts the internet experience of not only “extreme users” but also the mainstream customers
- De-activating expensive network features which are priced based on traffic (e.g. HSUPA)

The graph below illustrates that if the Capex caps are achieved by customer experience affecting measures like the ones listed above, that may seriously impact the operator’s overall profitability.



In this analysis we assumed that while the Capex to sales ratio freezes at 16%, the operator suffers a 2 percentage point loss in its market share as a result of the increased customer dissatisfaction.

In contrast, the upper curve shows that by doing smart Capex reallocations and lowering the cost base by means of UMTS900, migrating to low cost multimode network platforms and rolling out LTE at a right pace will enable the operator to sustain its profitability even if the traffic is allowed to rise “freely”.

Mobile broadband/data is neither panacea nor a telecom plague. It is a natural step in the evolution of a maturing industry where the cash cow service is increasingly commoditized. The industry winners of tomorrow will be smart operators that seize the opportunity and transform themselves into very efficient data production factories with a sole purpose to serve their customers’ needs rather than to restrict them for example by throttling internet service of normal users. ■