FEBRUARY 2012 | WHITE PAPER

Making LTE Roaming Work

PRODUCED BY

telecoms.com

SPONSORED BY

iBasis

kpn

SYNOPSIS

In terms of deployment, LTE is the fastest growing mobile technology ever. But it is also the most disruptive element to appear since the introduction of WCDMA, bringing with it fundamental changes to the network and telecom provider business model.

Lessons learned from the deployment of GSM still ring true–the 2G network technology only became a mass market success once interconnection and roaming were in place. Global interoperability is critical for LTE's success but is not yet guaranteed.

Due to the all-IP nature of LTE, the SS7 signalling protocols familiar to operators of circuit switched networks are largely being replaced by a new generation of specifications, including Diameter and other IP protocols. But a lack of universal interoperability for roaming is a very real problem; after all, the value of a network is directly proportional to its reach.

This whitepaper will explore the challenges facing operators when facilitating LTE roaming, and the potential solutions that can be employed to deal with them.

INTRODUCTION

The LTE era is well and truly upon us, with research from the Global Mobile Suppliers Association (GSA) showing 285 operators currently investing in LTE in 93 countries worldwide and 49 commercial networks already in place across 29 countries.

Operators are deploying LTE because it promises an enhanced user experience for consumers, a simplified, flat IP-based network architecture, a high level of security, a robust quality of service (QoS) framework, lower CAPEX in the long-term and lower OPEX in the immediate term.

There is little doubt now that LTE will define the next stage of the telecoms market, and that operators will need to invest in new technologies and infrastructure to adapt to the changing environment. One of the most pressing challenges that operators face is how to implement roaming and signalling in an LTE environment, as they upgrade from 2G and 3G networks.

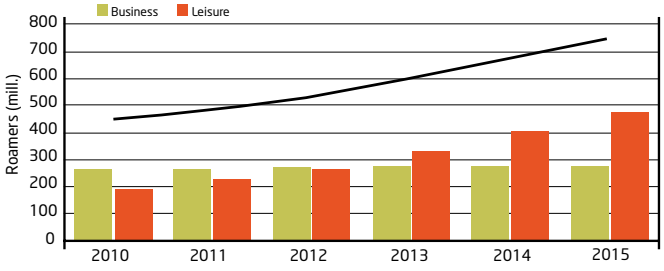
As network operators embrace LTE, it is of paramount importance that they can provide mobile data roaming from the outset. Without this capability, mobile operators will be at a serious disadvantage in generating the revenues required to recoup their investment in LTE technologies. Yet a number of organisations have expressed concern over the lack of a standard solution to the problem of data LTE roaming, and there is a strong argument for an interim solution that is backwards-compatible with legacy GSM technologies.

The opportunity is not to be underestimated. Although the global economic downturn has had a noticeable effect on the roaming market in terms of the numbers of people travelling abroad, research suggests that overall revenues are still rising due to an increase in roaming usage. The use of mobile data services while abroad is booming, and is a market that operators need to nurture to ensure profitable future growth. Moreover, business roamers will generate an increasingly large proportion of the overall roaming revenues going forward.

Total global roaming users will increase sharply from 485.9 million in 2011 to 752.2 million by 2015, and according to Informa Telecoms & Media, the use of data roaming services is set to grow exponentially in developed markets. LTE take-up is also set to increase dramatically, with Asia Pacific seeing the greatest rise in take-up, followed by Europe and North America.

Western Europe will remain the largest roaming market delivering approximately 41 per cent of the global roaming revenues by 2015, followed by Asia Pacific with approximately 18 per cent and North America with approximately 10 per cent.

Global total business and leisure roamers 2010-2015 users



Note: Figures refer to end of year-end. Source: Informa Telecoms & Media

Annual global roaming revenues will grow by 86 per cent from 2010 to 2015, rising from $42bn in 2011 to $66.8bn in 2015, accounting for approximately 6.3 per cent of total mobile service revenues. Crucially, enterprise spend will be more resilient to the economic downturn; revenues from this group will see a CAGR of 17 per cent compared with just five per cent for leisure users over the period.

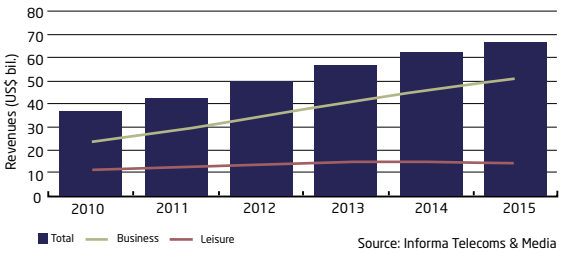
However, the number of leisure roamers is forecast to overtake the number of business roamers during 2013 as customers in more populous developing markets, such as India, begin to experiment with roaming.

Mobile data is seen as the antidote to decreasing voice revenues for the majority of operators. The long-term potential of data services is much greater than voice as it is far more adaptable; new data services can be developed and marketed to fulfil any customer requirement as and when demand dictates. Global data roaming traffic will jump from around 688 million MBs in 2011 to 1.9 billion MBs is 2015.

Annual revenues from non-SMS data roaming will grow by 246 per cent, delivering a CAGR of 28.16 per cent, over the forecast period. This trend will be sustained despite the high costs associated with mobile data use while roaming, through the continued support of applications and services by mobile operators. An estimated 3.5 billion roaming SMS messages were transported in 2011 compared to a forecast of 5.4 billion by 2015.

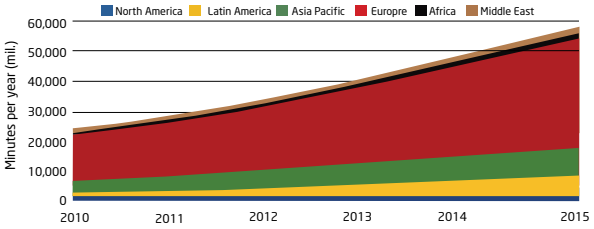
Yet voice should not be discounted. Informa estimates that 28 billion roaming minutes were delivered in 2011 a number that is anticipated to almost double to 58 billion in 2015.

Global, total mobile roaming revenues by business and leisure, 2010-2015



Source: Informa Telecoms & Media

Global, total mobile voice roaming traffic, by region, 2010-2015



Source: Informa Telecoms & Media

ROAMING TODAY

For 2G and 3G networks, signalling for roaming is based on SS7—a set of telephony protocols that have long been used to set up most of the world's PSTN telephone calls.

SS7 provides signalling and control for various network services and capabilities, although it is primarily used for voice call setup and mobile management. The protocol itself makes use of packet switching in the network, but unlike circuit switching, which uses dedicated data pipes for transmission of information, packet switching dynamically assigns routes based on availability and least-cost algorithms.

In a 2G and 3G environment, every call in every network is dependent on SS7, and the protocol is widely considered to be the "glue" that binds together traditional circuit switched networks with IP-based networks. In these environments, every mobile phone user is dependent on SS7 to allow inter-network roaming.

The way that roaming has traditionally worked with 2G and 3G is through the use of a Roaming Exchange (GRX), which acts as a hub for 2G GPRS connections from roaming users, removing the need for a dedicated link between each GPRS service provider. These hubs were developed to facilitate a more efficient way for operators to interconnect networks, and played a large part in the transition to 3G networks.

Hubbing that represented a radically new way for operators to open roaming relationships with each other, under the understanding that they could increase roaming revenues and at the same time decrease costs.

Initially GPRS roaming was based on complicated relationships between individual operators with each operator requiring a dedicated link to each different partner. This meant that mobile subscribers who wanted to use GPRS while roaming could do so only if their operator had a direct agreement with the operator in the country or area in which they were roaming.

THE RISE OF IP NETWORKS

However, as operators move to LTE, SS7 is being replaced by purely IP-based signalling interfaces, such as the Session Initiation Protocol (SIP) and Diameter. SIP is a text-based protocol, incorporating many elements of HTTP and the Simple Mail Transfer Protocol (SMTP) familiar to traditional IT network engineers. In the context of internet communication, it is widely used for controlling voice and video calls over IP. Meanwhile, Diameter is an authentication, authorisation and accounting protocol for networks, which also supports mobile management in the all IP network.

IP-based networks need to handle much larger volumes of data, because smartphones constantly use data services. Even through the simple act of switching a smartphone on, the user transmits a surge of data that needs to be signalled by the operator. This in itself is a significant issue when it comes to billing mobile roaming in LTE because an LTE device acquires an IP address as soon as it registers with a network, unlike a 2G or 3G device, which only does so when it goes 'online'. Billing systems traditionally charge as soon as this registration occurs, which may not be a great problem for domestic networks as the billing system can be modified to ignore this registration, but is considerably more difficult in visited networks.

In addition, there are many new network elements to bear in mind in an LTE environment, such as policy control enforcement, security and billing and charging. Not only does Diameter come into play to connect all of these elements, but operators need to support Diameter with software capable of routing and load balancing traffic, to ensure that each signalling message gets to the right place at the right time. So, if a message would normally be routed to one server, but all of a sudden there is a surge of traffic and that server becomes overloaded, a Diameter-enabled router would send it to another server. It is imperative that operators have such solutions to cope with the vast and unpredictable surge in data that comes with LTE.

This surge of traffic represents another key challenge for operators moving to IP-based signalling for roaming in terms of scale, as they will have to support hundreds of thousands of connections. This could necessitate the recruitment of more support staff to handle roaming and also demands a wholesale shift in mindset, away from traditional SS7 models.

As Ajay Joseph, CTO at iBasis, explains: "There is a combination of different elements that go into setting up LTE roaming and signalling. On the Diameter part, you need to support Diameter routing agents and the interexchange of diameter routing messages between different operators. This has implications relative to interoperability, performance, supporting a new technology and establishing global footprint."

Most operators use multiple vendors and this presents a further complication. While vendors have begun to realise this and are beginning to standardise, consumers will not wait for the industry to catch up with their demands, particularly if there are competitors around that are able to satisfy them sooner.

"Another challenge is that a lot of this is new technology, which raises concerns. Operators that have deployed LTE have complained that the interoperability between vendors is not sufficient," Joseph adds.

Indeed, 3GPP-defined standards are still in a state of flux in relation to data roaming but organisations are pushing for recommendations to ensure, at the very least, support for voice over LTE, perhaps through the use of an IMS-based solution that incorporates circuit-switched fall-back (CSFB) that is compliant with 3GPP specifications. This could allow mobile operators that provide an LTE, GSM or UMTS network to provide a non-IMS voice service as well as LTE data service roaming to visiting subscribers using an LTE device, with CSFB as a fall-back mechanism in order to also provide voice.

Due to the fact that standards are still evolving, even though convergence is already a reality, we are at a point today where one implementation of LTE roaming can be quite different from the next. And there is still much work to be done within the industry to try and normalise and equalise protocols deployed by different operators and vendors.

Roaming has traditionally been organised bilaterally between individual operators, with network testing and commercial negotiations taking place on a per-operator basis. This approach still remains an option for LTE carriers, with operator A and operator B connected using IP-based signalling. However, this method is fraught with complication and expense; when there are more than 300 different LTE networks in operation, the creation of bilateral connections will simply be too unwieldy a process.

"We have seen a few cases of operators trying bilateral connections for other services, but there have been very few instances worldwide where you would do this globally," says Joseph. "That's where the expertise that iBasis has—and what we're trying to do in terms of stabilising and bringing about reliability—comes into play."

According to a recent Informa consumer survey, one of the most important influences on the growth and maturity of LTE will be the ability to use roaming services. However, in the same survey, when asked how prepared they were to offer roaming services across LTE networks, two-thirds of operators said they were at best hesitant about their capabilities.

"Each of these networks are going to have different vendors, and even from the same vendors, there are going to be different versions of diameter. So, getting all of them to talk to each other, including all of the different variants, is a significant challenge," explains Joseph.

THE SIGNALLING EXCHANGE

Indeed, roaming is already a lucrative service for any operator, but monetising LTE from a roaming point of view is not so straightforward, and there are two key aspects operators need to put in place to encourage data roaming: Firstly, to ensure the technical capability to enable data roaming in at least the key destinations that the operators' subscribers travel to; and secondly to ensure transparency on the cost to end-users to consume data while abroad and price the data services to encourage usage.

Bear in mind that consumers want to update social networking sites while they are abroad at least as much as when they are at home, and operators have the opportunity to encourage this behaviour with tariffs that provide security about the costs of doing so. Meanwhile, using mobile data services while abroad is becoming increasingly essential for enterprise users, and operators are already offering competitive rates that encourage usage in this segment.

Related to that is the cost associated with maintaining multiple cross-border connections. Eventually operators get to a point where bilateral connections simply won't scale. "So, what you need is somebody in the middle that can solve all of these issues," says Joseph.

iBasis is addressing these issues by setting up an LTE signalling exchange (LSX), which will act as a single interconnect, reducing complexity and allowing MNOs to connect to the hundreds of other operators downstream.

The iBasis LSX has the ability to inter-operate with multiple vendors by looking inside the messages on an individual basis, depending on what the operators need. It can normalise the messages going back and forth, to enable interoperability on behalf of each roaming partner. The iBasis LSE can also inter-work with existing SS7 networks.

The iBasis LSX runs on iBasis' IPX network, a multiservice, global IP network that delivers high quality voice and data services for mobile operators. The network covers over 240 countries and territories worldwide. It is built on KPN International's MPLS network, and ensures high quality through direct routes and security through physical and logical separation from the public internet.

For operators looking to capitalise on the growing demand for global multimedia services, the iBasis LSE provides a converged interconnect, an ecosystem that is more efficient and commercially viable for interconnecting the growing number of LTE operators.

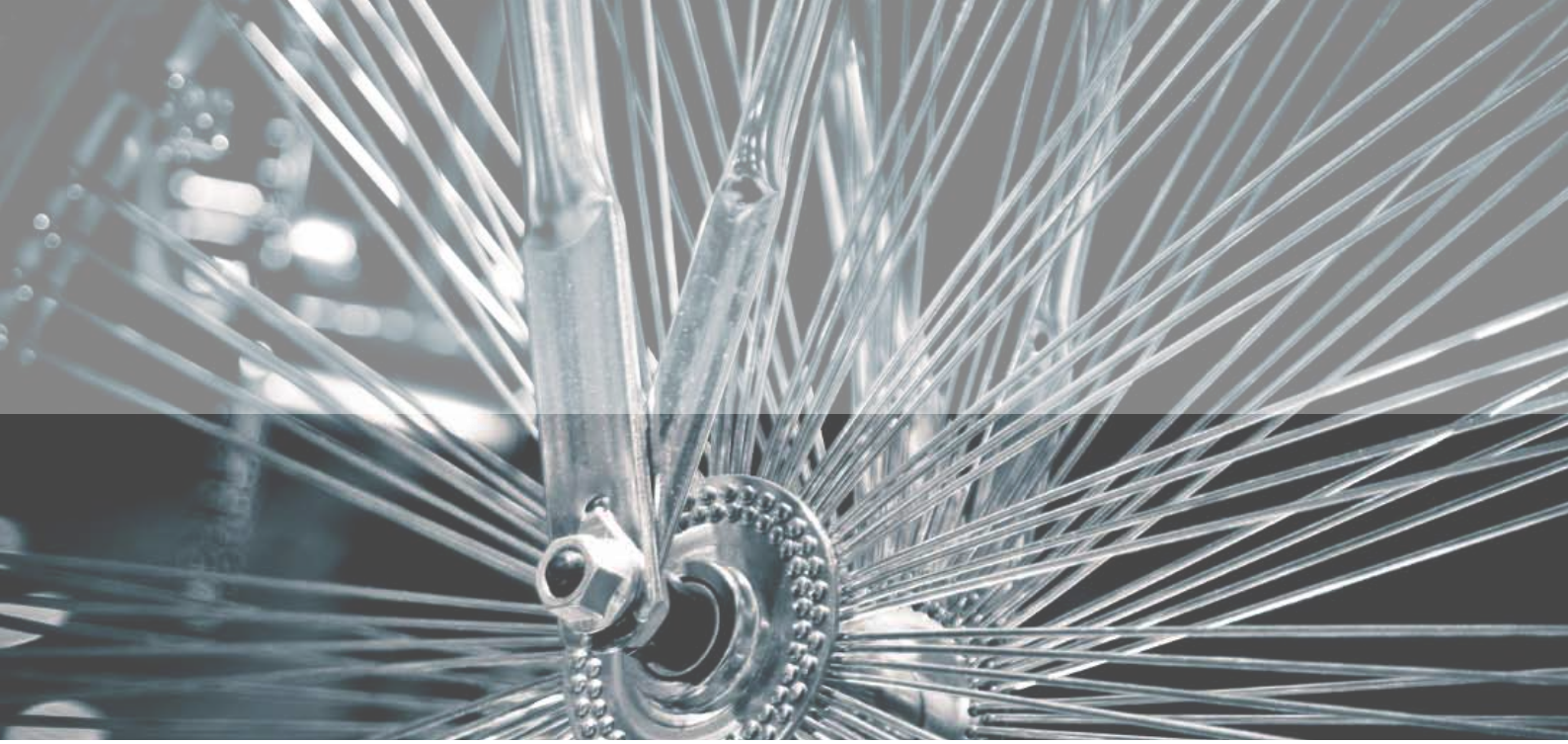
CONCLUSION

The use of mobile data services while abroad is booming, and is a market that operators need to nurture through transparent and reasonable pricing to ensure profitable future growth. Clearly, by failing to facilitate LTE roaming operators risk lost revenue-not only by failing or being slow to implement voice roaming, but more importantly, by not implementing prepaid roaming, data roaming, and the implementation of virtual home environments to users travelling abroad.

Deployment of LTE is expected to be a lot quicker than 3G, and the point at which end users will demand roaming is approaching rapidly. The issue is particularly urgent in the lucrative business user segment, which will drive the early revenue in this segment.

The leisure segment, meanwhile, is the next great growth market in roaming. While it has a lower average spend than the enterprise market its far greater size offers significant potential. Operators must be proactive in addressing the current low level of roaming services by leisure users as the size of this segment will act as a counterweight to pricing regulation.

Fairly soon, operators will have to decide whether they want to divert significant time and investment into setting up and maintaining their own network of roaming interconnections for LTE, or whether they would be better served by using a third party to fulfil these key requirements, while they keep their focus on their core business of delivering compelling services and products to paying subscribers.



ABOUT TELECOMS.COM

Telecoms.com is the leading provider of news and analysis for the global telecoms industry, generating over 2 million page views per year. Reporting directly from the major telecom markets around the globe - 80,000 unique monthly visitors rely on telecoms.com to keep them informed daily.

Our editorial team go beyond the daily headlines and produce in-depth features on industry leaders, technological advancements and market trends – delivering content that inspires, stimulates debate, and provides insight and understanding on the key business and technology issues facing the industry.

Email: support@telecoms.com
www.telecoms.com

ABOUT IBASIS

A wholly-owned KPN company, iBasis is a leading international voice carrier and a provider of data services for mobile operators. The company offers a comprehensive portfolio of voice termination services and data services, including messaging, signaling and roaming, for many of the world's largest fixed and mobile operators, as well as"over-the-top" and voice-over-broadband service providers. iBasis customers include KPN and its mobile operators, KPN Mobile, E-Plus, andKPN Belgium, and more than 1,000 other providers, including Verizon,Vodafone, China Mobile, China Unicom, Skype, TDC, Telecom Italia, and Telefonica.

The company can be reached at its worldwide headquarters in Burlington, Mass., USA at +1 781-505-7500 or on the Internet at www.ibasis.com.

PRODUCED BY

telecoms.com

SPONSORED BY

iBasis

kpn