Mobile data revenue growth has helped the telecommunications industry compensate for voice revenue stagnation but the profitability trends are alarming. Why is data profitability lagging, and how can the trend be reversed?

Alcatel-Lucent Bell Labs models show that technology upgrades and network load balancing are two options to help mobile operators regain sustainable (and profitable) revenue growth. In a high-growth, rapidly changing environment such as wireless broadband, we find that meaningful projection of future profitability requires the amortization of CAPEX over a shorter period than is done for traditional accounting.
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1. INTRODUCTION

Wireless service providers have seen their voice revenues stagnate in recent years. Instead, top-line increases have come from the dramatic growth — 25 percent or more — in mobile data service revenues. The increasing popularity of consumer devices such as smartphones, air cards for notebook computers, netbooks and tablet devices is one factor. The availability of faster networks and thousands of interesting applications are also fueling mobile data subscription and revenue growth.

In the early days of mobile data, the hugely profitable Short Message Service (SMS) was the dominant application. A user with 3000 text messages per month was sending less than 0.1 MB per month. In contrast, today’s data revenues can potentially negatively impact the profitability equation because of the associated enormous increase in network traffic. A typical smartphone user who uses 600 MB per month puts 6000 times more load on the network but produces only about twice the data revenue compared to an SMS user.

2. MOBILE DATA TRAFFIC AND REVENUE TRENDS

Figure 1 shows the contribution of data services to overall mobile service revenues and traffic for a large North American operator, and the trend is typical of the industry. Data has changed from generating disproportionately high revenues in relation to network resources consumed when it was mainly SMS, to generating only 35 percent of the revenues while consuming 54 percent of the resources today.

![Figure 1. Percentage contribution of mobile data services to overall revenue and traffic](image)

This disparity threatens to increase with the compounding effects of more data users and their growing usage triggered by better devices, faster networks and new applications. Data traffic growth rates — 70 to 100 percent — are projected to be almost three times the associated revenue growth rate.
The networks that carry these voice minutes and megabytes of data are traffic-sensitive: the more traffic they carry, the more capacity investments and ongoing expenses they will incur. Understanding the true economic profitability impact of data traffic hyper-growth in mobile networks requires a carefully structured analytical approach.

3. ASSESSING THE ECONOMICS OF MOBILE DATA GROWTH FOR MOBILE CARRIERS

Alcatel-Lucent Bell Labs Business Modeling has developed a systematic analytical framework to assess the incremental network cash costs accounting for both capital and operating expenditures (CAPEX/OPEX) to support growth in network traffic (voice and data). We have applied this framework to benchmark the economic indicators of data and voice service profitability trends for operators in diverse regions.

3.1 Deducing network operations costs

Carriers usually report network operations costs in their financial statements. This amount is sometimes included with handset costs, regulatory fees and customer service costs. These traffic-insensitive costs must be estimated and removed to deduce the network operations cost.

Voice interconnection and roaming costs can be estimated and assigned to voice only. Data roaming and Internet interconnection costs are assigned only to data. Internal network operations costs, tower leases, backhaul and power are shared and can be allocated between voice and data based on the volume of respective traffic — converted into equivalent bytes for voice minutes.

Depending on the carrier and the market, the network operations cost for data ranges from 1.5 cents to 3.4 cents per MB. For voice, the network operations cost ranges from 0.1 cents to 0.4 cents per minute. Considering both voice and data traffic-related costs and performing such allocations helps ensure that all relevant network operating costs are accounted for.

3.2 Estimating network investment costs

We similarly estimate the network investment needs triggered by traffic growth. First we isolate the capital costs that are specifically related to network assets. While network operations expense is a recurring cost, network investment expenses are reported as capital costs for a period and flow through the income statement over subsequent periods as depreciation expenses based on a depreciation schedule. We translate these accounting figures into incremental investments that directly support the growth in traffic. We assume that the network has the capacity to carry all the voice and data traffic it carried during the previous year.

While it could be argued that some of the capital is spent for modernization, these adjustments are small and can be ignored in a fast-growing network with rapidly declining equipment costs. In addition, we amortize CAPEX over a period of 2.5 years — the typical payback period operators demand for a viable investment business case. This amortization period is much shorter than the depreciation accounting period of 7 to 10 years, which would not be meaningful for understanding the true economic costs of supporting the hypergrowth environment of data traffic. We find the following ranges for CAPEX:

- **Data**: from 6.6 to 35 cents per annual incremental MB
- **Voice**: from 1.2 to 6.1 cents per annual incremental minute (for the current generation of network technologies)
The network cash cost is therefore computed as the network operations cost per MB, plus the network investment cost per annual incremental MB divided by 2.5 years. The result is a network cash cost of 6.3 to 20 cents/MB for 2009. The network cash cost differences among carriers are mainly explained by their busy-hour network utilization (how under- or over-engineered their networks are), operating scale (the amount of traffic in the base station), and their overall operating efficiency.

### 3.3 Assessing the impact of traffic growth on profitability

The impact of data and voice traffic growth trends on economic profitability can now be assessed by comparing the average revenues per MB of incremental traffic with the network cash costs per MB of incremental traffic that will be needed. Figure 2 summarizes these trends. Currently, the network cash cost figures are less than the revenues of 16 to 28 cents per MB, providing a margin buffer. While this produces positive gross margins from 32 to 63 percent, these margins are generally lower than the historical voice-dominated traffic margins and, more important, show a declining trend.

Figure 2. Key trends for data usage, unit revenues and unit costs

Will this shrinking gross margin be enough to cover the handset subsidies; marketing and sales; customer service and billing; and selling, general and administrative expenses (SG&A) to make it economical to continue to expand the network?

Figure 3 shows the overall cost, revenue and profitability trends. Data revenue per data-plan subscriber per month is slowly increasing. Network cash costs are a function of the projected deployment of new technologies, such as long term evolution (LTE), that are expected to lower unit costs. However, data-traffic volume per subscriber is increasing so fast that the network cash cost per data-plan subscriber may also trend upward.
When fair allocations of SG&A and handset subsidy are added, data costs approach the data revenue line at the end of 2010. Data, the current revenue growth engine, is about to cause a profit decrease! Because almost all customer buying decisions about choosing a service provider are being made on data devices, their capabilities and the data network, this is a dangerous situation. What will cause the cost curve to reverse its direction?

4. ADDRESSING THE DECLINING PROFITABILITY OF MOBILE DATA

Our modeling and analysis lead to insights about addressing the challenge of reversing the declining profitability of mobile data traffic.

4.1 Network considerations

We modeled a conversion to LTE, which has the biggest effect beginning in 2011, reducing the network cash cost per MB by an order of magnitude. In addition to LTE, conversion introduces a number of benefits:

- 85 percent of the base stations have enough volume to make Ethernet backhaul economical
- Traffic per base station increases more than ten times, significantly decreasing the leasing cost per MB
- Average busy-hour utilization is increased with larger traffic volumes at base stations
- Small cells in high-volume geographies
- Reduced internal network operation cost per MB, consistent with historic reductions
Even with all these benefits, explosive data growth still requires the splitting of 25 percent of base stations and additions of a second LTE carrier. These requirements and new pressures on data profits are again expected after 2014 if data explosion continues — even sooner if data growth accelerates.

### 4.2 Pricing incentives

Data is very peaked in the cell. Capacity equal to two to three times the carried load goes unused during the middle of every day. Offering economic incentives to customers to shift traffic to off-peak can make a huge difference.

By 2014, 90 percent of traffic will be data. Most of circuit switched voice will have also migrated to data. Both mobile operators and vendors must innovate to keep data revenue growth profitable. In particular, innovative high-value applications that have high revenue per bit are fundamental to improving the value of mobile data.

### 5. ABOUT BELL LABS ADVISORY SERVICES

Bell Labs is the innovation engine of Alcatel-Lucent. Bell Labs Advisory Services applies innovative and advanced analysis-driven problem solving expertise to address your complex business, network, strategic and operations challenges.

Tailored to your unique needs, a multi-disciplinary team of Bell Labs scientists, technologists, modelers and Alcatel-Lucent services and solutions experts will perform an objective analysis and provide you with actionable insights and confidential recommendations.

Contact us to:

- Request a first-of-its-kind analysis or get a second opinion on focused topics.
- Learn how emerging technologies will perform in specific scenarios.
- For more information on this market analysis or how Alcatel-Lucent is working with service providers and stakeholders globally to better understand consumer needs, please contact Bell Labs Advisory Services.