WHITE PAPER

LTE Broadcast

Sponsored by: Qualcomm

Sathya Atreyam William Stofega
September 2014

SITUATION OVERVIEW

There is little doubt that television (TV) has produced the most efficient and powerful content distribution and consumption platform of the 20th century. In the new millennium, the potential of Internet and innovation coupled with the rapid technologic advancement of mobility is already disrupting the dominance of television as a media platform. More specifically, with the introduction of the smartphone and high-speed 4G networks, the notion of mobile TV has become a reality.

In 2002, South Korea became the first country in the world to deploy a mobile TV service using CDMA IS95-C and 3G (CDMA2000 1X EVDO). In Europe, BT in the United Kingdom rolled out mobile TV service using the Digital Audio Broadcasting-IP (DAB-IP) standard, and three operators in Italy were among the first to offer a mobile TV service outside of Asia. In the United States, new alliances between entertainment and news organizations and mobile operators were quickly formed in anticipation of new revenue driven in part by new rate plans as well as advertising models. For instance, in September 2002, The Walt Disney Company became one of the first content providers to enter into a deal with mobile operators. This deal allowed AT&T and Sprint mobile customers access to Disney's content library through branded operator services known as mMode and PCS Vision, respectively. In 2005, Disney decided to double down on mobile TV and create its own service as a mobile virtual network operator (MVNO). Verizon launched its V CAST service in 2005, an offering that included access to NFL football games, with both Sprint and AT&T eventually offering a similar service. Both Verizon and AT&T utilized Qualcomm's MediaFLO technology to deliver content to their customers.

Although those involved in delivering the new service had high expectations for delivering video content, the reality proved to be less promising. In Europe, BT cancelled its service a year after it was introduced, and both Disney and ESPN cancelled their services because of the less-than-enthusiastic response. Sprint still offers a mobile TV service in partnership with MobiTV Inc.

IDC believes that despite the rather lackluster start, underlying opportunities for mobile video remain as strong as ever, especially with the robust growth of Long Term Evolution (LTE)–enabled networks and devices. The roles assigned to the key partners in the ecosystem are rapidly shifting, creating both opportunities and challenges. Operators are acquiring content as part of a strategic initiative to offset the incursion of over-the-top content providers. However, the ability of operators to efficiently transmit this content to their high-value mobile customers has become nothing less than a barrier to transforming their business and offering more revenue-generating services to their customers. IDC believes that LTE Broadcast (sometimes referred to as evolved Multimedia Broadcast Multicast Service [eMBMS]) provides

both a technology and a platform that will help operators create revenue-generating services. This white paper focuses on understanding and exploring new business models enabled by LTE Broadcast to build revenue-generating opportunities for mobile operators, device OEMs, and content providers.

What Is Different This Time?

Expectations regarding video use and consumption have increased over time. Improvements in network and device performance and more device storage have led to a better mobile content experience. At the same time, consumption has increased with little regard to efficiency, which in turn has created unsustainable demands on the network and lower quality. IDC believes that improvements in devices aided by growth in networks utilizing LTE have created an ideal environment for combining powerful devices and fast LTE networks capable of efficiently delivering content via LTE Broadcast. There is evidence that a well-defined services market exists, pushed in part by demand for video services and related content. However, simply expecting a return on investment (ROI) by replicating past efforts over an LTE network will not provide the needed uplift. One of the key issues related to past deployments is that mobile video services simply replicated traditional terrestrial TV service. For their part, operators narrowly defined video as a product to be consumed instead of a platform that could deliver a variety of services including entertainment. This notion of product instead of platform defined the early attempts at delivering content to mobile devices. These older technologies, including DVB-H, were designed specifically to deliver a linear video experience to mobile devices with little flexibility.

LTE Broadcast can provide the flexibility needed to deliver a variety of different services. This is critical because the need for all partners in the mobile ecosystem, including operators, OEMs, and content providers, to drive new revenue streams has only increased. Although the deployment of LTE networks is a critical first step in increasing financial performance, mobile operators will need to build new capabilities on top of their LTE deployments. This is especially important in saturated markets, such as Western Europe, which for 2Q12–1Q14 experienced a QoQ decline in wireless revenue of 4.78%. Unfortunately, some of the most problematic trends are in countries that are just beginning their mobile transformation to LTE. This suggests that the deployment of revenue-additive solutions is critical. We believe the following conditions to be conducive to creating new revenue-enhancing services that will be delivered via LTE Broadcast technology:

- The advent of low-cost smartphones, tablets, and other devices capable of delivering a high-definition experience presents an opportunity that was not available to earlier video implementations. Given the reliance on smartphones versus traditional computers in growth markets such as China, these markets should prove to be fertile ground for LTE Broadcast services.
- The enterprise mobility market has become the hottest market in terms of growth opportunities. Businesses as well as mobile operators will be looking for technologies that reduce the complexity inherent in many mobile device management platforms given the fragmentation of operating systems (OSs) and applications. We believe that LTE Broadcast is well suited to provide highly targeted delivery services for enterprise mobile applications.
- As referenced previously, attempts to deliver mobile content were largely focused on replicating the terrestrial TV experience. LTE Broadcast is a flexible delivery platform that is able to support a variety of revenue-generating applications as well as cost-saving operational tasks. These tasks include delivering application or software updates to millions of smartphone subscribers.

- Despite missteps in the past, the delivery of video content is certainly a high-value opportunity, and LTE Broadcast is well suited for the task given its highly efficient characteristics. The TAM for video has increased beyond just entertainment to include delivery of emagazines and newspapers, enterprise video content to corporate employees including the sales force, and specialized content to emergency first responders. Content providers are pushing their content to personal devices beyond the TV, including tablets, phones, automobiles, and public transportation.
- Past attempts to distribute content via technologies such as unicast forced the mobile operator to deliver its service to wide swaths of its customer base. Although this approach aimed to expose the service to as many subscribers as possible in order to generate revenue, the result was not seen as a success. In some cases, promotional and paying subscribers in densely populated areas converged on popular programs, creating unacceptable quality issues. In other cases, subscribers in sparsely populated areas found that their networks had not yet been upgraded to deliver an acceptable video experience. LTE Broadcast allows an operator to deliver high-quality service to dense segments of its subscriber base, thus creating the best possible opportunity for monetizing the investment.
- IDC believes that pushing specialized content to specific verticals represents a greenfield opportunity that is largely unrecognized. For instance, car dealers are looking to ensure that their customers spend less time waiting for routine maintenance to be completed at dealer service centers. Currently, software updates related to engine performance and related systems require a trip to the dealer. The cost of performing these updates is billed back by the dealer to the manufacturer. LTE Broadcast can be harnessed to deliver software upgrades over the air, thereby negating the need for customers to waste time at the dealer.

Video constitutes most of the traffic that flows over networks today. We believe that there is demand for specialized video and related content services that can be delivered over LTE Broadcast. IDC research shows that more than half of smartphone owners are streaming video content. The battle for content services is more about efficient delivery to the existing customer base while delivering new services. In either case, we show that LTE Broadcast provides the most efficient delivery platform.

UNDERSTANDING CONTENT DELIVERY VIA LTE BROADCAST

IDC expects that within a constantly evolving mobile ecosystem, companies will continue to migrate to new business model approaches – and refine their existing approaches – because customers demand new ways of buying and deploying software. The ability to be successful with the transition will depend very much on a company's culture and ultimate desire for success. Transitions will not happen overnight, and success will be measured over a period of years versus months. By investing extensively early on, across various technological and business aspects of the LTE Broadcast opportunity, Qualcomm has made its intentions clear to motivate key stakeholders such as mobile operators, content delivery networks (CDNs), and device OEMs.

Technical Overview and Qualcomm Solution

The international body Third Generation Partnership Project (3GPP) recognized the growing adoption of the LTE standard and took proactive steps in the right direction to introduce the next set of capabilities under the umbrella term *LTE Advanced (LTE-A).* 3GPP Release 8 and Release 9 address the LTE standard and network architecture. The standardization of broadcast capabilities under the

LTE-A umbrella, often referred to as eMBMS, is part of 3GPP Releases 10, 11, and 12. A typical eMBMS solution would have to be incorporated at different levels of a protocol stack within different functional elements of a mobile network. This starts from the smart user equipment (UE) devices and spreads to the eNodeB (eNB) radio stations as a logical entity called multicell/multicast coordination entity (MCE) and into the evolved packet core (EPC) components as another logical entity MBMS gateway (MBMS-GW). In addition, there are requirements for the logical entity broadcast/multicast service center (BM-SC) to efficiently communicate with the provisioning systems in the network for content delivery tasks such as scheduling, provisioning, and monitoring. Qualcomm, with its eMBMS initiative in its forward-looking strategy, has actively engaged with the 3GPP committees, UE manufacturers, network equipment vendors, mobile network operators (MNOs), and content delivery networks.

Advantages and Efficiencies

Qualcomm has adopted a multipronged approach in influencing the key contributors to an LTE Broadcast solution rollout. With a proven software development kit (SDK), application and service providers are able to reduce the time taken to validate interoperability with network equipment providers (NEPs) and encoding vendors. An intimate knowledge of the 3GPP eMBMS protocol stack allows Qualcomm to help NEPs incorporate end-to-end optimization techniques when it comes to channel acquisition and reducing switching latency. This is particularly helpful in the case of streaming and file download services on a mobile device. An eMBMS solution brings the promise of enabling MNOs to offer exclusive services that can efficiently distribute live and other digital media. A fully scalable SDK solution that simplifies app development opens up the option for an MNO to expose a consistent set of service features. The Qualcomm eMBMS solution leverages 3GPP features like Dynamic Adaptive Streaming over HTTP (DASH), File Delivery over Unidirectional Transport (FLUTE), and correction methods Raptor and RaptorQ, enabling MNOs to offer a robust commercial quality broadcast service and at the same time optimize device battery management.

Adoption Trends

With LTE technology beginning to roll out across the globe, multiple MNOs are thinking ahead to address the growing customer demand for content. Although LTE provides a variety of technical advantages including higher data speeds, it does little to address the revenue concerns as over-the-top players utilize network resources to deliver content to subscribers with little or no payback for the operator. Thus LTE should be conceived not as the endgame but as a foundation on which to build revenue-generating platforms.

Qualcomm is actively engaging forward-thinking MNOs that are in the race to gain first-mover advantage when it comes to rolling out LTE Broadcast technology. KT Telecom launched an eMBMS solution activity in early 2014. The Qualcomm eMBMS solution is being trialed across a variety of areas such as stadium broadcast, entertainment, file delivery mechanisms, and smart cities relying on digital signage. Verizon trialed its solution at the Indianapolis 500 in May 2014 and, more recently, at GoPro Grand Prix of Sonoma. On August 15, 2014, AT&T reported its intention to roll out LTE Broadcast.

BUSINESS USE CASE MODELS

IDC believes that given the rich set of technical capabilities that are part of the LTE specification, business use cases for LTE cover a wide range of applications and cost-effective, operations-focused tasks. When evaluating the business use case for deploying LTE Broadcast, operators, OEMs, and content providers must think of LTE Broadcast as a platform for revenue-generating services rather than a singular technology. In addition, it is important to think of services that can be delivered via partners as well as those that can be delivered by the deploying entity. Creating an ecosystem of partners that can package and bundle a variety of services will only help speed up monetization of LTE Broadcast.

As much as we believe that LTE Broadcast constitutes a multiuse platform for mobile operators, we also see that the industry is rapidly changing and creating new opportunities and business models. Major new sources of competitive advantage are being built by creatively leveraging what IDC calls the "four pillars" of the 3rd Platform of computing (cloud, mobility, social business, and big data/analytics technologies): a once-in-every-20-years paradigm shift that has transformed the ICT landscape and, therefore, the business landscape too.

Software Upgrades

Although the pervasive use of smartphones has led to a massive shift in the digital economy that has created many new business opportunities, smartphones have also created just as many problems. More mobile computers than phones, smartphones make use of sophisticated operating systems that run a wide range of applications. These applications run the gamut, including sophisticated business as well as games that deliver the same level of detail and performance associated with game consoles.

Prior to the smartphone era, software upgrades followed a predictable and highly managed software upgrade process. This is primarily due to the static singular use case of the feature phone as well as the reliance on a proprietary operating system. The smartphone introduced a shifting and unpredictable relationship between operating system vendors, OEMs, mobile operators, and application developers. The smartphone era introduced an update process that is continuous as operating system vendors, OEMs, mobile operators, and application developers respond to a variety of issues, including fixing software bugs, updating versions to introduce new features, and patching security holes.

Upgrading software has become a particularly burdensome issue for all involved in the process, but it can be especially difficult and costly for mobile operators. For their part, mobile operators must make operational decisions regarding when and if to push a particular software release balanced by the effect on their network resources. From our conversations with network operators, we suggest that the size and frequency of software release can be almost overwhelming. For example, we note that a recent iOS update was approximately 1.47GB in size, requiring careful network management when pushing out the update to iPhone users. For this reason, many operators have decided to utilize WiFi as the primary network technology for smartphone software upgrades.

This strategy may help avoid congestion issues that can occur when a key update is made available; however, there is a downside to relying on WiFi. In conversations with mobile operators, IDC learned that the compliance rate for software upgrades tends to be lower, with one operator citing only 70% of its smartphone customers downloading and installing the upgrade compared with 90-95% compliance using cellular technology. While the implications of not downloading a software upgrade can be trivial, critical updates – especially those that close security loopholes – can create significant problems that can potentially damage the brand and result in adverse publicity. For instance, in April 2013, a complaint and request for investigation was filed at the U.S. Federal Trade Commission citing AT&T, Sprint, Verizon, and T-Mobile for not providing critical security updates to their Android smartphone customers, thus exposing these mobile operators to a variety of damages, including invasion of privacy as related issues. Although the disposition of this complaint is unclear, IDC believes that it represents a threat to the reputation of all mobile operators.

In fact, while updating customers to the latest versions of operating systems and applications is important, several operators have stated that maintenance upgrades that close holes and patch critical application functions are the primary focus. In pushing critical updates, some operators utilize their LTE network, which they claim can increase successful downloads and installations from 70% to upwards of 95%.

The addition of LTE Broadcast can help the process of completing critical software upgrades more efficiently. For instance, LTE Broadcast is highly efficient in densely populated locations. We also understand that software upgrades are typically done in stages that target a set number of subscribers in a particular location. This conservative approach is employed not only to guard against potential installation problems but also to lessen the strain on the network. However, it adds more delays to a process that can take as long as four to six months. It makes sense to utilize the efficiencies of LTE Broadcast to deliver critical updates faster at less cost.

Software Updates and the Customer Experience

The sense of urgency related to critical software upgrades provides a well-rounded opportunity to take advantage of the benefits of LTE Broadcast. However, IDC also believes that it is important to fix less critical software problems that can lead to poor end-user experiences that inevitably contribute to customer churn. As smartphones have become more complex, customer support agents at mobile operators often are required to fix problems that are difficult to diagnose. This is especially true with smartphones running Google's Android operating system. The Android operating system does not function as a unified, well-articulated code base; there are many flavors of Android, each of which includes subtle differences in the code that can cause havoc with applications or core functions of the device. In some instances, customers who have purchased a new Android phone experience problems that cannot be solved during a call with a customer support agent. The result is an expensive use of call center resources and often a costly device return.

Bring Your Own Device

Enterprise IT managers and buyers are in the midst of a fundamental shift in the acquisition of mobile devices, including smartphones and tablets. As a response to the groundswell of demand for devices that are not purchased or supported by the IT organization (known as corporate liable), the notion of bring your own device (BYOD, or individual liable) is now mainstream in corporations on a worldwide basis.

IDC forecasts that total smartphone shipments will reach approximately 1.8 billion units by 2018. IDC expects worldwide shipments of corporate-liable devices (those that are purchased by the company for use by its employees) will grow at a CAGR of 8.8% to reach 149 million units by 2018. By comparison, worldwide shipments of BYOD devices will grow at a CAGR of 15.3% to reach 331.1 million units by 2018 (see *Worldwide Business Use Smartphone 2014–2018 Forecast and Analysis,* IDC #249178, June 2014).

Although BYOD represents potential cost savings, issues related to software upgrades as well as compliance with regulatory requirements have unanticipated problems for IT managers. Some of these problems are a direct result of the rush to improve the cost structure by shifting device costs to the employee without considering the business risk and operational friction. Similar to carriers that face issues regarding managing mobile software upgrades, enterprise IT managers have quickly discovered that the financial benefits of BYOD come at a cost. For instance, recent conversations and IDC surveys with corporate IT managers and end users who have deployed BYOD have revealed that security is always a top concern.

Yet, despite the concern regarding security on mobile devices, IDC found that only 31% of U.S. IT managers push out smartphone operating system updates, and only 33% of managers do so on a worldwide basis. By comparison, 75% (worldwide and the United States) of IT departments push out PC operating system upgrades, and 60% (worldwide and the United States) push out enterprise applications and security updates.

IDC believes that two factors contribute to this seeming lack of interest on the part of IT managers regarding security on mobile devices. First, despite the pervasiveness of WiFi inside corporations, the upgrade process is hardly smooth. Users experience difficulty logging into the network, and coverage is often uneven at best. Many mobile device management platforms do not have full control of device upgrades, especially those that affect the operating system with the employee as the only reliable mechanism in the upgrade process. Lax OS upgrade compliance in terms of device management as well as reliance on WiFi will lead to security breaches and compatibility issues with core enterprise applications.

Utilizing LTE Broadcast to push out mobile enterprise software upgrades represents a true early-stage monetization opportunity for mobile operators. IDC believes that the mobile enterprise management software market will grow to $2.2 billion by 2017 (see *Worldwide Mobile Enterprise Management Software 2013-2017 Forecast and 2012 Vendor Shares,* IDC #241650, June 2013). Further, the ability to extend an enterprise-focused LTE Broadcast service to multitenant offices increases the ROI dramatically.

Mobile Media

Traditionally, media content has been consumed by subscribers through different channels, whether via print or by accessing the Web on the desktop and, in the past decade, through subscribers' smart devices (phones, tablets). Content providers and service providers have to take a new sales approach to delivering content over the mobile network. A key focus for these companies is the reduction of friction in the sales process, particularly with new offerings. Existing high-touch sales approaches do not meet the needs of customers that have expectations for quality of experience, price transparency, low sales interaction, and self-provisioning. Mobile operators and content providers, such as The Orange Group, EE (formerly Everything Everywhere), and BBC, indicated in their conversations with IDC that they have to recognize the importance of having clearly differentiated offerings and processes

to support traditional and new business models when delivering content to the subscriber. IDC believes that these new models will also require business expertise integrated with platforms that can be additive to revenue. For instance, Verizon Wireless has developed and patented a platform for broadcast services that will enable the following features:

- Bill discounts if subscribers are willing to watch ads
- Location-based advertising
- The ability to discount content if a minimum number of subscribers are reached
- "Zero rate" or "sponsor" any data delivered over LTE Broadcast

We believe that the innovative business models and technology will allow Verizon to realize returns on its investment much faster than simply rolling out a standalone product.

A mobile subscriber fluctuates between the perpetual models of consuming content and the need-based models of consuming content. In a situation where there is no clear segmentation, mobile operators and content providers alike have to make a call as to which model they will pursue. eMBMS technology presents stakeholders with the flexibility to adopt a hybrid of both the perpetual subscription model and the need-based subscription model. A large media house in Europe is using eMBMS to download digital editions of large newspaper dailies without affecting network capacity. Typical file sizes are as large as 1GB, with high-definition video clips. In another example, terrestrial radio stations, in an effort to retain their demographic dividend, are investigating the use of eMBMS to stream high-quality audio content. In addition to increasing customer loyalty with an improved listening experience, this initiative allows mobile operators to bring opex savings to radio stations, with a reduced number of back-end streaming servers.

Delivery of media via a mobile device has been a long-term objective of mobile operators as well as developers, OEMs, and content providers. In many ways, the journey toward mobile media consumption has taken longer than expected. Nevertheless, it is a journey that must be completed because end users' expectations are growing. In a discussion at the August 2014 Oppenheimer Technology, Internet & Communications Conference, John Stankey, Group President and Chief Strategy Officer for AT&T, noted that in the next several years as net adds begin to slow, the "basis of competition is going to start to shift onto other terms, and we know that what customers want to do with their mobile devices is they want to entertain themselves. We have done all kinds of studies, we have watched customer behavior, and it is largely video." Thus subscribers will base their services-buying decisions on who offers the best content. Anticipating this trend, Stankey commented," Just like today, the number one influencer of customers' decision around why they buy broadband is linked to their television services in their home. I think over time, in the mobile space, there will be a tighter link to aspects of what kind of content people can consume and how easily they can get at what they want to watch." Efficiency and spectrum will always be a concern, but technologies such as LTE Broadcast will allow operators such as AT&T to provide a competitive content offering for their customers.

BUSINESS ECONOMICS

The LTE Broadcast ecosystem can experience success only when key stakeholders such as mobile network operators, content delivery networks, and device OEMs are driven by a desire for a more flexible pricing model that aligns more closely with actual consumption or experience. Measurements could include user- or feature-based metrics such as average revenue per user per gigabyte for a high-definition experience versus a standard-definition experience. Furthermore, infrastructure-related metrics such as number of cell sites, number of subscribers per cell site, and LTE Broadcast–enabled device penetration could also factor into the cost. Other factors affecting cost could include service availability, scalability, and reliability. In addition, the ability to track and bill on metrics that scale up or down will play a critical role in the adoption of business models based on LTE Broadcast. Per-unit costs may be higher, but units being purchased at a more granular level could enable cost efficiencies.

For example, when we consider the case of TV- or event-based content, factors to consider when building a business use case could include the number of eNBs and related number of subscribers per eNB, availability of LTE Broadcast–capable devices, number of consumers per site who actually subscribe to this content, and average revenue per user per month for different services (live events versus seasonal programs). A mobile network operator deploying these levers in a business model could then project annual margins per subscriber per eNB site as potential revenue stream for this use case.

Off-Peak Delivery Services

The mobile consumer is driving an explosion in new services and new applications that the consumer demands in order to be happy with a mobile network operator. In turn, mobile networks are constantly challenged on one hand to deliver the best performance and on the other hand to keep opex costs to a manageable number.

Take, for example, the case of a mobile network operator that has a varied viewership pattern that is defined by the type of content. A hypothetical mobile network with 20,000 cell sites and 3,000 subscribers per site could be working with a unicast capacity of 15Mbps. An overnight file delivery over this network could require allocation of at least 40% of network capacity. In terms of gigabytes, this could be seen as around 16GB of overnight file delivery capacity on the network. If we were to consider the most popular TV content to take around 4.5GB of this capacity and attribute this to premium services, then the remaining network capacity would be around 11.5GB of TV content. Taking this case further, consider half the portion of this content is of interest to a typical viewer and that only half of the subscribers within a cell site are aware of the availability of this interesting content on their devices, and finally around one-tenth of those tablets have mobile content subscription. This would mean the network has to serve around 75 subscribers per site and handle an average content consumption of 0.11GB per viewer per day. Considering the rate of one event per day in a year for the number of subscribers in a particular cell site, the network capacity in gigabytes automatically builds up to a considerable number.

In the hypothetical example discussed previously, with the current unicast capacity of around 15Mbps taking up an extensive 40% of network capacity, this calculation can easily turn into an opex nightmare for any mobile operator. In such a situation, LTE Broadcast will almost immediately bring value by reducing the need for large network capacity in serving consumers. From a cost-saving perspective, mobile operators

could potentially queue up delivery of content during off-peak hours, thereby conserving precious spectrum resources during peak hours and also keeping network opex to a manageable number.

Sporting Events: Formula 1

Broadcasting live sports events to attendees is often cited as a winning use case for LTE Broadcast. Many of these scenarios involve broadcasting content that highlights difficult-to-see or interactive content to attendees at a live sporting event. Assuming that attendees are using an LTE Broadcast-enabled smartphone, the ability to reach sporting event attendees has been successfully demonstrated by Verizon Wireless, EE, Telstra, and others. IDC expects that monetization of sporting events will be done via agreements with advertisers, concessions, or selling team merchandise via special offers. Furthermore, the opportunity to gather and analyze data will help team owners improve and target their products.

We also believe that in addition to stadium-oriented sporting events, events that are not stadium oriented provide fertile opportunity for LTE Broadcast to enhance the event experience and create new revenue streams. For instance, the Formula 1 (F1) Motorsports series is one of the world's most watched events behind soccer and the Olympics. The events take place at venues on every continent except Antarctica, providing a marketing platform that is truly global in reach.

The events take place on large courses such as Belgium's Circuit de Spa-Francorchamps, which is 7.004km (4.3 miles) long and utilizes both purpose-built and public roads. It is impossible to build viewing stands around the course from both a logistical perspective and a financial perspective because sections of the race take place on public roads and are thus not permanent. Given the length of the course, much of the race takes place away from spectator stands. Race organizers have attempted to solve this problem by positioning large television screens near spectator stands. However, the positioning of the screens is not always possible, and even in optimal viewing, locations cannot accommodate all the spectator sections. Thus we believe augmenting the experience via LTE Broadcast to spectators will enhance the experience and provide much-needed new streams of revenue.

Formula 1 is considered to be the premier motor racing series, commanding the most skillful drivers who drive the most technologically advanced cars. It comes as no surprise that expenses incurred by the various teams can easily exceed $300 million per season. Over the past 10 years, Red Bull has spent over $1 billion in funding and developing its F1 team in concert with its partners (Christian Sylt's "Revealed: Red Bull's $1.2 billion Bet On Formula One," April 3, 2014, is available at **www.forbes.com/sites/csylt/2014/04/03/revealed-red-bulls-1-2-billion-bet-on-formula-one/**). Typically, F1 teams must raise at least 70% of their operating budget through sponsorships that include branding cars, team gear, and promotional/commercial appearances. In 2007, 257 sponsors contributed $2.75 billion to support the various teams that participated ("Analyzing Return-on-Investment in Sponsorship: Modeling Brand Exposure, Price and ROI in Formula One Racing," 2014, is available at **www.academia.edu/4417136/Analyzing_Return-on-Investment_in_Sponsorship_Modeling_Brand_Exposure_Price_and_ROI_in_Formula_One_Racing**). The television rights and related media licensing provide the balance of operating budget. Even with the budgetary largesse, costs continue to increase, and sponsors are becoming increasingly harder to find.

Although Formula 1 may represent the highest standards in terms of technical sophistication, its approach to interacting with its fans is lagging. At some venues, the race organizers have seen a decline in onsite attendance, with fans preferring to watch the event on terrestrial TV. Although this trend is not necessarily attributable to every race on the F1 calendar, it is concerning enough that some of the sport's most respected commentators have spoken out about the lack of initiative by the F1 governing body regarding monetizing new media consumption. In an interview in July 2014, former World Champion Niki Lauda, commenting on poor attendance at the German Grand Prix, noted that the audience "wants to watch sports in a different way than before because of the rapid growth of the new means of communication." Lauda was especially critical of the fact that Formula 1's current broadcast model does not allow for monetizing content beyond the company's licensing agreements with terrestrial broadcasters (Justin Hynes' "Is F1 Losing Its Buzz? Niki Lauda Offers Answer to Sparse German Crowd Puzzle," July 19, 2014, is available at **www.jamesallenonf1.com/2014/07/is-f1-losing-its-buzz-niki-lauda-offers-answer-to-sparse-german-crowd-puzzle/**). IDC believes that utilizing LTE Broadcast can help create a better experience for race attendees while creating new revenue streams for all parts of the ecosystem.

Economics

According to a 2011 report commissioned by Tourism Victoria, over the four days of the 2011 Australian Grand Prix, total attendees were 298,187. On a per-visitor basis, these attendees spent $791 (in-country) and $1,498 (overseas), with per-day spending of $243 and $192, respectively. With the cheapest three-day event ticket averaging $176, Formula 1 attracts fans that are willing to spend money to ensure the best experience. For the race promoters, despite projected expenditures of $50 million to $100 million, expenses can quickly erode margins (*The Economic Impact of the 2011 Formula 1 Australian Grand Prix,* July 2011, is available at **www.tourism.vic.gov.au/images/stories/Documents/FactsandFigures/2011_gp_eco_impact_final_21_07_11.pdf**). However, like many sporting events, advertising provides the most lucrative source of income for the participants. In 2007, sponsors paid $2.75 billion in fees to advertise on cars, team clothing, and other physical objects that can be branded. Despite the expense associated with sponsorship, brand exposure has been valued at $18.8 billion over a five-year period. At the 2011 Australian Grand Prix, it was estimated that Red Bull racing garnered $14.1 million in advertising value for its sponsors (*Formula Money ROI Review* is available at **www.formulamoney.com/roireview.html**).

IDC believes that adding LTE Broadcast can increase the exposure for sponsors, thus increasing the rates charged by race teams. Furthermore, the ability to add a value-added service for race organizers could also be instrumental in offsetting costs. For instance, consider a three-day event with 250,000 attendees. If half of these attendees are willing to spend $20 on a high-end service that allows them to get complete video coverage of the race, including special driver views, the expected revenue could be as high as $2.5 million. Even further, inserting advertisements into the live video feed, such as special offers around team clothing or admission to a special post-race event, could extend the revenue potential enabled by LTE Broadcast. Since the Formula 1 race event takes place over several days, using LTE Broadcast to transmit content after the racing day is over presents an opportunity to keep fans apprised of special events while allowing advertisers additional opportunities to keep their brand front and center.

At any Formula 1 race, the sheer number of brands vying for attention is overwhelming. Since most of the advertisements are analog, it is difficult to effectively measure audience response beyond exposure models. LTE Broadcast enables race promoters and sponsors to plan and accurately

measure and assess the effectiveness of their campaign. For instance, during a pause in the action, race promoters could insert advertisements for selected beverages; attendees who click on an ad pushed by LTE Broadcast via a smartphone could receive a drink discount and be directed to a special dispensing cart. Race promoters and sponsors could monitor response rates and adjust them on a real-time basis. Beyond crowd exposure, there is little to link the advertising value to measurable interaction with the brand. Using LTE Broadcast to push sponsored content that can be measured and analyzed to attendees will give sponsors a unique view into the value of their advertising investment while creating a new revenue-generating service for Formula 1.

CHALLENGES/OPPORTUNITIES

IDC believes that LTE Broadcast will play a critical role in creating new revenue streams, and mobile operators and others will take advantage of the 3rd Platform. However, it is important to recognize that simply deploying any new platform or technology does not guarantee success. Before deployment, it is important to anticipate and prepare for the challenges and opportunities that inevitably follow the acquisition of new capabilities. Furthermore, IDC believes that the terms *challenges/opportunities* are interchangeable and are intended not to suggest problems or easy solutions but to provide an outline that details various issues related to product development.

Challenges

- **Overcoming the past.** As detailed previously, the history of mobile content-related services, especially video, has created negative perceptions from customers that can be difficult to overcome. This is despite the fact that the technology has improved by leaps and bounds and that the capabilities for LTE Broadcast have moved well beyond efforts to mobile TV.
- **Smart device manufacturers.** OEMs will play an important role in delivering LTE Broadcast-ready devices to the market. As the smartphone market begins to cool, vendors are under considerable pressure to maintain their margins. This is becoming more difficult as growth shifts to emerging market countries that require lower price points. Lower-cost smartphones do not necessarily require components that may not be capable of reproducing a high-quality experience. Furthermore, OEMs and their mobile operator partners will need to make sure that the required software updates have been downloaded and installed.
- **Mobile operators.** For their part, mobile operators are struggling to contain costs and grow new businesses in an environment in which revenue from legacy services is rapidly declining. As most operators have built out their LTE capabilities at considerable cost, their willingness to spend additional money building out new systems represents an impediment. In addition, carriers have not done well conveying value, excitement, and exclusivity to their customers. Too often, carriers quickly resort to pricing as their primary approach to marketing. For LTE Broadcast to succeed, carriers will need to develop marketing strategy that takes into account the multifaceted capabilities of the service. Here, we stress that time to market is critical, and we believe that operators and service providers that deploy first will reap the greatest benefits and will be well positioned to become innovative market leaders. It is worth mentioning that when mobile network operators build out their LTE networks, it makes sense to make their networks LTE Broadcast compliant by including eMBMS as an optional feature.

Opportunities

- **Internet of Things (IoT).** Our business use case discussion on software updates focuses primarily on the opportunity of utilizing LTE Broadcast to push critical software updates to smart devices. Although we believe that this opportunity is attractive, we believe that the nascent Internet of Things market presents a massive yet untapped opportunity for LTE Broadcast. IDC predicts that revenue from IoT services will grow to $8.9 trillion by 2020 (see *Worldwide Internet of Things (IoT) 2013–2020 Forecast: Billions of Things, Trillions of Dollars,* IDC #243661, October 2013). In addition to the software updates opportunity, mobile operators will need to enhance their business models to include scalable machine-to-machine (M2M) wholesale revenue by offering managed end-to-end services to vertical industries such as manufacturing, healthcare, telematics, smart digital signage, and oil and gas. Typical applications include moving large workloads across geographies, telehealth, fleet management, smart grid monitoring, and high-bandwidth emergency diagnostics systems equipped with high-resolution cameras. The need to update and maintain operating and application software that controls a multitude of devices is duly addressed by the technological capabilities within the LTE Broadcast framework. For example, LTE Broadcast's capabilities are ideally suited for delivering content in areas that are densely clustered endpoints such as vending machines, parking meters, or even law enforcement vehicles.
- **Content delivery networks.** Not all CDNs are equipped to face the onslaught of consumer demand, rapid service adoption, and volatile customer churn. The ability to make, and justify, investments in risk and value chain resiliency is up to each individual CDN. However, it is obvious that such abilities will be influenced by a number of factors, such as tracking business disruptions over the past 12–24 months; preparedness to quickly recover from those disruptions; and adequate visibility into, and understanding of, potential vulnerabilities in the delivery chain. As consumers across varied age groups become more literate with their entertainment content needs, CDNs should work with mobile operators to leverage the power of eMBMS and rapidly adapt to a marketplace that is evolving to be simultaneously volatile, personalized, and demanding of quality in product and service.
- **Advertising and analytics.** As brand owners look to understand their return on investment as well as attract new customers, utilizing the data generated by LTE Broadcast will increase the value of the service. Thus LTE Broadcast creates an attractive revenue-positive service, and the data extracted from the service helps brands increase their ability to efficiently target customers that can help grow brand revenue.

3rd Platform Prerogative

Mobile network operators, enterprises, and organizations alike are grappling with how to address the impact of 3rd Platform technologies not only on their decision-making processes, operations, product rollouts, and promotions but also, most importantly, on how they engage with their customers.

The largest and most established mobile network operators are in the process of reinventing themselves. Customer expectations for how services are defined, designed, rolled out, and consumed have changed dramatically in the past decade, and mobile operators are adapting their business models accordingly.

However, it is very challenging for mobile network operators with existing business models to adopt new business model approaches. This means that mobile network operators with traditional businesses are at a disadvantage when it comes to moving to newer pricing and deployment models. With most of the mobile network operators having a foot in both the old and the new, the question is how to manage the transition.

It is also imperative for network equipment vendors, device OEMs, and content providers to work closely with mobile network operators as they roll out new business models. A large retail bank in a South Asian country is exploring ways to leverage the mobile network for its branchless banking services. In this example, a good banking experience will hinge on the quality of video experience. Further, business models of the bank and the mobile operator alike will be tested across the four pillars of the 3rd Platform, namely mobility, cloud, big data/analytics, and social business.

This transition cannot be achieved in isolation; rather, it has to be an ecosystem exercise wherein network equipment vendors, device OEMs, and industry verticals will have to join hands to offer the best possible service to the consumer.

CONCLUSION

LTE Broadcast has the potential to bring along sweeping changes that may affect multiple actors in the technology, media, and telecom (TMT) industry. There is a growing need to investigate new ways of thinking about the business problems within this industry and how LTE Broadcast can address some of these problems. It is essential that key stakeholders in the TMT industry identify individuals and organizations that are approaching a problem in a fundamentally new way that presents a transformational change. The onset of Internet of Things will drive the need for an earnest due diligence into verticals such as healthcare, sports, entertainment, manufacturing, automotive, and utilities.

LTE Broadcast holds the promise of a strong link connecting the current 4G/LTE networks and the 5G networks of the future. The advanced technical capabilities of LTE Broadcast have been thoroughly tested and documented, and the business use cases described previously are prescriptive and relevant. However, to take advantage of the capabilities of LTE Broadcast, carriers need to continue expanding the density and reach of their LTE networks while encouraging their partners, especially device OEMs, to expand LTE Broadcast capabilities to their entire portfolio. As discussed previously, the market is experiencing new and disruptive forces, requiring mobile operators and their partners to respond with products that can differentiate while creating new revenue flows. LTE Broadcast will enable mobile operators to deploy a flexible and efficient platform that delivers high-value services to their current customers as well as potential new customers.

About IDC

International Data Corporation (IDC) is the premier global provider of market intelligence, advisory services, and events for the information technology, telecommunications and consumer technology markets. IDC helps IT professionals, business executives, and the investment community make fact-based decisions on technology purchases and business strategy. More than 1,100 IDC analysts provide global, regional, and local expertise on technology and industry opportunities and trends in over 110 countries worldwide. For 50 years, IDC has provided strategic insights to help our clients achieve their key business objectives. IDC is a subsidiary of IDG, the world's leading technology media, research, and events company.

Global Headquarters

5 Speen Street
Framingham, MA 01701
USA
508.872.8200
Twitter: @IDC
idc-insights-community.com
www.idc.com