Uncovering *Real* Mobile Data Usage and the Drivers of Customer Satisfaction
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Uncovering Real Mobile Data Usage and the Drivers of Customer Satisfaction

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For the consumers that use it and the companies that build it, the connected world offers immeasurable potential. Yet realizing that promise isn't a given. Networks and applications need both to work reliably and to offer the experiences that users want most. This requires key players—including telecom operators, software developers, and device manufacturers—to possess a deep understanding of how consumers use networks and what most affects their satisfaction.

**Usage Patterns Vary Across Customer Segments, Carriers, and Plans**
Usage varies appreciably by income, employment status, data plan, and even gender. Males in the low-customer-lifetime-value segment, for instance, are the heaviest data users while also less likely than other segments to use Wi-Fi, delivering a double whammy to networks and profitability. Also, telcos most actively facilitating Wi-Fi access are doing the best job of offloading traffic from their cellular networks.

**High Speed Has a Limited Impact on Satisfaction**
Contrary to conventional wisdom, lightning speed is not required for satisfactory experiences using smartphones. Even for video, readily available network speeds prove sufficient. So instead of continually stepping on the gas, telcos should invest in speed increases only when—and to the level—usage warrants.
How can networks and applications be optimized to provide not only a smooth and seamless experience but also the experience that customers want most? And how can this be done without incurring huge costs for either customer or provider?

Telecom operators, in particular, will need to face this challenge, as well as a hard truth about their traditional approach to network optimization. One-size-fits-all upgrades rolled out on a national scale simply won’t be sustainable. To meet even the most conservative growth projections, telcos will need costly new infrastructure (resulting in higher prices for customers) or resources, such as additional spectrum, that are hard to obtain. In many cases, they’ll need both.

This dilemma has been on the horizon for a while now, and ideas for addressing it have been floated before. (See “How Telecoms Can Manage the Mobile Data Explosion,” BCG article, May 2012.) But with technological improvements, such as LTE, that can squeeze greater efficiencies out of existing infrastructure, most telcos haven’t had to worry about it. The coming demand, however, will outpace these relatively low-cost efficiency boosts.

If telcos don’t discover more efficient, more effective ways to optimize their networks, they’ll be in jeopardy of losing customers and profits. App developers, content providers, and hardware manufacturers will be at risk, too, if the experience and the appeal of the connected world should diminish.

Yet if the problem affects everyone, so, too, can the solution. By leveraging a deep understanding of how customers actually use networks and what drives their satisfaction, telcos and other stakeholders can focus their optimization efforts and their investments where they have the most impact: on both the customer experience and their own bottom line.

There’s just one hitch. Most companies lack that deep understanding.
Although it is clear that different customers use networks in different ways, the specifics are largely unknown. Telcos, for example, typically don’t have a detailed picture of how usage patterns differ among customer segments. Nor do they know for certain what drives customer satisfaction. Most telcos work under the assumption that the key to keeping customers happy is to continually ratchet up speed. It’s a notion that makes sense, considering the growing popularity of video and other data-intensive apps. But is it really the case—particularly for smaller mobile devices such as smartphones, whose users generally aren’t streaming super-high-resolution content such as 4K video?

Working with key stakeholders around the world, The Boston Consulting Group has unveiled some important—and even surprising—insights about usage, satisfaction, and long-held assumptions. A project with a telco in Eastern Europe, for example, revealed that reliable voice performance, a seemingly old-school factor, still plays a key role in customer satisfaction and churn. Another project, in Western Europe, showed that mobile-network users consider good service more important in certain locations—for example, train stations—than in others.

Such findings have helped these telcos substantially redirect their network investments to achieve better returns. In a more recent study that captured detailed usage information from 1,500 volunteers as they—and their smartphones—went about their lives, we were able not only to see how usage differs across segments but also to quantify the differences. And by polling participants about their experiences—not, like traditional surveys, long after the fact but almost immediately afterwards—we were able to gain a better understanding of what really influences satisfaction. (See the sidebar “Unveiling the Truth Behind Usage and Satisfaction.”)

The vast cache of data we collected—on both usage and the experience—led to insights, presented below, that can help telcos target and tailor network investments, keeping capital expenditures in check or even reducing them. Indeed, we estimate that annual capex savings of more than 10% are possible. These same insights can also help app developers, content providers, and device manufacturers make better decisions about how to optimize their offerings.

In all cases, the payoff of this deep understanding of consumer behavior and preferences is a true win-win deal: customers enjoy a better experience, and providers can invest less and realize better returns.

**How Does Usage Differ Across Customer Segments?**

All customers are not equal in the way they use networks. Telcos know this in a general sense, just as they know, generally, that much mobile usage takes place over Wi-Fi rather than cellular networks.

Still, understanding the specifics of usage can be extremely beneficial. Not only can it help telcos target their upgrades—aligning the level of investment for a location or a customer segment with potential returns—but it can also help identify factors that encourage or discourage Wi-Fi offloading.
Moving more data off cellular networks and onto Wi-Fi is crucial in a world where data usage keeps growing and networks are becoming congested. And it is especially important in countries with limited spectrum, where investments in capacity can be particularly expensive. Wi-Fi offloading can help operators meet the data challenge while reducing their capex burden and, in doing so, give them an edge over competitors that are struggling to meet cellular-heavy demand or that are meeting demand by making oversize investments and charging higher prices.

UNVEILING THE TRUTH BEHIND USAGE AND SATISFACTION

What can companies do to gain a better understanding of how their customers use data and what factors are important to them? Our approach was to go directly to the source: the customers themselves.

With a proprietary app installed on study participants’ phones, we were able to capture a wealth of detail, including which apps participants were using, when and over what type of network they used them, and how much latency and throughput they were experiencing. Meanwhile, by conducting in-the-moment surveys that popped up on participants’ screens almost immediately after usage sessions, we were able to discover how participants felt about each experience. Matching their responses to actual network performance let us zero in on the true drivers of satisfaction.

The 1,500 people who took part in the study—customers of all major U.S. cellular carriers—represented the full spectrum of age groups and income levels. Over the course of the project, we collected some 100 gigabytes of data about their usage. And because we captured the information on individual customers, we were able to segment them and their usage patterns and analyze the data on an extremely granular level—even, if so desired, by employment status and credit score.

We collected approximately 300,000 customer-satisfaction surveys. These pop-up questionnaires allowed participants not only to rate the experience (on a scale of 1 to 5) but also to tell us what factors—such as excessive pauses in a video, poor quality in video display, or lengthy waits for maps to load—may have hindered its success. Through the surveys, we asked participants how satisfied they were with network speed and how it compared with their expectations. To measure actual speed, we used 30-second sampling windows while an app was running, recording the amount of data being used each second and calculating an average.

In the end, what we had wasn’t an idea of how customers were using applications and the network. Rather, we had a clear picture of that usage. For the companies that build those applications and networks, this picture provides a crucial first step for improving their offerings, giving customers what they want and giving themselves a competitive edge.
A key benefit of our research methodology is that it allows us to explore usage from a multitude of perspectives. We can see not just who users are but also what types of plans they are on and even which carriers they are using. Indeed, by looking at customers of a broad spectrum of carriers, we were also able to see how specific telco strategies might be affecting usage. The idea is to home in on as many usage-influencing factors as possible. Improved understanding of these factors will allow telcos to make better decisions about critical investments.

Our proprietary database of customers can be segmented in a wide variety of ways on the basis of a broad array of demographics and traits, but for this report, we divided participants into three main groups on the basis of customer lifetime value (CLV):

- **Low-CLV Segment.** Because these mobile subscribers generally have low incomes or are very price sensitive (or both), this segment exhibits the highest churn rates.

- **Midlevel-CLV Segment.** These customers are more loyal, with medium churn rates, but for the most part, they have low to moderate incomes and don’t spend much on mobile service.

- **High-CLV segment.** This segment comprises the most attractive customers for any telco. They generally have the lowest churn rates, and because they have the most disposable income, they spend the most on service.

Overall, we saw that usage, in terms of both data volume and the network (cellular or Wi-Fi) used, varies appreciably by income, employment status, data plan, and even gender. Subscribers who identified themselves as retired, for example, are on cellular networks for about 60% of their data usage, far above the average 25% across all study participants. The distinct usage patterns we saw across customer segments, carriers, and plans led to some interesting insights and implications.

The least profitable customers are, in many cases, the most costly to serve. Low-CLV males are, by a significant margin, the heaviest data users. In fact, they use about 1.3 times the total data of high-CLV males and 1.5 times the cellular data. (See Exhibit 1.) This higher overall usage, combined with a greater tendency to use cellular, can make this segment more expensive to serve. At the same time, customers in this group tend to be among a telco’s least profitable. Perpetually seeking value, they demonstrate higher churn and lower CLV than customers in other segments.

By contrast, the high-CLV group is not only more lucrative but also less taxing on cellular networks. These customers use less data overall, and when they do use it, they are more likely to do so over Wi-Fi. Customers in this segment are generally satisfied with their wireless experience and have a low propensity to seek alternatives. This is the segment telcos need to pursue, as it is responsible for generating the lion’s share of profits. But the investments needed to satisfy customers in this segment are, in many cases, different from the investments telcos actually make.

Our research demonstrates that the equation needs to change and that steering investments to serve the high-CLV segment—in practice, by targeting the regions where these customers are concentrated—is the smart play. These customers use

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less data overall and are more likely to offload to Wi-Fi, so the typical investment strategy of increasing speed as a matter of course is likely to have a limited benefit. Other types of investments may prove more beneficial for this segment—and more profitable for the telcos, which should prioritize these high-CLV-specific strategies.

But for all stakeholders in the connected world, the usage patterns we saw raise an important question: Why, exactly, are customers in the high-CLV segment more apt to use Wi-Fi, to both at home and at work, than low-CLV customers. Telcos might, therefore, want to think about what they can do to facilitate Wi-Fi offloading for their less profitable customers, in effect, making them a bit less profitable. One possibility is to facilitate Wi-Fi access at nomadic locations (such as coffee shops and restaurants where customers generally stay for a while) by deploying Wi-Fi hot spots at these sites or by partnering with third-party hot-spot providers. Some U.S. carriers already include the use of such hot spots in their mobile plans.

Device manufacturers, meanwhile, can differentiate their hardware by building in the ability to connect automatically or to prompt users to connect to Wi-Fi when it is available. Similarly, by understanding usage patterns, companies that operate nomadic locations can determine whether there is a business case for offering Wi-Fi or better gauge how to use its availability to attract customers.
**Unlimited plans do not increase usage; they shift usage to cellular.** Linking usage data with the type of plan the customer is on lets us address an oft-asked—and oft-debated—question: Do subscribers on unlimited plans actually use more data than those on capped plans? The answer, we found, is no. Overall usage is roughly the same. What unlimited plans do appear to do, however, is steer more—significantly more—of that usage to the cellular network. In fact, we found that customers on unlimited plans use twice as much cellular data as customers on limited plans.

For many telcos, this finding will be particularly noteworthy and perhaps serve as a call to action. Most unlimited plans do not provide the ability to adequately monetize the increased cellular-data usage. (In some countries, though, a throttling-upselling strategy has been used to provide monetization.) Indeed, most such plans have the effect of enabling data abusers. For telcos with a significant base of customers on unlimited plans, the shifting of traffic from Wi-Fi to cellular will continue to drive an unnecessarily higher cost-to-serve model—one that puts them at a disadvantage relative to telcos with capped data plans. (However, we acknowledge that unlimited plans may provide one of the few attractive marketing differentiators for carriers with lower-quality networks.)

**Optimizing for offloading pays off.** The usage data also shows that carriers that facilitate Wi-Fi offloading reap the rewards of their efforts. These operators are seeing a lower percentage of their customers’ total data traffic on the cellular network. Indeed, the U.S. operator that has arguably been the most proactive on the offloading front (converting its in-home Wi-Fi routers into hot spots that can be used by any subscriber within range), fared particularly well, with more than 80% of its traffic offloaded to Wi-Fi. It even managed to buck the trend and see a similar level of offloading among unlimited and capped customers. Conversely, we saw that telcos that have lagged behind in their offloading optimization see the highest percentages of use on cellular. They would do well to redouble their efforts.

**How Do Customers Use Apps, and How Do Apps Use the Network?**

Another noteworthy finding: some apps give a lot more than they take. The usage data shows, quite clearly, that the apps customers value most aren’t necessarily those that account for the most data volume or usage time. (See Exhibit 2.) Combined, messaging, browsing the Web, e-mail, and mapping—the four most important apps as ranked by users in a survey commissioned by BCG—account for just 10% to 15% of total data usage. (See the appendix for an overview of how all app types use data.)

By contrast, social networks, which ranked fifth in importance, account for a full quarter of total data usage. This is due in no small part to the increasing amount of video—largely short-duration clips—embedded in these services. For developers, it is important to understand how apps, which are becoming increasingly video intensive, are being used. This knowledge could help them identify and manage potential roadblocks, such as delays in starting video. The effect on user satisfaction of such delays can be far more significant for short clips than for the full-length content streamed by services such as Netflix and Amazon Video, because users experience delays repeatedly as they try to watch multiple videos in a relatively short time span.
App usage varies by customer segment, as well. Low-CLV males, for example, are the biggest users of video. Indeed, their extensive use of video data—1.5 to 2.0 times that of other segments—helps explain why they are the heaviest data users overall.

But perhaps the most surprising finding of our research is related to the speed apps require. Particularly when it comes to video, the conventional wisdom, and the focus of many a telco marketing campaign, is that speed is everything. Video data, the thinking goes, needs to move quickly over the network in order to avoid pauses and buffering. And operators are certainly putting their capex where their mouths are. According to Cisco, the average mobile-network connection speed, globally, is expected to more than double from 2014 through 2019, from 1.7 megabits per second (Mbps) to nearly 4 Mbps. (The speeds will vary widely across regions. North America, for example, is expected to see an increase from less than 3 Mbps to more than 6 Mbps during that period.)

However, our study demonstrated that on smartphones, even video apps don’t require lightning speed or anything close to it. (See Exhibit 3.) In nearly half the cases of participants viewing video over a cellular network, the speed utilized was below 1 Mbps—a level that is easily attainable on most modern mobile networks. Other types of applications that are commonly thought to require high speed—such as games, audio, and social networks—operated at even lower speeds.
Thus, purely from the perspective of what apps require, today’s readily available mobile-network speeds are sufficient and, in many cases, far more than sufficient. This is a point that a few telecom operators seem to have realized—and are starting to use to their advantage. Consider the experience of one U.S. carrier, which recently introduced an option that gives customers unlimited video at standard definition (SD). While SD resolution might be suboptimal in the living room, it tends to work well on relatively small smartphone screens. Publicly available analyses put the speed customers are seeing at a less-than-blistering 1.5 Mbps, but they also indicate that while users are consuming less video data than before, they are also spending more time watching video. In essence, the operator has been able to increase customer engagement even as it reduces network load. Significantly, its approach suggests that telcos may be able to step back from the speed race while keeping customers happy—and coming.

This raises an important point that telcos need to consider: What does the customer require? Even if high speeds aren’t needed by apps, do they nonetheless increase user satisfaction? And if they don’t, is there something else that does? This was the focus of the third prong of our research.

What Propels Customer Satisfaction?
The data we captured from participants’ devices let us measure not only speed but also latency. (See the sidebar “The Lowdown on Latency.”) We recorded these metrics throughout usage sessions, asked participants about their experience, and
linked users’ responses to actual network performance. Thus, we were able to zero in on what truly drives the customer experience.

- **Speed has a limited impact on satisfaction.** Put simply, telcos have overrated the role that speed plays in customer satisfaction. For video, we saw that once speeds reach 1.5 Mbps, further increases have little or no impact on users’ perception of performance. (See Exhibit 4.) Even at relatively slow speeds, smartphone users are generally happy with the experience. We found, for instance, that at speeds

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**THE LOWDOWN ON LATENCY**

Latency. Speed. Bandwidth. To many of us, it’s all a muddle. But understanding how these concepts differ and how they interact is essential for consumers and businesses alike.

Part of the confusion stems from the tendency of providers to promote their “high-speed” networks and the 20-, 50-, or even 100-Mbps connections they offer their customers. It turns out that what they are really describing is *capacity*: the amount of data that can move through the connection, or “pipe,” in a given amount of time. The idea is simple: the higher the Mbps number, the wider the pipe, the more data flows in parallel.

But there is also the length of the pipe—the distance the data must travel—to consider. No matter how fast the connection, there is always some delay, because all data is coming from somewhere. This delay—the time required to travel from one location to another—is *latency*.

To some degree, latency is beyond our control. Data can’t move faster than the speed of light. But other factors that contribute to latency—such as network congestion and the locations of the servers users are trying to access—can be addressed and managed, in many cases, without huge capital outlays. Data can be positioned closer to users through, for example, a content delivery network. And certain users can be prioritized or deprioritized, depending on how they are using the network. (It is possible, for instance, to throttle, or lower, the data transfer rate for users downloading dozens of high-definition videos during peak-usage hours.) Furthermore, technology can be used to address latency. Switching from 3G to 4G standards, for instance, can help cellular providers reduce delays.

Both latency and bandwidth can affect a user’s experience, but not always in the same way. Consumers viewing long-form videos, for example, may experience an initial delay as the first bits of data travel from the server to their devices, but once the stream reaches users, the experience should be smooth. Users browsing the Web, on the other hand, turn the pipe on and off as they visit different websites and pages. Every turn of the valve means another delay as new data, from a new location, starts its journey. If latency is high, those delays add up, and even on a so-called high-speed network, things may seem slow. Although a 100-Mbps connection is great, low latency is something both users and providers should care about.
ranging from 500 kilobits per second (Kbps) to 1 Mbps, 83% of users are satisfied with video performance. For other types of apps, speed has even less impact. Web browsing sees only marginal increases in satisfaction at speeds faster than 500 Kbps, and for social networks, satisfaction levels are relatively constant at all speeds. The telcos’ race for speed may, in fact, be a largely unnecessary endeavor that breaks the cardinal rule of focused investment: spend where the spending counts most.

- Latency does have an impact on satisfaction, and that impact is significant. Across all usage on cellular networks, we found that latency does appear to influence satisfaction. For video, 72% of users reported that they are satisfied when latency measures between 75 and 100 milliseconds. Yet when latency drops to just 25 or 50 milliseconds, satisfaction jumps to 83%. Although the correlation varies from app to app, satisfaction generally increases as latency decreases. Cellular carriers should, therefore, consider intensifying their efforts to reduce network congestion. At the same time, they need to educate consumers on why latency—a concept that is generally far less understood than speed—matters. Each carrier needs to demonstrate that it is doing a better job on this front than its competitors. The promotional brochures may not be as eye-catching as those that focus on speed, but the payoff could be much greater.

For cellular network providers, insights on usage patterns and satisfaction drivers can help steer optimization efforts in more focused and, ultimately, more
effective ways. Upgrades targeted to regions with concentrations of high-CLV customers will require far smaller investments than wide-scale deployments but will generate disproportionately impressive returns.

Efforts to boost Wi-Fi offloading, already seen to bring real benefits to telcos, can dramatically reduce cellular capacity requirements (and the investments they require). And contrary to conventional wisdom but in line with real data, steps that reduce latency (for example, designing networks with less reliance on microwave daisy chains and fewer layers in the architecture) bring a bigger payoff than high-priced efforts to increase speed.

Meanwhile, app developers can improve the customer experience by optimizing on the basis of usage patterns. Social-network apps, for example, can be designed to better account for network congestion and to reduce the latency that is particularly problematic for the short-form video prevalent on these services. Content providers, especially those that serve up data-intensive games and videos, can improve both their own performance and customer satisfaction by reducing latency, perhaps utilizing content delivery networks to bring data closer to customers and shorten the path from source to destination. Already, major content services are pursuing this strategy. Netflix has even built its own content-delivery network, no longer relying on third parties for so vital a tool.

For their part, device manufacturers can help ensure a robust experience and reduce strain on cellular networks by configuring their hardware to provide a seamless handoff to Wi-Fi. Understanding true usage patterns and satisfaction factors can also help them identify opportunities for working with telcos and developers to address and beat back the challenges that threaten the growth and the full enjoyment of the connected world.

These insights and the results they can lead to are just the beginning. Usage, we’ve seen, can vary in different ways demographically and regionally. Many factors—including, age, income level, employment status, location, carrier, and plan—affect the way customers use data and networks. Stakeholders at all points in the value chain now have the capability to drill down to these individual factors and see with increasing clarity and specificity how customers actually use networks and what is important to them. With this information, companies can build better networks, applications, and services, boosting the customer’s experience, as well as their own.

**Note**
This report was originally published in November 2015. This version revises labeling for observed speeds. It has also been updated to reflect subsequent developments in the telecom market.
APPENDIX

Not all apps use networks equally, and indeed some of the apps that users value most actually account for a surprisingly small amount of total data usage. The chart below breaks out, by customer segment, the average weekly Wi-Fi and cellular usage for a broad array of mobile apps.

The Importance of, and Data Used by, Various Apps

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<th>CUSTOMERS RATING AS IMPORTANT (%)</th>
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<th>MIDLEVEL-CLV SEGMENT</th>
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Source: BCG proprietary study and mobile app.
Note: MB = megabytes; CLV = customer lifetime value.
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