

Akamai Mobile Network Solutions:
A Content-Centric Approach to Delivering
High-Quality Mobile Experiences

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Introduction

Mobile network operators have an ongoing need to effectively and cost efficiently manage data traffic in order to address network congestion, particularly at peak periods on the Radio Access Network (RAN) and mobile backhaul. Perhaps even more important than managing the traffic to reduce cost is the need to differentiate the wireless network and provide the best customer experience. This paper takes a granular look at customer experience management (CEM) by focusing on the content traversing the mobile network and the customer's quality of experience (QoE).

The reality is that all mobile content is not the same and does not have the same requirements or even user expectations. Some forms of content, like software updates or backups, can be deferred, whereas the ability to quickly load a product's web page or launch a video on a mobile device is critical to their success. Financial websites and m-commerce sites have very different requirements than news or lifestyle websites, and traffic optimization methods need to address these variations to meet the customer's expectation. It is not just the type of content but the content provider that is also important. Mobile users have relationships with certain brands, and those relationships have an impact on how they choose to engage with their content.

This paper provides a framework to close the gap between consumer expectations, mobile content trends and the realities of a shared and often congested radio network. It outlines how a content-aware traffic optimization solution uses QoE analytics from real-time user monitoring, along with predictive delivery techniques, to efficiently deliver an optimal customer experience.

Mobile Data Trends Affecting Customer Behavior

Higher Speeds Beget Higher Data Usage

Advancement in technology, connection speeds and an increase in connected mobile devices are expected to continue to exponentially drive wireless data usage and consumer engagements. According to "Cisco VNI: Feb 2014", by 2018 there will be 10 billion mobile-connected devices — which will exceed the world's population by 2.4 billion. 4G connections will represent only 15% of these connections but 51% of total traffic. Faster speeds will inevitably lead to greater consumption and higher expectations. The Cisco VNI report also estimates that a 4G connection in 2018 will represent 6 times more traffic on average than a non-4G connection.¹ Also, two-thirds of the world's mobile traffic will be video. At this growth and data consumption rate, even as connection speeds improve globally the trajectory of data traffic will still result in portions of the mobile network being congested. Wireless spectrum and the RAN will remain an expensive and precious resource to mobile operators.

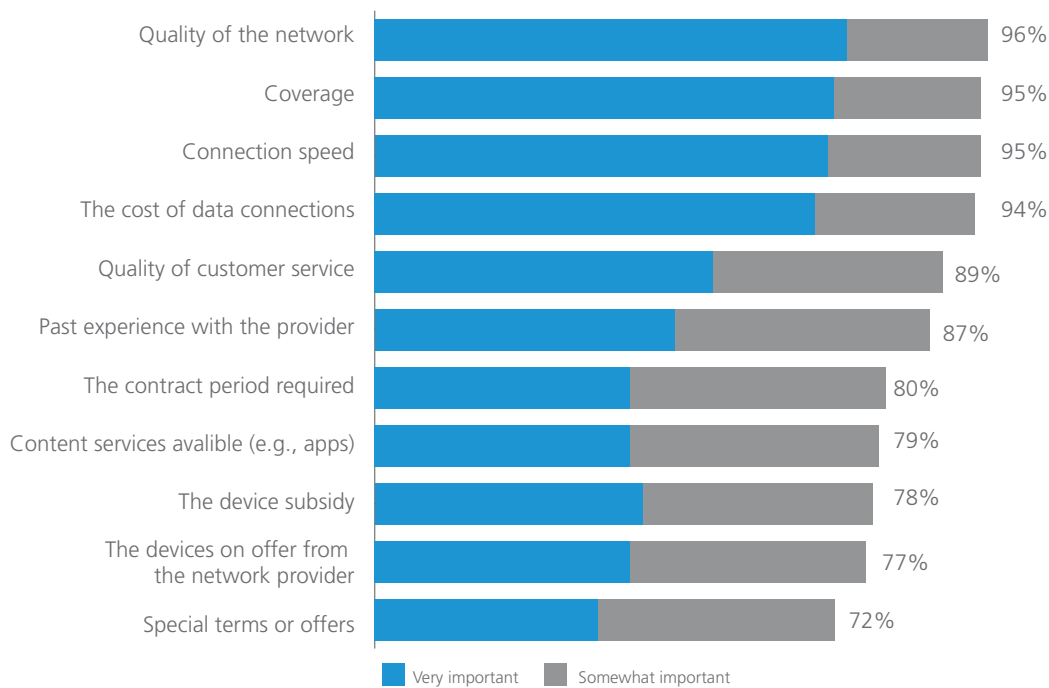
Data Caps Negatively Affect Mobile Customer Experience

Mobile consumers like the idea of never having to think about their wireless data limit. A survey done on behalf of Akamai by High Start Group covering n=494 mobile users in the U.S., U.K. and India identified that although consumers don't necessarily know what drives their wireless data usage, their behavior changes as they approach data limits. Consumers will put a moratorium on watching videos and accessing what they consider to be data-rich content on their mobile device until a new cycle opens up.² This goes against the consumer's natural desire for instant gratification.

Wi-Fi is a cost avoidance strategy used by some consumers, but it is not the solution to data limits. The problem with Wi-Fi is that coverage is sporadic and dependent upon a third party (coffee shop, train, store, etc.). It generally does not provide the necessary coverage users expect. Perhaps most importantly, data plans that cap usage and incur overage fees do little to differentiate the value of the mobile network to the consumer. These plans are viewed as disincentives to use the network and force the mobile operator to compete based on the price per GB delivered rather than the value of the network or service being provided.

Customer Experience is THE Key Performance Indicator for Mobile Network Operators

Customers are expecting more from their mobile device and demand a great mobile experience every time they pick it up. This is a key criterion when a consumer chooses a mobile service provider. Regardless of who or what is congesting the network - whether it is heavy data usage, software downloads or excessive signaling from the device itself - a great mobile experience is viewed as the responsibility of the mobile network operator. According to a 451 Research mobility survey, 71% of mobile consumers who download Internet content still expect their service provider to be responsible for the quality of their experience.³ As shown in Figure 1, the quality of the network is the number one item of importance for choosing a mobile provider; it is also the way many mobile operators market their service. To provide the expected level of network quality, mobile network operators need to move beyond traditional network-centric traffic optimization and embrace a CEM model when dealing with cellular network performance. This will require understanding the mobile user experience based on the type of content, device, location and network situation. Implementing a CEM approach to traffic optimization can help mobile network operators avoid becoming a commodity bit-delivery mechanism



Base: All respondents able to choose their provider (n=17,873); All who consider the criterion important (n=see chart)

Figure 1: Importance of Criteria for Choosing a Mobile Internet Provider.⁴

A Content-Aware Traffic Optimization Solution

Understand the End-User's Quality of Experience (QoE)

Traditional quality of service (QoS) management tools focus on network performance and do not take into account the actual experience as perceived by the end user. To really measure QoE, mobile network operators need a sophisticated view into performance analytics at the individual user level. Mobile users have distinctively unique content requirements and data usage patterns, which make obtaining the data necessary to properly optimize traffic and improve the user engagement a time consuming and difficult process. It requires reviewing mobile device data as well as correlating it with the characteristics of the content being consumed and the conditions of the cellular network at the time of engagement.

Real user monitoring (RUM) measures actual website performance data (download time, page load time) collected from actual end-user devices. Network analysis products typically measure network characteristics that impact QoS performance (packet loss, jitter, etc.), whereas RUM collects millions of real data points from hundreds of domains across all networks to provide accurate end-user QoE analytics. Measuring web performance data combined with video analytics (e.g., video startup time, rebuffering, avg. bit rate) can help mobile network operators fully understand how websites load and videos play on the end-user device.

The web and media analytical data can help mobile network operators understand what their customer base is experiencing while on their cellular network and how it is impacting behavior. By understanding the real end-user experience with various forms of content, mobile network operators can incorporate QoE metrics into their CEM model when making decisions on how to best manage the mobile network and the customer experience.

Deliver a Premium Video Experience

Delivering huge amounts of video content over the cellular network during peak times, when the network is most congested, doesn't appeal to any stakeholder in the delivery chain. Mobile subscribers want a better and more consistent viewing experience, mobile network operators struggle to manage the network capacity required to deliver HD videos, and suboptimal video playback affects the brand of the content owner.

The High Start Group survey identified the video viewing behaviors of mobile users. The survey showed that watching videos, in particular short-form videos, has unrestricted physical boundaries – with consumers looking for short video distractions throughout the day at home, at work and during their commute. Survey respondents desired instant startup when it came to watching videos on their mobile device. When videos buffered and viewers saw the “spinning wheel of death,” it elicited a very negative emotional response.² This type of frustration typically leads to abandonment of the video and an unhappy customer. A research paper⁵ published in November 2012 measured stream quality and the correlated viewer behavior on a global scale. It identified that if a video takes longer than 2 seconds to begin playing, viewers will start to abandon the video, and after a 10 second delay, more than half the audience will leave. Viewers were also less tolerant of startup delays for short videos, such as news clips, than they were for long-form videos, such as hour-long TV episodes. These are precisely the videos mobile users gravitate to when they are on the road. While viewers are definitely more patient when viewing on a mobile device, faster connection speeds are leading to greater expectations and lower tolerance for delays.

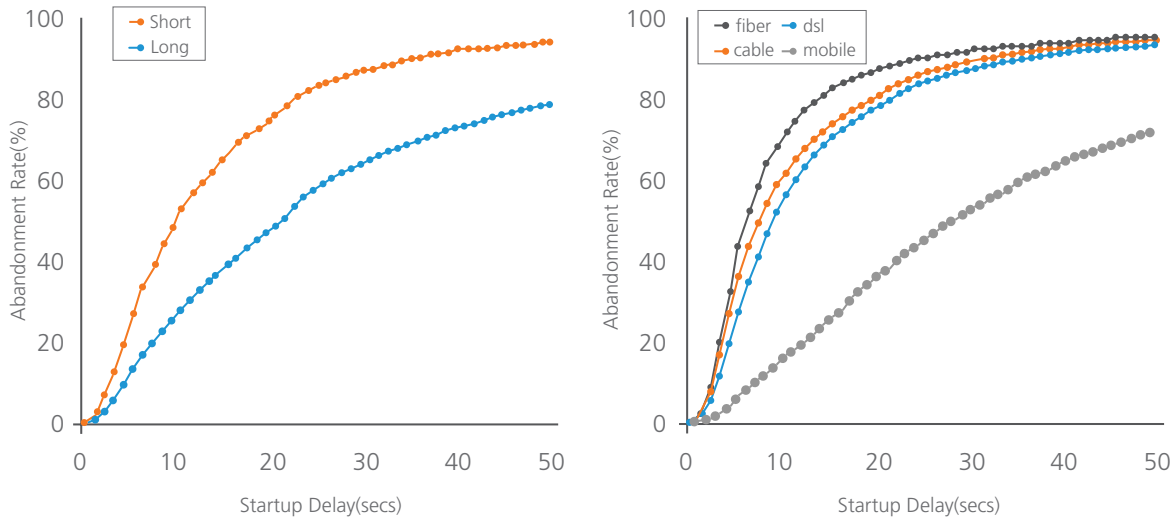


Figure 2: Startup Delays and Associated Abandonment Rates by Content Type (Short-form vs. Long-form) and Access Type⁵

Pre-positioning video content on user devices could help solve a lot of these issues and provide the ultimate experience for all parties involved. Using predictive analytics, mobile network operators can deliver video content customized to each unique user based on their interests and pre-position that content to mobile devices during off-peak hours or when a strong Wi-Fi signal is available. This will personalize the video service and move the delivery to a more cost-effective time of the day. The results are instant startup of the videos and a superior viewing experience regardless of the time of day or the situation of the cellular network. Also, in exchange for a cooperative opt-in delivery approach, the end user will not have the download counted against the wireless data plan. This approach will alleviate data cap issues that currently constrain the mobile user – providing a real perceived value to the consumer. This presents mobile network operators with an opportunity to manage peak congestion, differentiate the network, generate revenue and deliver quality video service to customers.

Utilize Off-Peak Capacity to Reduce Cost of Delivery

Cellular networks are built to support peak-level traffic at the busiest times of day in an effort to reduce wireless network congestion and increase performance. Building for these peaks is not only costly, but it leaves a good portion of the network capacity unused for much of the day. This surplus capacity, if left unused, is a lost opportunity to deliver mobile content. By understanding the situation of the cell site and what content is most likely to be consumed, mobile network operators can deliver content using the surplus/idle capacity when RF signals are strong. Mobile network operators can manage traffic by delivering content at a time when it is most cost effective, helping to elevate peak traffic levels and ensuring a better mobile experience regardless of the time of day. It also increases an operator’s ability to deliver more GB/month to users with no additional capacity needed.

Improve QoS for Latency-Sensitive Mobile Content

Today’s websites are delivering more engaging and personalized experiences to their mobile visitors in order to attract viewers and convert them into customers. To deliver a more personalized experience, web properties have increasingly moved from static and easily cached content to dynamic content that needs to be populated on the fly when a user comes to their mobile web page. Accessing more dynamic content can result in latency and a higher level of packet loss in a mobile network environment, which in turn leads to slow response times. TCP and HTTP can fail over long distances and in congested environments, requiring repeat back-and-forth calls to origin servers. This results in significant page load time delays and frustration on the part of the mobile consumer. Seconds of delay can cause high abandonment for many critical web applications.

Improving QoS for content delivery requests terminating on a mobile network is equally valued by mobile customers and by content providers. This value can be monetized, and it is one of the principles behind mobile Content Delivery Networks (CDN). The time it takes to render a mobile website and the time it takes for the customer to engage directly impacts the content provider’s brand image and the customer’s desire to purchase. Companies that offer mobile commerce/travel/ banking services are particularly sensitive to suboptimal or inconsistent performance over cellular networks. Any increase in speed has a direct impact on mobile site conversion rates. Figure 3 shows how page load time can dramatically affect abandonment rates for a site accessed via iOS devices. In addition, if a customer is dissatisfied with a website’s performance, 49% of tablet and 40% of smartphone users are unlikely to visit the site again, and 33% of tablet and 26% of smartphone users are less likely to purchase from that company regardless of the sales channel.⁶ The stakes are high for businesses looking to engage their customers via mobile devices. For mobile network operators, the ability to monetize this opportunity is tied to enabling consistent, high performance content delivery in the mobile network and improving the end-user experience for key mobile interactions.

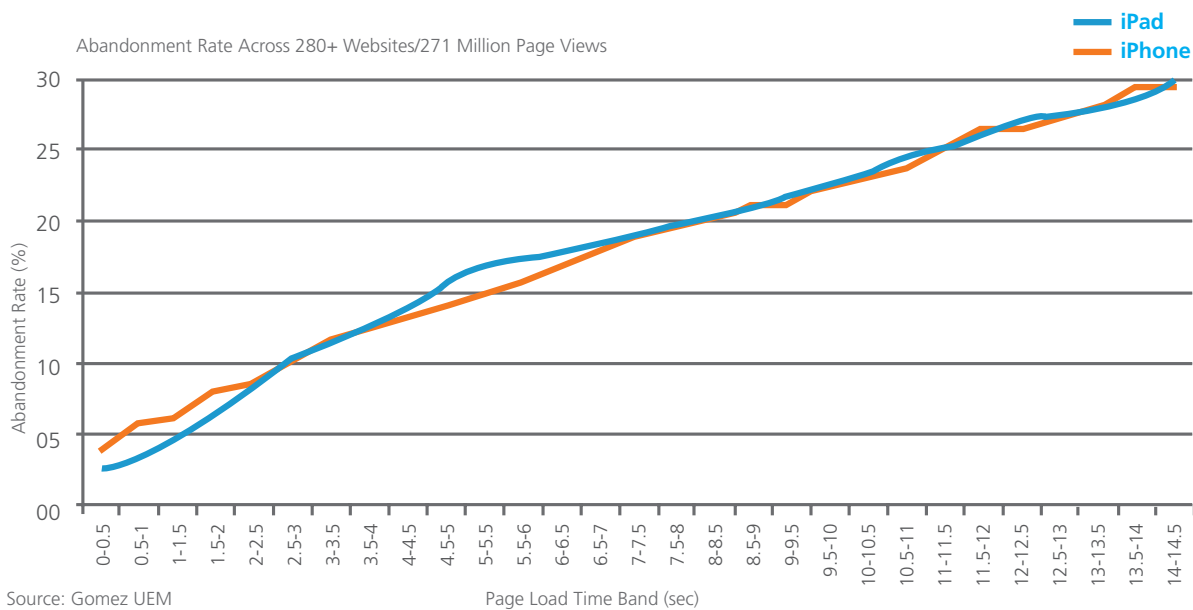


Figure 3: Page Load Times and Associated Abandonment Rate⁶

Identify and Optimize Encrypted Content

To further complicate mobile traffic optimization, mobile websites and applications are now embracing encryption to secure content and improve privacy. There are many reasons for moving towards encrypted content; one is that it makes consumers more comfortable dealing with mobile websites when accessed over public networks. Another is that content providers adopt encryption specifically to remain in control of their content delivery and avoid traffic management solutions that they view as arbitrary to the needs of their service, such as using proxies as middleboxes, which hinders optimization protocols like adaptive bitrate (ABR) streaming used by content providers in the cloud. They do not want operators “optimizing” traffic unless it is done explicitly to improve the user experience. Netcraft’s January 2014 web survey found that SSL use among the busiest million, sites was up 48% YOY, while the total number of SSL certificates had increased by a over a half a million or 22% YOY. Encrypting content removes any and all insight a mobile network operator may have into the content it is transporting. Content filtering, parental controls, TCP optimization, video optimization, security services and monetization techniques relying on analytics and deep packet inspection (DPI) are significantly diminished with encrypted content and make it challenging for mobile network operators to optimize traffic using traditional methods.

In a world where encrypted content is becoming the rule rather than the exception, visibility into the content is required to recognize and optimize wireless traffic. Mobile network operators need to collaborate with the organizations that are sending the traffic over their network in order to have this visibility. A CDN can help foster collaboration between mobile network operators and content providers and smooth out the barriers to optimization as a result of encrypted content. Integrating a CDN into the traffic optimization solution simplifies the coordination between content providers and mobile network operators to ensure the needs of the content or application are taken into account. By making the network content aware, it allows mobile network operators to expand their customer relationships to deliver premium content and value-added services that enhance the mobile experience.

Leverage a CDN to Scale a Comprehensive Content-Aware Solution

There are tens of thousands of content providers and millions of mobile websites and applications. The sheer volume of content makes it impractical for mobile network operators to scale a content-aware solution without the integration of a CDN. CDNs already unify the fragmented Internet market for many fixed-line networks and can provide a mechanism for mobile network operators to scale a solution across content providers. Partnering with a CDN to provide technology and content relationships offers many potential benefits including: access to detailed QoE metrics, accelerating traffic delivery, delaying expensive network expansions and providing value-added services and premium content to customers. CDNs are a trusted partner for many mobile websites, applications and video distributors, and they have expertise in handling traffic across carriers worldwide. Leveraging the assets and relationships of a CDN could prove essential to a mobile CEM strategy going forward, as CDNs exist to serve content with high availability and high performance, while providing a high quality of experience for end users.

Summary

The rise in media, dynamic and encrypted content over wireless networks is putting pressure on the mobile operator's network; usurping traditional lines of revenue and rendering current mobile traffic optimization techniques less effective. In order to properly support the continuing growth in wireless data usage and provide a superior customer experience, mobile network operators need to implement a CEM strategy that understands the content being transported and the real mobile user's QoE. A content-aware solution gives mobile network operators the tools to optimize traffic and deliver content according to customer expectations and usage behavior. Mobile network operators, who understand the requirements and characteristics of the content they are transporting, can accelerate content delivery where required, reduce the cost of delivering data and provide differentiated services to subscribers. A mobile CDN partnership offers a unique opportunity to manage traffic according to the needs of the content owner and the end user and deliver on the value of CEM.

Akamai Emerging Mobile Products

Akamai is a leading cloud platform for delivering secure, high-performing user experiences to any device, anywhere. Akamai serves a daily peak of almost a terabit of traffic to mobile users, 30-35% of which is encrypted content. The Emerging Mobile Products Group is focused on developing unique solutions for mobile network operators that leverage Akamai's scale, technology and content provider relationships to optimize mobile traffic for a superior mobile user experience. Akamai is expanding the focus of the mobile CDN to create a new archetype for traffic optimization by externalizing mobile operator assets to the cloud where they can be leveraged to provide better visibility into content, provide greater experiences to end users, deliver value added services and support a more efficient mobile network.

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As the global leader in Content Delivery Network (CDN) services, Akamai makes the Internet fast, reliable and secure for its customers. The company's advanced web performance, mobile performance, cloud security and media delivery solutions are revolutionizing how businesses optimize consumer, enterprise and entertainment experiences for any device, anywhere. To learn how Akamai solutions and its team of Internet experts are helping businesses move faster forward, please visit www.akamai.com or blogs.akamai.com, and follow @Akamai on Twitter.

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