



Quality Mobile Broadband Network

A quality network is a must in attracting and keeping subscribers



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About the author



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Daryl covers the wireless infrastructure space at Ovum, with a primary focus on market activities as they apply to the radio access network (RAN). RAN coverage includes macro-, micro-, and picocell solutions for CDMA EVDO, HSPA/HSPA+, LTE (TDD and FDD), and LTE-Advanced. Daryl's research includes not only what infrastructure vendors are developing, but how mobile operators are deploying and using these wireless networking solutions.

As an industry analyst Daryl has been involved in such projects as helping technology vendors develop use cases for new products and services, identifying new technology trends, and providing market sizing and market share support. He regularly speaks at industry and vendor events on trends impacting the wireless infrastructure market. He is also sought out by trade publications to comment on mergers and acquisitions, new product announcements, and market developments as they relates to his coverage area.

Daryl brings over 14 years of industry analyst experience to Ovum. Prior to Ovum he held similar positions with Current Analysis and In-Stat. Before becoming an industry analyst, Daryl worked at telecommunications service provider Cable & Wireless USA, where he was a member of the marketing and competitive intelligence team.

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Summary

In brief

Quality pays. Quality especially pays when it comes to a mobile operator's network. An operator with a reputation for providing a good-quality network will attract and retain subscribers. Network quality provides a true competitive differentiator. The challenge is that "quality" does not come quickly or easily. There are several steps a mobile operator needs to go through to improve network quality. Those steps start at the planning stage, continue with assessment of current performance, and include changes for both short- and long-term improvement of the network.

Ovum view

- **Quality can be defined.** There are service metrics available that can be used to define a good-quality network. Those metrics include such things as network speeds, consistent performance, responsiveness, and footprint. Consumers can certainly recognize network quality.
- **Focus on performance measures that have the biggest market impact.** There are many different types of network quality tests from a variety of sources. Mobile operators should focus on those that get the most coverage and have the greatest impact on improving their reputation.
- **Investing in network quality has commercial benefits.** Ovum's research shows that network quality plays a major role in customer satisfaction. Negative network quality also leads to poor word-of-mouth, which hurts growth as well. T-Mobile provides a good example of an operator growing its market share as it improves its network's quality.
- **Quality changes over time.** Networks are not static. Different things can affect and change the quality of the network. At the same time, consumer expectations change as their usage patterns change. Operators need to be prepared for this. Maintaining the network quality is an ongoing process.
- **Quality improvements take planning and time and need to be implemented from the customer perspective.** To improve network quality, vendors need to have clear goals and definitions. Quality does not happen by accident. Vendors also have to realize that quality improvement has to be a full end-to-end process that ultimately addresses the user experience at the per-service level.

Recommendations for players

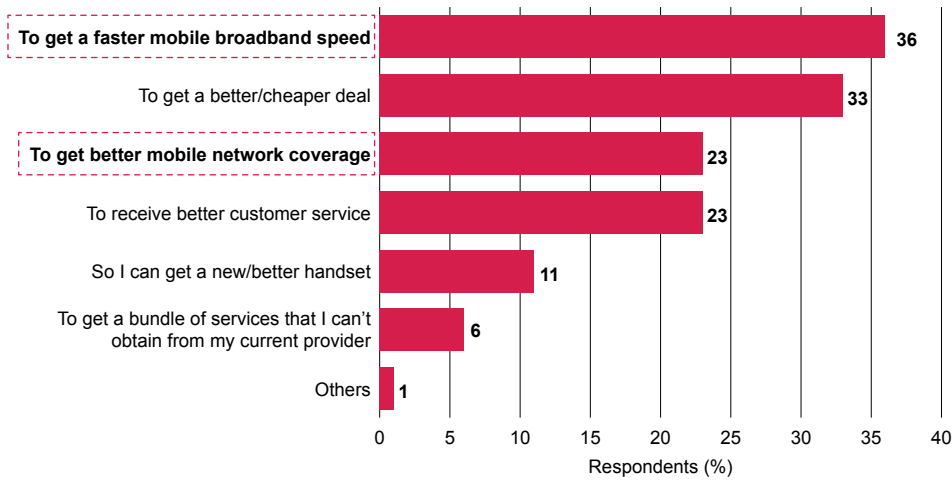
- **Service providers need to build KPIs and KQIs specific to their own competitive situation.** While a quality network should be quantifiable, what is needed to build a quality network is still very specific to the mobile operator's individual competitive situation.
- **Mobile operators need to embrace the importance of building a quality network as a way of gaining a competitive edge.** Network quality is very important to the end user. The investment in building a better network will provide a mobile operator with commercial benefits, such as reduced churn.
- **Improving network quality requires specific goals and timeframes.** Improving network quality can take several years, but there are short-term improvements that can be made as well. A well-defined plan to improve network quality aligned with business goals will help mobile operators manage the process and maximize the results.
- **Partners can help make network transformation successful.** Mobile operators should look to large-scale partners to help scope out and manage the network transformation process. Operators should especially work with partners that have a track record of successfully helping operators implement improved network quality.

Quality network performance benefits the operator

Network performance is a key differentiator in getting and keeping subscribers

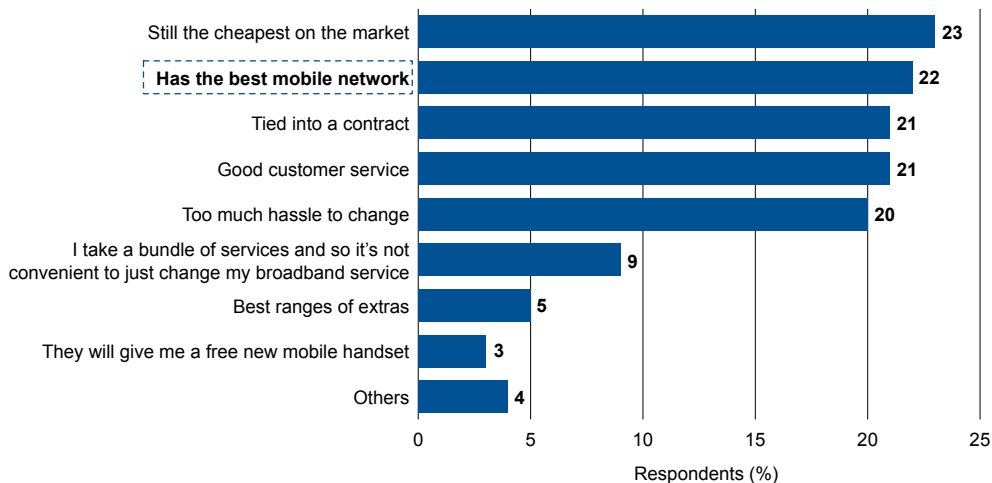
Clearly building a quality network demands a significant investment. It cannot be done any other way. Operators need to know that investing in a network is a good use of their resources and is important to customers.

Figure 1: Reasons for subscribers to leave their current mobile service provider



Note: n = 3,602
Source: Ovum

Figure 2: Reasons why subscribers stay with their current mobile service provider



Note: n = 9,036
Source: Ovum

Ovum's Global Consumer Survey, published in October 2014, indicated that network performance was a very important element in the relationship between an operator and its subscribers. When asked why they planned to change or churn from their current mobile operator in the next 12 months, two of the top reasons the survey respondents gave were network-related (see Figure 1).

When it came to reasons for staying with their current mobile operator, once again, the respondents indicated that a good network performance was important when it comes to retaining subscribers: "Has the best mobile

network" scores almost as high as service cost when it came to the reasons why consumers plan to stick with their current provider (see Figure 2).

Market share rankings back operators' network investment

Consumer surveys provide just one piece of evidence when it comes to the importance of network investments. Market share rankings also clearly indicate that network performance has a major impact on the market performance of an operator. Those that have historically tested well and invest in their networks tend to be market leaders.

Table 1 show six randomly selected mobile network tests and compares them against end-of-year 2014 market share results. In all six examples, the mobile operator ranked as having the highest quality network in that country had the highest market share as well. In many cases where operators came in second or third place on quality tests they also had similar market share rankings.

Table 1: Comparison of network-quality tests and market shares	
Ookla speed test of nine different regions across Russia measuring download and upload speeds and data latency	
Top-ranked mobile operator in Ookla test: MTS	Largest Russian market share at the end of 2014: MTS
P3/Connect network test for voice and data both outdoor and indoor of German mobile operators	
Top-ranked mobile operator in P3/Connect test: T-Mobile Germany	Largest German market share at the end of 2014: T-Mobile <i>(note: this ranking includes O2 and E-Plus separately, the merged O2/E-Plus overtook T-Mobile's market share at the end of 2014)</i>
UK regulator Ofcom ranked mobile operators 3G/4G networks on speed, time to load website, latency, and coverage	
Top-ranked mobile operator per Ofcom: EE	Largest UK market share at the end of 2014: EE
France regulator ARCEP ranked mobile operators' networks based on over 90,000 measurements	
Top-ranked in ARCEP tests: Orange	Largest French market share at the end of 2014: Orange
PC Magazine conducts an annual test of the fastest mobile networks in the US across 30 cities. Last test results were published June 2014	
Top-ranked mobile operator by PC Magazine: Verizon Wireless	Largest US market share at the end of 2014: Verizon Wireless
OpenSignal tested mobile operators for fastest 3G and 4G networks along with coverage for the cities of Sydney and Melbourne (Australia)	
Top-ranked operator averaged across all eight test variables: Telstra	Largest Australian market share at the end of 2014: Telstra
Sources: Ovum, ACREP, Ofcom, Ookla, OpenSignal, PC Magazine, P3/Connect magazine	

In the case of Germany, T-Mobile was ranked first for network quality. However, technically it was number two in terms of market share at the end of 2014 because, in October 2014, O2 and E-Plus merged giving the new entity the largest market share for Germany. Prior to the merger, T-Mobile had the largest market share. Pre-merger, O2 and E-Plus had the third and fourth largest market shares, respectively, and that was also where they were ranked in the P3/Connect magazine network-quality tests.

T-Mobile's market share transformation began with an improved network

At the end of 2012, T-Mobile was in fourth place in the US mobile market and clearly lagged its

competitors. Its network had a bad reputation and it was late in rolling out both 3G and LTE. However, in 1Q13, T-Mobile started to make moves to expand its network coverage and capacity in order to change that perception. Its LTE rollout, which started in the second half of 2012, accelerated in 2013. It improved its spectrum position through the acquisition of Metro PCS and at spectrum auctions.

In 1Q13, T-Mobile also started to aggressively market its network performance. Since then, its fortunes have changed dramatically. T-Mobile captured the bulk of 2014 growth in the US market (40% of the total reported net adds for the full year), particularly among postpaid subscriptions. In 2Q14, five quarters after launching its commercial LTE network, T-Mobile overtook Sprint as the largest prepaid provider in the US and it is likely to overtake it as the third largest mobile operator in terms of total subscribers before end of the first half of 2015. T-Mobile has even started taking advantage of third-party network testing from Ookla and OpenSignal to help build its public image as a top-performing network.

T-Mobile certainly has a way to go before it overtakes AT&T and Verizon Wireless in the US market, but its customer gains since early 2013 certainly show its network investments are delivering returns. T-Mobile's gross additions started to make a dramatic upturn at the same time as it started to improve its network reputation (see Figure 3).

Building the quality mobile broadband network

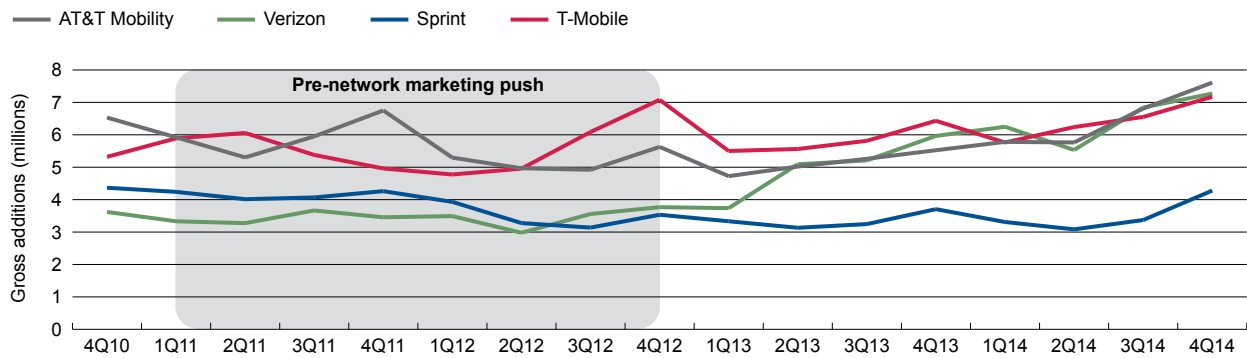
Quality can be quantified

Saying something is of quality is, by its very nature, a qualitative description. This means it is not always easy to quantify, but end users certainly can recognize quality. For mobile networks, this can be a challenge. Clearly the quality of the network is a very important asset. At the same time, there needs to be metrics to measure, or quantify, quality. To do this, an operator needs to focus on the measurable elements that have an impact on the overall quality of the network.

Ovum believes the elements that contribute to a quality network are as follows:

- **Network speed or capacity:** Generally network speed describes the download speed of a network; however, as devices grow in capabilities and end

Figure 3: US gross mobile operator subscriber additions, 4Q10–4Q14



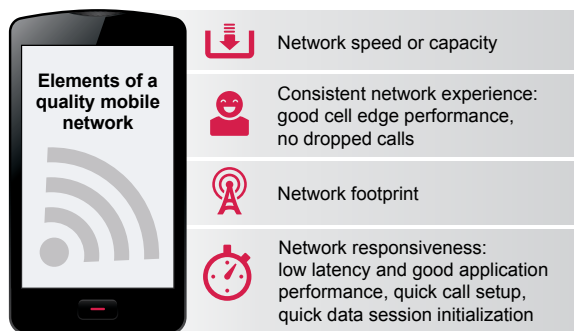
Source: Ovum, operator financial results

users create and upload more content, the upload speed will become more important.

- **Consistent network experience:** Mobile networks need to give the end user the same experience no matter where the user is located within cell coverage. Slower data speeds and dropped calls at the cell edge, such as found in subways, are not acceptable.
- **Network responsiveness:** People do not like to wait. Networks need to be built that respect this. This means low network latency and responsive applications, short voice call setup times, and quick data session initialization.
- **Network footprint:** Basically, network footprint measures the percentage of population or landmass a network covers. No matter how well a network performs when it comes to other elements, if it is not available, it is no good to the subscriber.

Figure 4 shows the network elements Ovum believes are needed to build a quality mobile network.

Figure 4: Elements of a quality mobile network



Source: Ovum

There are different sources for network measurements

As discussed earlier, an operator cannot just claim to have a quality network. These claims need to be backed up by network performance elements that can be measured. All of the elements previously highlighted as necessary to a quality network can be measured and quantified. Fortunately for mobile operators, there are many tools and sources, both in-house and third-party, for quantifying a quality network:

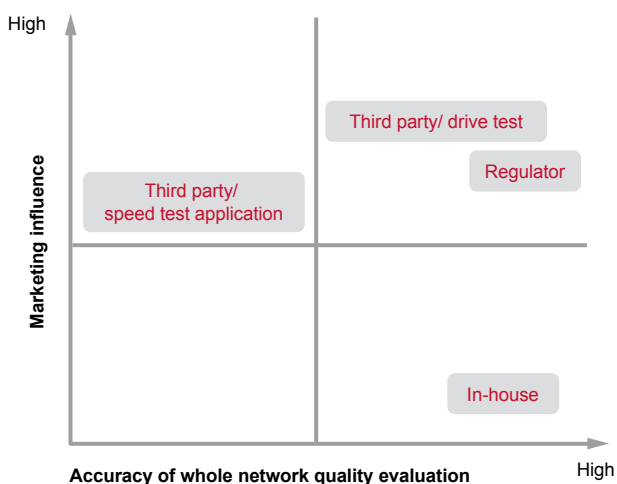
- **Operators have the most thorough data on their own networks, but that data has very little marketing value for brand building.** Clearly an operator has more data on its network performance and is in a better position to measure total network performance than any outside party. The problem with just relying on internal testing is that it does not provide good competitor comparisons and, as it is developed internally, it cannot be used in marketing.
- **Third-party testing offers objectivity, but can be limited in scope.** Several different third-party options exist for measuring network performance. Some of them can be crowd-sourced by way of device applications. Others can be derived from different drive tests; a third-party testing company drives around different markets and measures the network performance of several operators using commercial devices and specialized network testing tools. This data, as it is seen as impartial, is good for building the public perception of the service provider. The drawback is that some of the tests are limited in scope and only look at a few elements related to quality. This is especially true with tests based on device applications that tend to

have limited sample sizes, samples based only on smartphones, or samples based on only one or two network features. These types of test are great for marketing but limited for network planning.

- **Government network measurements can be extensive, but out of date and not released regularly.** Government regulators, like Ofcom in the UK, can be a great source for metrics on network performance. Results often get wide press coverage, which is good for marketing, due to their source. The problem is that government regulators may only publish testing results irregularly and may focus on out-of-date network elements.

The different data sources highlighted above can have different uses. Obviously they can be used in planning network improvements. The tests can also have a very important impact on marketing. External test from third parties and government regulators get press coverage and play a role in building the operator’s public image. Operators should examine which external network rankings have the greatest marketing influence and use those as a guide in prioritizing how they improve their networks. Figure 5 shows how different network testing sources compare when it comes to market impact and testing scope and accuracy. Clearly those tests with the most impact are where operators should start.

Figure 5. Marketing impact of different sources of network testing data



Source: Ovum

Challenges to achieving a quality mobile network

Network quality challenges are evolving

Network quality is not a fixed thing. It changes. Therefore ensuring network quality is an ongoing, never-ending process. While everyday events may not pose a challenge to networks, major events, such as music festivals, religious pilgrims, or big sporting events, could cause a strain that makes the network unusable. Traffic spikes coming from these events are outside the norm of usual network demands, but at the same time they can be forecasted and the network adjusted to meet them. Failure to prepare for these spikes can lead to very well publicized negative press coverage for the operator.

Another challenge is the introduction of new services. These services may interact with the network in a way that the network was not originally designed to handle. VoLTE is one example of this. The addition of voice service to a data network (LTE) will put new requirements on the network. Along with voice, the introduction of new applications – instant messaging or new games and video streaming from sources such as YouTube – can also have a negative impact on a previously well performing network.

Focus on the customer experience through KQIs

Mobile operators need to use measurable performance indicators when building a quality network. These indicators should be quantifiable. Operators have two sets of metrics that can be used in measuring how the network performs: Key Performance Indicators (KPIs) and Key Quality Indicators (KQIs):

- KPIs measure network performance at the network level. They can provide the mobile operator with data such as network latency, video packet loss, and successful network handover rates.
- KQIs measure the network at a service level. These measures focus on how the end user experiences a service or application and not just network performance. Not all services respond the same to similar network conditions. Focusing on the KQIs gives an operator a better way to measure and predict network quality. If the KQIs measure poor service quality, the mobile operator will need to use network KPIs to get a better understanding of the root cause of the poor service quality.

Figure 6: Steps in building a quality mobile network



Source: Ovum

Ultimately all of this should lead to operators thinking not just about performance per service, but also about performance per service per user. This extends the focus of network quality not just to a generic end user, but to one more specifically based on device, service class, location, and individual user behavior.

Building a quality network takes partners and experience

There are very few mobile operators that can do all of this on their own. A partner with experience in building out quality networks and knowing the right KPIs and KQIs to focus on is needed to make this transformation – and it must be a strong partner that can manage the entire process.

Some of the capabilities and features of a strong partner are:

- A history of performing network transformations
- The ability to unlock value by supporting new revenue opportunities while driving down network costs and increasing network performance
- A focus on business outcomes, not KPIs
- Ongoing investments in customer experience management
- A deep understanding of the different technologies and elements that make up the mobile network and having expertise across those domains
- A well-developed managed services organization.

Mobile operators will also need to look at their own staff. Changing from a network-performance-first to a customer-first mindset will take education.

How to create a quality network

Mobile operators need to create a plan and follow it

A quality mobile network does not just happen. It has to be planned and takes time. The investment is worth it given the clear benefit a quality mobile network offers in preventing churn. Given the importance of “word-of-mouth” reports in consumer circles, a quality network will help move subscribers

from being just users of the service to actual promoters of the service.

Ovum believes that there are four major steps a mobile operator needs to go through when building a quality mobile broadband network (see Figure 6).

- **Project definition and goals:** It is at this initial step that the mobile operator defines what it considers a “quality network” to be for its market and sets goals and timelines for achieving this. Part of this includes developing KPIs and KQIs for measuring performance. Operators should keep in mind that this process is very customizable and can vary greatly between operators. It needs to align with business goals and target markets.
- **Gap analysis:** With GAP analysis, the operator measures the current network performance against its ideal network performance goals. This analysis needs to be used to find the root causes of poor network performance.
- **Implement short-term network improvements:** Operators should look at what changes they can make immediately versus those that will take longer. Those that can be done quickly and provide an immediate performance improvement should be done first. An example of this would be to improve base station neighbor relations to reduce network interference, beef up coverage, and make sure voice works well. Operators would further benefit by making sure that the most popular applications in their market run well.
- **Implement long-term network improvements:** After taking care of those things that can improve performance quickly, the next step for the operator is to take on the longer-term improvements and goals. The long-term focus needs to be on deep coverage planning and on-demand capacity design. This needs precise geo-location technologies and new planning concepts that meet user service experience requirements, and creates more value by taking a top-down customer-first perspective. This is

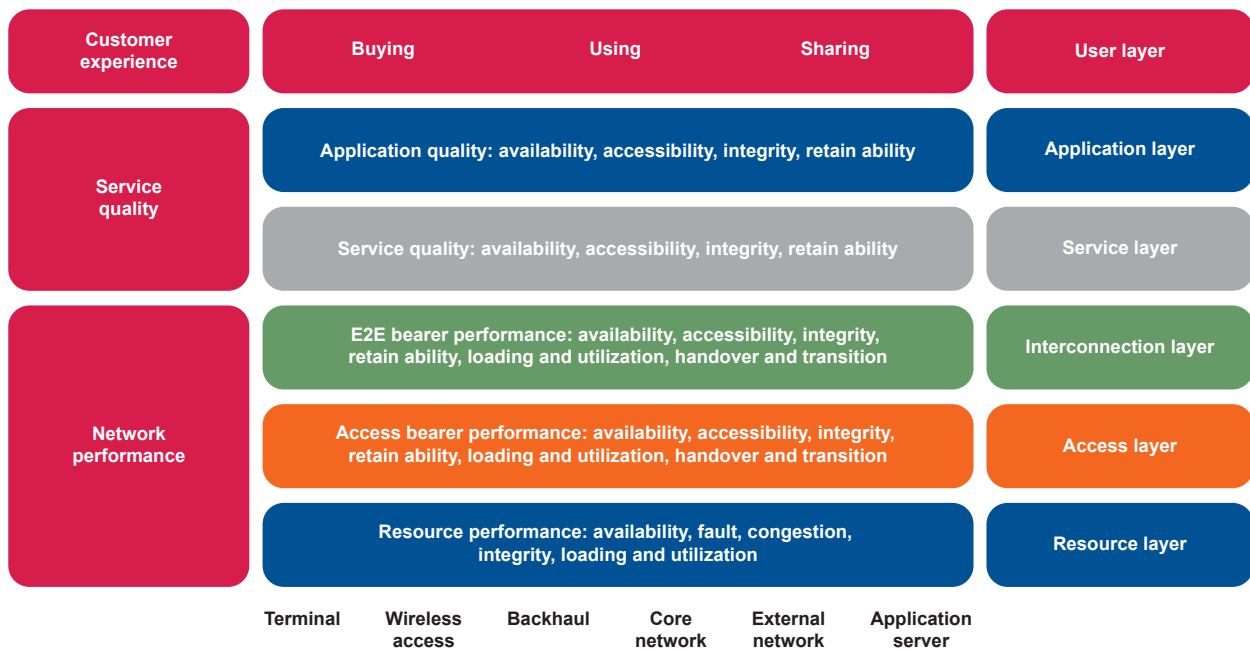
where the operator should transform itself from thinking about the network first to thinking about the per-service per-user experience and what that means for revenues. Ovum advises that network operations centers (NOC) should become service operations centers (SOC).

Internet cloud. It needs to be top-down from the end user’s perspective. The strategy also needs to be built in such a way to be scalable and to address the fact that quality expectations will change over time as well. Operators need to consider not only LTE performance but that of 2G and 3G as well.

There also needs to be holistic approach to network transformation. This holistic approach (see Figure 7) should include an examination of the network across several layers, from the per-service per-user layer all the way to the network resource layer, and across the full end-to-end service delivery – from the device to the application server residing in the

This network transformation should also be seen as an opportunity to introduce newer network architecture using software defined networks (SDN) and network function virtualization (NFV). SDN and NFV can help with the faster introduction of new services and many optimization vendors are adopting SDN and NFV technologies.

Figure 7: The multiple service delivery layers and end-to-end elements that make up a quality network experience



Source: Ovum



ABOUT OVUM

Ovum is a leading global technology research and advisory firm. Through its 180 analysts worldwide it offers expert analysis and strategic insight across the IT, telecoms, and media industries. Founded in 1985, Ovum has one of the most experienced analyst teams in the industry and is a respected source of guidance for technology business leaders, CIOs, vendors, service providers, and regulators looking for comprehensive, accurate and insightful market data, research and consulting. With 23 offices across six continents, Ovum offers a truly global perspective on technology and media markets and provides thousands of clients with insight including workflow tools, forecasts, surveys, market assessments, technology audits and opinion. In 2012, Ovum was jointly named Global Analyst Firm of the Year by the IIAR.

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