ERICSSON

# ERICSSON MOBILITY REPORT

ON THE PULSE OF THE NETWORKED SOCIETY

June 2013

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The number of mobile subscriptions worldwide has grown approximately 8 percent year-on-year during Q1 2013. The number of mobile broadband subscriptions grew even faster over this period at a rate of 45 percent year-on-year, reaching around 1.7 billion. The amount of data usage per subscription also continued to grow steadily. About 50 percent of all mobile phones sold in Q1 2013 were smartphones.

These factors combined have resulted in the total amount of mobile data traffic doubling between Q1 2012 and Q1 2013. In this issue we look beyond our usual update and outlook on mobile traffic with an analysis of traffic types. Traffic has been forecast by application type, providing analysis into factors behind the growth.

In the last issue we highlighted the growing importance of speed in mobile broadband networks. In this edition we take this analysis a step further, describing a new framework to understand varying network performance within a given coverage area in our App Coverage article. Continuing on the theme of network performance, we cover the relationship between performance and customer loyalty and explain the effects of signaling on data traffic. We also take a look at data roaming, and identify an opportunity for operators to generate new revenue streams.

Our final chapter, the Signature of Humanity, offers a visualization of data and voice activity in three major cities around the world.

Finally, you will find our usual table of key figures at the end of this document. We hope you find this report engaging and valuable.

## ABOUT THIS REPORT

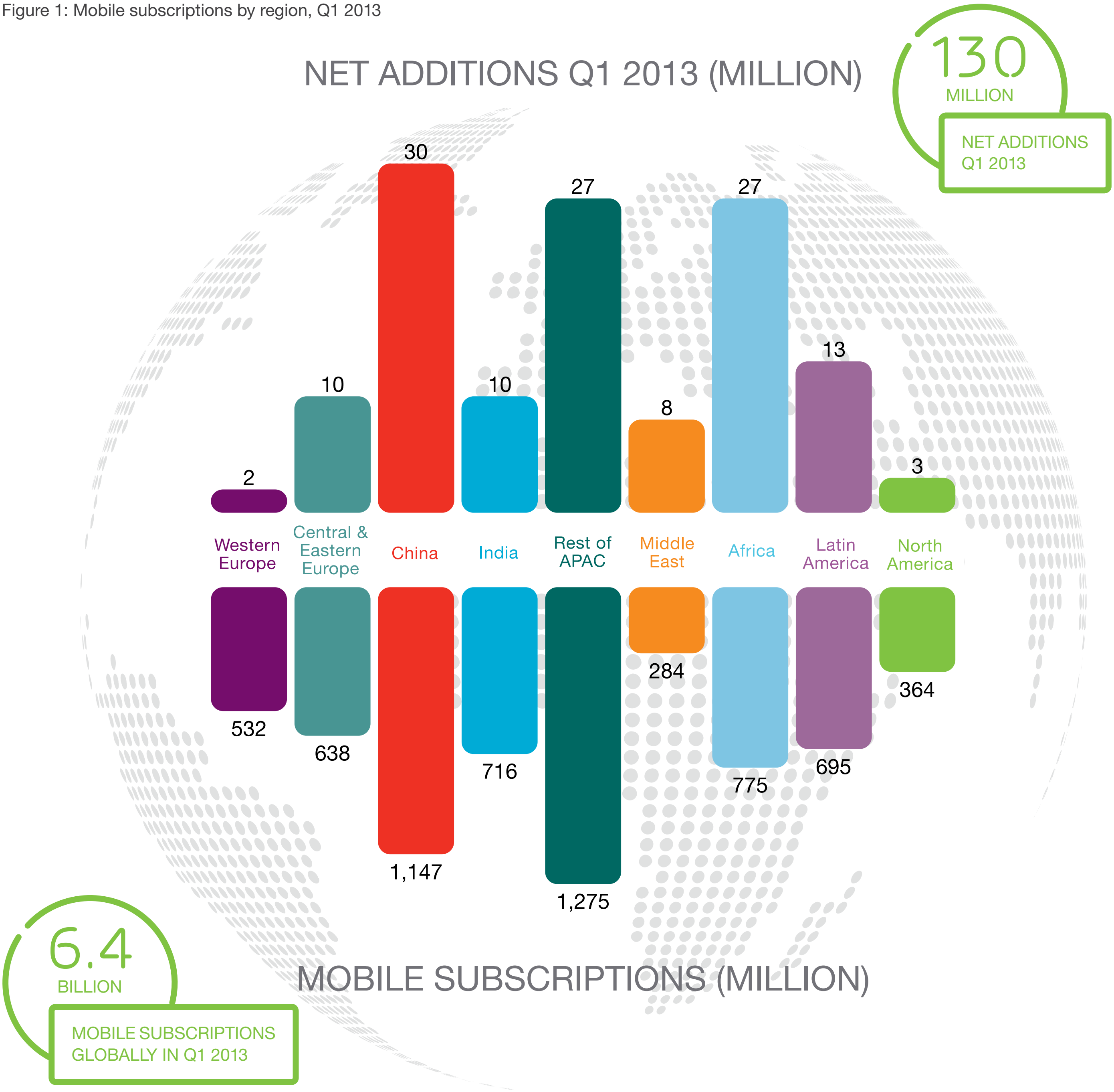
Ericsson has performed in-depth data traffic measurements in mobile networks from the world's largest installed base of live networks. These measurements have been collected from all regions of the world since the early days of mobile broadband.

The aim of this report is to share analysis based on these measurements, internal forecasts and other relevant studies to provide insights into the current traffic and market trends.

**Publisher:** Douglas Gilstrap, Senior Vice President and Head of Strategy, Ericsson

# MOBILE SUBSCRIPTIONS UPDATE

Figure 1: Mobile subscriptions by region, Q1 2013




Source: Ericsson (June 2013)

Figure 1

Mobile subscription figures are estimates as of Q1 2013. Mobile net additions are estimates during Q1 2013. APAC = Asia Pacific.

The estimate of mobile net additions has been made based on historic information from external sources and regulatory and operator reports, combined with Ericsson analysis. Historical data may be revised when operators report updated figures.

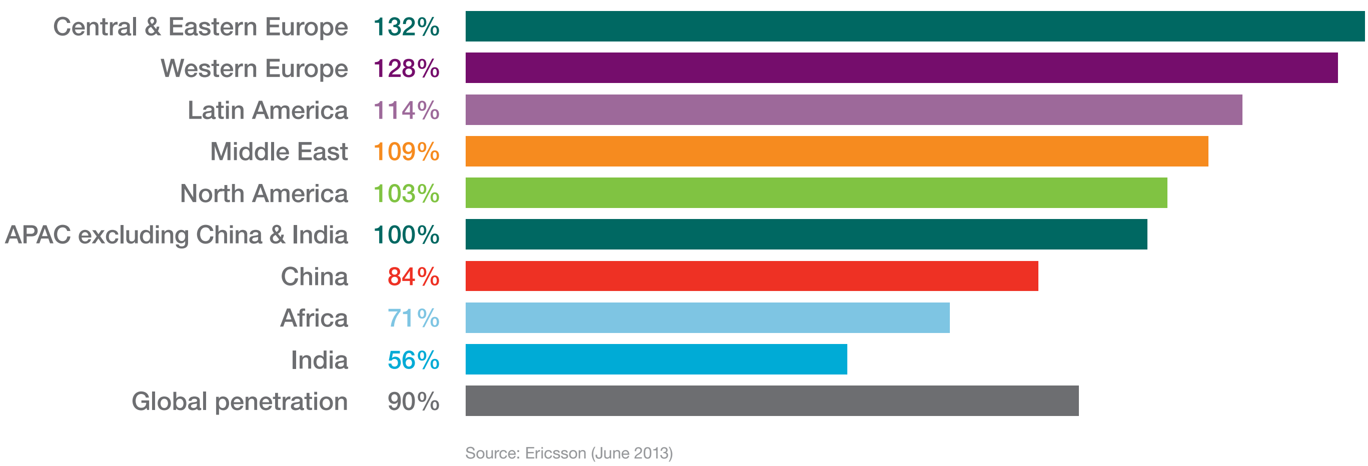
Indian subscriptions have been adjusted to reflect active subscriptions as defined by the telecom regulatory authority in India. This better reflects real subscriber growth at a time when India's operators have been deleting inactive subscriptions.

All figures are rounded up or down to the nearest million. The sum of all rounded regional data may therefore differ slightly from the rounded total.

Mobile subscriptions include all mobile technologies. M2M subscriptions are not included.

- Global mobile penetration was at 90 percent in Q1 2013 and mobile subscriptions now total around 6.4 billion. However, the actual number of subscribers is around 4.5 billion, since many people have several subscriptions
- China alone accounted for around 25 percent of net additions, adding around 30 million subscriptions
- India (+10 million), Indonesia (+10 million), Brazil (+5 million) and Nigeria (+5 million) follow in terms of net additions
- Global mobile subscriptions have grown around 8 percent year-on-year and 2 percent quarter-on-quarter
- Global mobile broadband subscriptions[1] have grown by around 45 percent year-on-year and have reached around 1.7 billion
- There is continued strong momentum for smartphone uptake in all regions. Around 50 percent of all mobile phones sold in Q1 2013 were smartphones, compared to around 40 percent for the full year in 2012. Of all mobile phone subscriptions 20-25 percent are associated with smartphones, leaving considerable room for further uptake
- LTE is now growing strongly, with around 20 million new subscriptions added in Q1 2013. GSM/EDGE-only subscriptions added ~30 million and WCDMA/HSPA ~60 million

Figure 2: Penetration percentage, Q1 2013




[1] Mobile broadband is defined as CDMA2000 EV-DO, HSPA, LTE, Mobile WiMAX and TD-SCDMA.

## SUBSCRIPTIONS VS SUBSCRIBERS

There is a large difference between the number of subscriptions and subscribers. This is due to the fact that many subscribers have several subscriptions. Reasons for this could include users lowering their traffic cost by using optimized subscriptions for different types of calls, maximizing coverage and having different subscriptions for mobile PCs/tablets and for mobile phones. In addition, it takes time before inactive subscriptions are removed from operator databases. Consequently, subscription penetration can easily reach above 100 percent, which is the case in many countries today. It should however be noted that in some developing regions, it is common for several people to share one subscription, having for example a family or community shared phone.

# SUBSCRIPTIONS OUTLOOK

4.5 BILLION
SMARTPHONE SUBSCRIPTIONS BY THE END OF 2018

Key changes in this forecast:

- Stronger uptake of smartphone[1] and LTE subscriptions than in previous forecast
- Notable increase in the number of smartphone subscriptions in the APAC and MEA regions
- LTE subscriptions forecast has increased from 1.6 to 2 billion in 2018

By Q1 2013, total mobile subscriptions exceeded 6.4 billion. By the end of 2018, they are expected to reach 9.1 billion.

Global mobile broadband subscriptions reached around 1.7 billion in Q1 2013, and are predicted to reach 7 billion in 2018. The majority of mobile broadband devices are, and will continue to be, smartphones. Mobile broadband will gain a larger share of total broadband subscriptions in many markets, complementing xDSL in certain segments and replacing it in others. Mobile broadband also includes some feature phones.

## Mobile devices

Mobile subscriptions are increasing for PCs, mobile routers and tablets that use larger screen sizes. They are expected to grow from 300 million in 2012 to around 850 million in 2018, exceeding the number of fixed broadband subscriptions.

Total smartphone subscriptions reached 1.2 billion at the end of 2012 and are expected to grow to 4.5 billion in 2018. Today the majority of mobile subscriptions are for basic phones.

Smartphone penetration will increase rapidly, while it is estimated that subscriptions for basic phones will remain high, slowly declining from around 5 billion today, to around 4 billion in 2018. This is because a large part of the growth in subscriber numbers will come from the lower-end phone segment.

[1] Roughly half of the increase in the smartphone forecast vs. the previous edition is due to an increase in the underlying device forecast. The rest is reflecting a modification to the definition of smartphone subscriptions.

[2] Subscriptions do not include M2M subscriptions.

Figure 3: Fixed and mobile subscriptions[2], 2009-2018

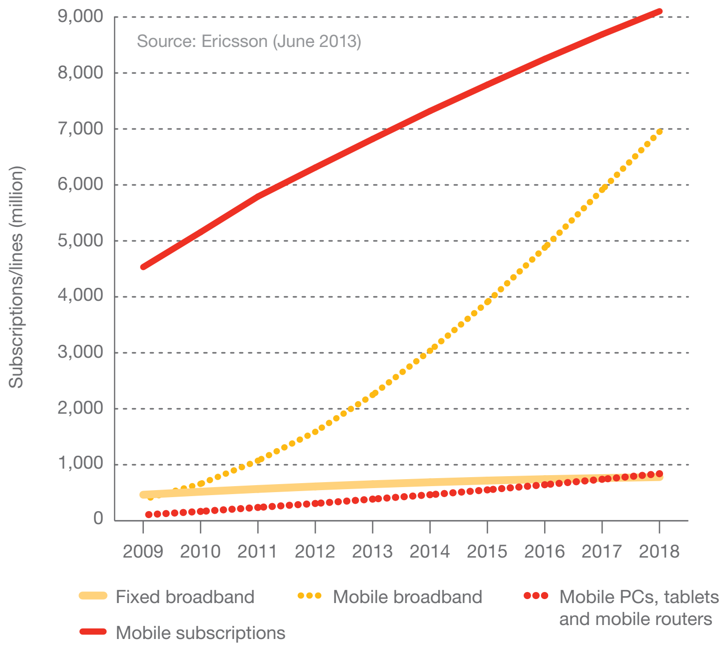
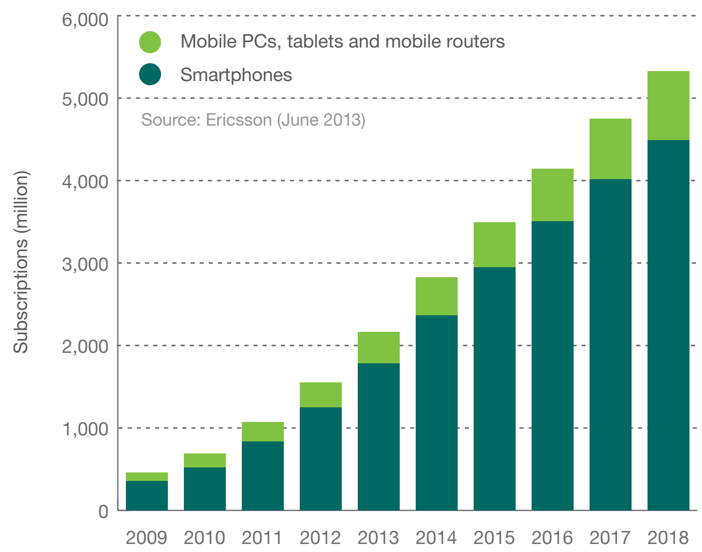



Figure 4: Smartphone, PC, mobile routers and tablet subscriptions with cellular connection, 2009-2018




**Mobile broadband:** Includes CDMA2000 EV-DO, HSPA, LTE, Mobile WiMAX and TD-SCDMA. For example, mobile PCs, tablets, routers and mobile phones, including both smartphones and feature phones. The vast majority are mobile phones.

**Mobile PC:** Includes laptop or desktop PC devices with built-in cellular modem or external USB dongle.

**Mobile router:** A device with a cellular network connection to the internet, and Wi-Fi or Ethernet connection to one or several clients (such as PCs and tablets).

**>9 BILLION**

**MOBILE SUBSCRIPTIONS BY THE END OF 2018**

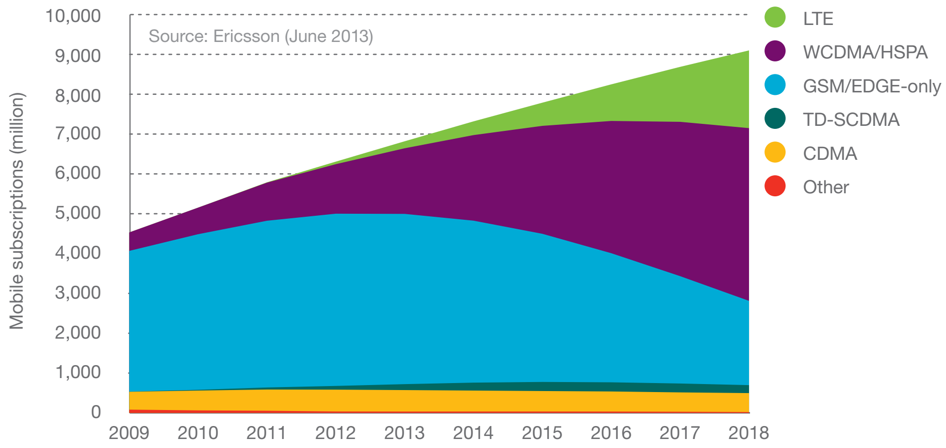
Regional differences will be large. In 2018 almost all handsets in Western Europe and North America will be smartphones, compared to 40-50 percent of handset subscriptions in the Middle East and Africa and Asia Pacific regions.

## Mobile technology

Figure 5 illustrates reported mobile subscriptions categorized by technology. Subscriptions are defined by the most advanced technology that the mobile phone and network are capable of.

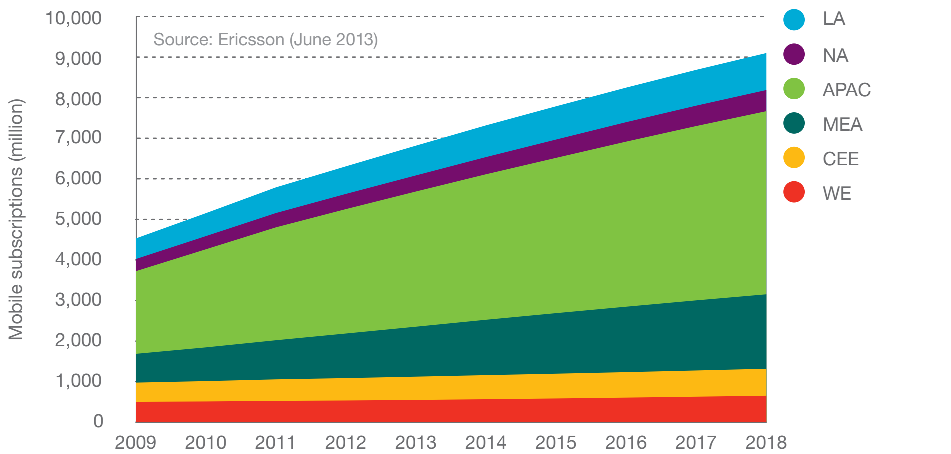
LTE is currently being deployed and built-out in all regions and will reach around 2 billion subscriptions in 2018. These subscriptions will represent the high-end share of the total subscriber base by 2018. Rapid migration to more advanced technologies in developed countries means global GSM/EDGE-only subscription numbers will decline after 2012-2013. Globally, GSM/EDGE will continue to lead in terms of subscription numbers until the latter years of the forecast period. This is because new, less affluent users entering networks in growing markets will be likely to use the cheapest mobile phones and subscriptions available. In addition, it takes time for the installed base of phones to be upgraded.

Figure 5: Mobile subscriptions by technology, 2009-2018




Subscriptions are defined by the most advanced technology that the mobile phone and network are capable of. Lack of 3G/4G coverage may connect users to 2G networks (GSM, CDMA1X).

Figure 6: Mobile subscriptions by region, 2009-2018




## Regional growth

Figure 6 illustrates regional mobile subscriptions up until the end of 2018 and shows continued growth. In APAC this process is driven by new subscribers, whereas in North America, it is based on increasing the number of subscriptions per individual – for example, adding a tablet.

The number of fixed broadband users is at least three times the number of fixed broadband connections, due to multiple usage in households, enterprises and public access spots. This is the opposite of the mobile phone situation, where subscription numbers exceed user numbers. In the latter years of the forecasting period, it is likely that the usage trend for mobile PCs will be similar to fixed broadband usage today, with several users per subscription. This is especially the case in developing markets where mobile access will be the main source of internet connection.

## Regional technology maturity

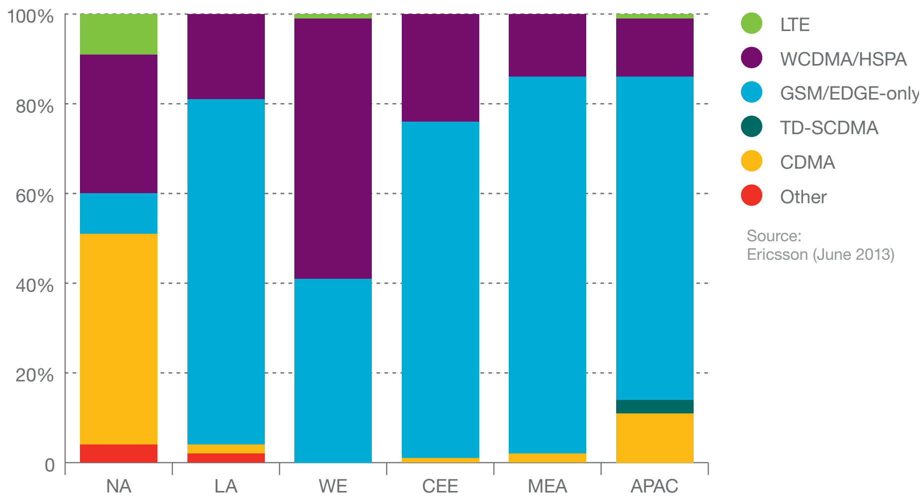
Different regional maturity levels are reflected in their radio technology mix. Less mature regions are dominated by 2G technologies, like GSM/EDGE, while more mature regions like Western Europe are dominated by HSPA. LTE is growing very strongly, particularly in North America. In all regions, 2G networks (GSM/EDGE, CDMA 1X) remain as fallback networks for 3G and 4G subscriptions when coverage is missing.

North America is characterized by early growth in LTE. This technology will represent the majority of subscriptions in the region 2016, growing to around 70 percent in 2018. GSM/EDGE-only subscriptions will progressively decline. This fast growth in LTE subscriptions is driven by strong competition and consumer demand, following CDMA operators' early decisions to migrate to LTE.

Latin America has a large GSM/EDGE subscriber base. The strong growth in subscriptions in this region will be driven by economic development and consumer demand. In 2018, WCDMA/HSPA will be the dominant technology, however GSM/EDGE-only subscriptions will still have a significant presence.

As a mature market, Western Europe will show little growth in subscriptions. What growth there is will come from an increasing number of connected devices. HSPA is the dominant technology in the region. By 2018, LTE will penetrate around 35 percent of the subscriptions base in Western Europe. Data services were rolled out early in this region, initially accessed via dongle or PC. The drive for LTE has not yet been as strong in Europe, partly because there are many well-developed 3G networks in the region.

Figure 7: Mobile subscriptions by technology and region, 2012




Subscriptions are defined by the most advanced technology that the mobile phone and network are capable of. Lack of 3G/4G coverage may connect users to 2G networks (GSM, CDMA1X).

Figure 8: Mobile subscriptions by technology and region, 2018


The Asia Pacific market continues to see a massive increase in subscriptions. Markets like Japan and South Korea will take up LTE subscriptions early compared to less developed countries. China will add substantial LTE numbers towards the end of our forecast period. CDMA will continue to grow gradually in absolute numbers, especially in China and Indonesia, but the CDMA share of subscriptions will decline. TD-SCDMA subscriptions will start to decline at the end of the forecast period.

Central and Eastern Europe shows a strong increase in HSPA subscriptions. LTE will initially grow in the most developed parts of the region, and will be present in most countries by 2018.

The Middle East and Africa region was dominated by GSM/EDGE in 2012. By 2018 it will have the largest share of GSM/EDGE, driven by demand for low cost phones. The region is diverse, so there will be large differences between developed and less developed areas.

# MOBILE TRAFFIC UPDATE

2X

MOBILE DATA TRAFFIC DOUBLED BETWEEN Q1 2012 AND Q1 2013

## Global traffic in mobile networks

Figure 9 shows total global monthly data and voice traffic. It depicts a stable trend of data traffic growth with some seasonal variations. It shows that mobile data subscriptions will grow strongly, driving the growth in data traffic along with a continuous increase in the average data volumes per subscription.

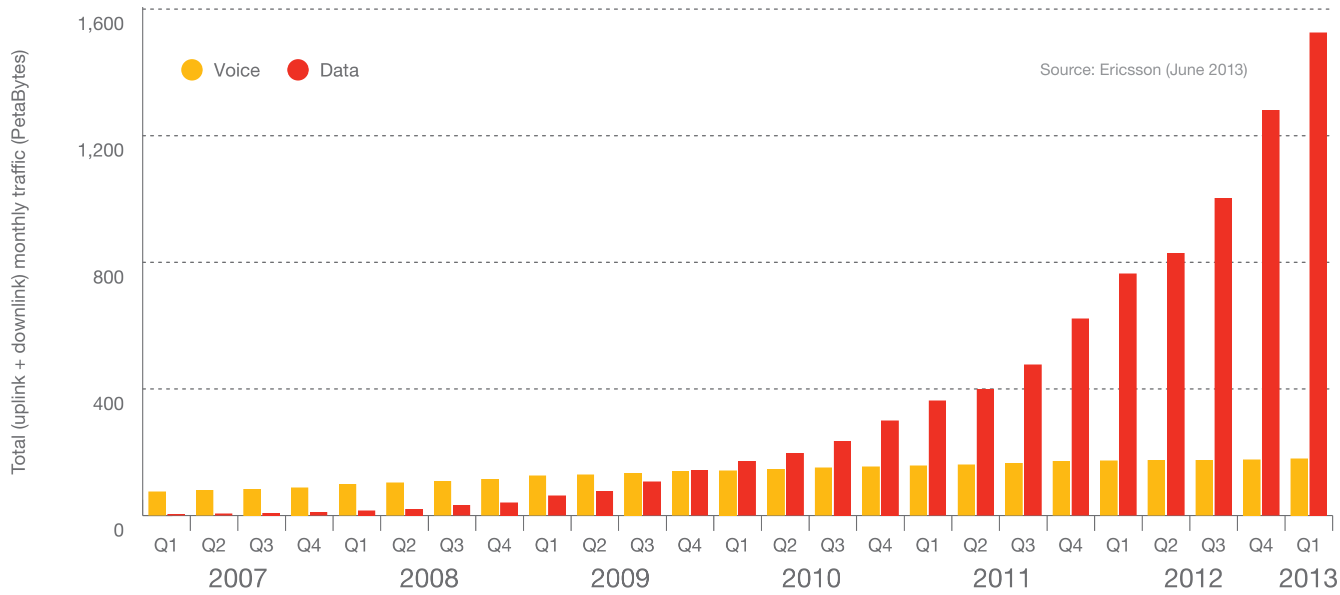
Highlights include:

- Data traffic doubled between Q1 2012 and Q1 2013
- Data traffic growth between Q4 2012 and Q1 2013 was 19 percent
- Voice traffic growth between Q1 2012 and Q1 2013 was 4 percent

It should be noted that there are large differences in traffic levels between markets, regions and operators.

These measurements have been performed by Ericsson over several years using a large base of commercial networks that together cover all regions of the world. They form a representative base for calculating world total traffic in mobile networks[1].

Figure 9: Global total data traffic in mobile networks, 2007-2013




[1] Traffic does not include DVB-H, Wi-Fi, or Mobile WiMax. Voice does not include VoIP. M2M traffic is not included.

# TRAFFIC DEVELOPMENT

12X

MOBILE DATA TRAFFIC WILL GROW BY ~12 TIMES BETWEEN 2012 AND 2018

Highlights of forecast:

- Smartphone traffic will have increased by ~10 percent in 2018 compared to the previous forecast
- Video will account for around half of global mobile data traffic by 2018

## Traffic outlook

During 2013, overall mobile data traffic is expected to continue the trend of doubling each year. Mobile PCs dominate traffic in most regions, except in North America. However, smartphone traffic is growing faster due to the high growth in subscriptions. In the latter years of the forecast period, data traffic will be split fairly equally between mobile phones on the one hand, and tablets, mobile routers and mobile PCs on the other.

Mobile data traffic will grow considerably faster than fixed data traffic over the forecast period. However, in absolute volume, fixed data traffic will remain dominant over the same period.

Accessing the internet through dedicated apps such as social networks and picture messaging will drive mobile traffic development. Mobile data traffic is expected to grow with a CAGR of around 50 percent (2012-2018), driven mainly by video. This will result in growth of around 12 times by the end of 2018.

Traffic per subscriber is partly affected by the screen size of the user's individual device. Resolution is also a factor, with recent smartphones closing in on PC-level quality. On average, a mobile PC generates approximately five times more traffic than a smartphone. By the end of 2012, an average mobile PC generated approximately 2.5 GB per month, versus 450 MB per month produced by

### MOBILE DATA TRAFFIC

Mobile data traffic is a share of total fixed and mobile traffic. It represents 4 percent in 2012 and 9 percent in 2018.

Figure 10: Global mobile traffic: voice and data, 2010-2018

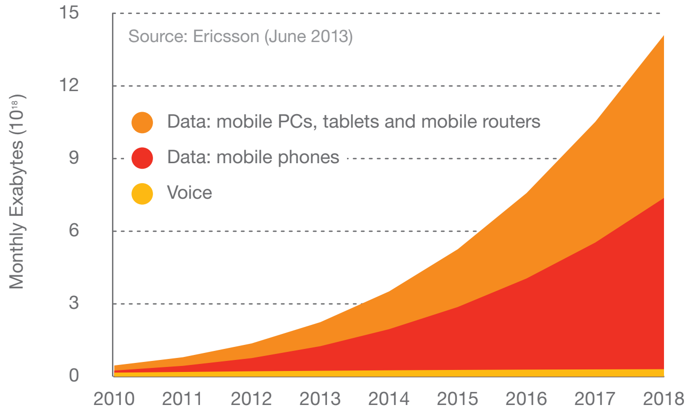



Figure 11: Global fixed traffic, 2010-2018

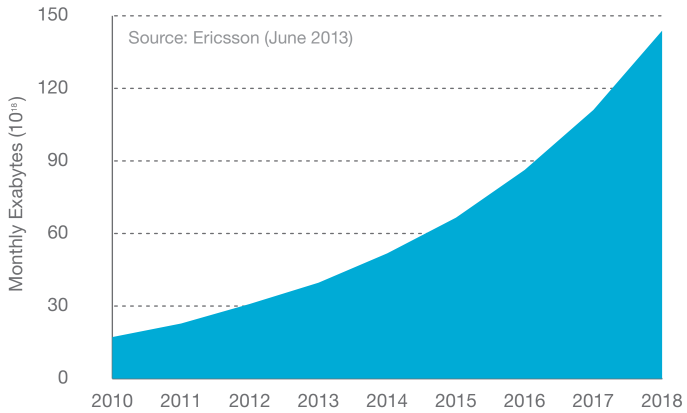
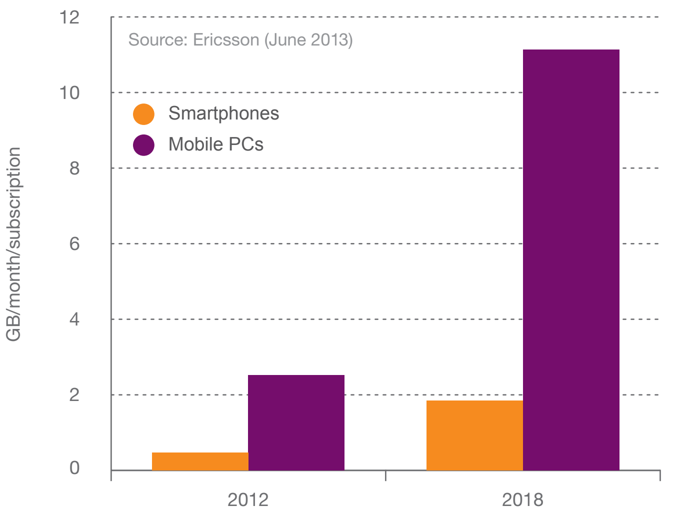



Figure 12: Smartphone and mobile PC traffic per month and active subscriptions, 2012 and 2018



the average smartphone. By the end of 2018, it is estimated that on average a mobile PC will generate around 11 GB per month and a smartphone around 2 GB. Note that there are large differences in user patterns between different networks, markets and user types.

## Regional mobile traffic variations

The diverse maturity levels between regions can be seen by looking at each region in figure 13 and comparing the traffic generated from different device types.

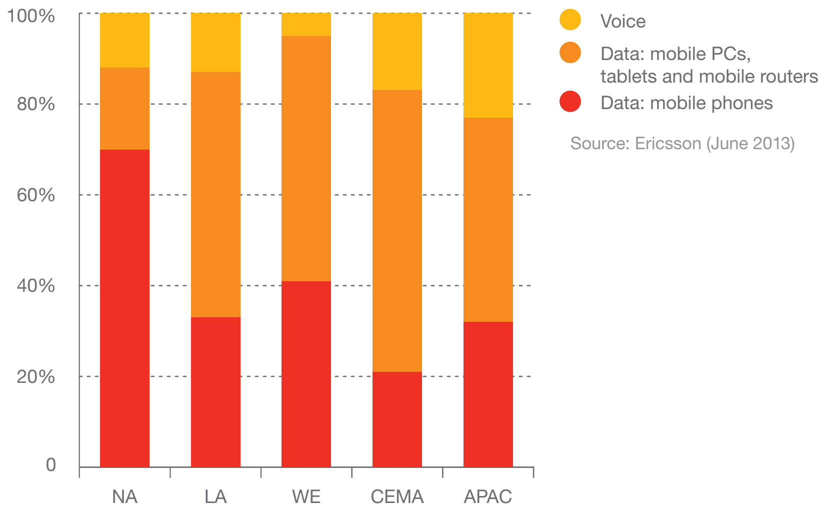
As illustrated in figure 14, Asia Pacific had a high share of the total traffic during 2012. North America and Western Europe have a significantly larger share of total traffic volume than their subscription numbers alone would imply due to a high proportion of mobile PCs, smartphones and tablets in 3G/4G networks. North America, which is dominated by smartphone traffic and already has a high penetration of smartphones, will have a lesser share of global traffic in 2018 than in 2012. This is because the smartphone share of total phone subscriptions – expected to already be at 80 percent in 2015 – will be saturated before the other regions.

Data traffic doubled between Q1 2012 and Q1 2013 and will continue to grow at a high rate, whereas voice traffic will maintain moderate single digit growth per annum. In other words, by 2018, voice traffic volumes in all regions will be very small compared to data traffic.

### TRAFFIC MANAGEMENT IMPACT

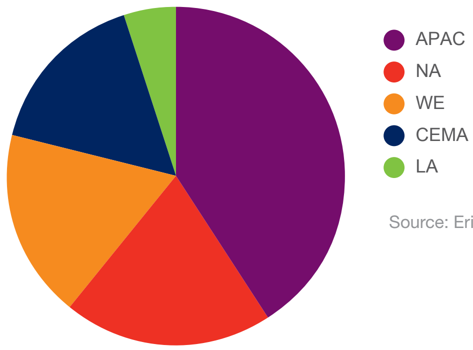
Note that a large part of data traffic (fixed and mobile) is generated by a limited number of users in each device category. The forecast is sensitive to operator data volume caps and tariff changes.

Figure 13: Mobile traffic by region and type, 2012



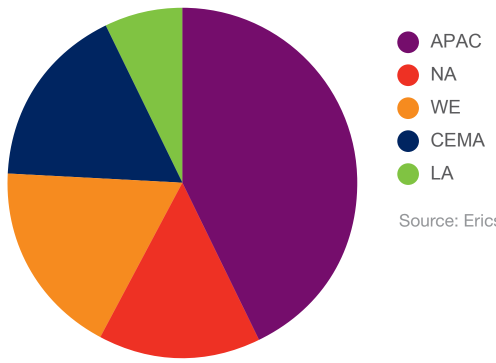

Source: Ericsson (June 2013)

Figure 14: Mobile traffic share by region, 2012




Source: Ericsson (June 2013)

Figure 15: Mobile traffic share by region, 2018

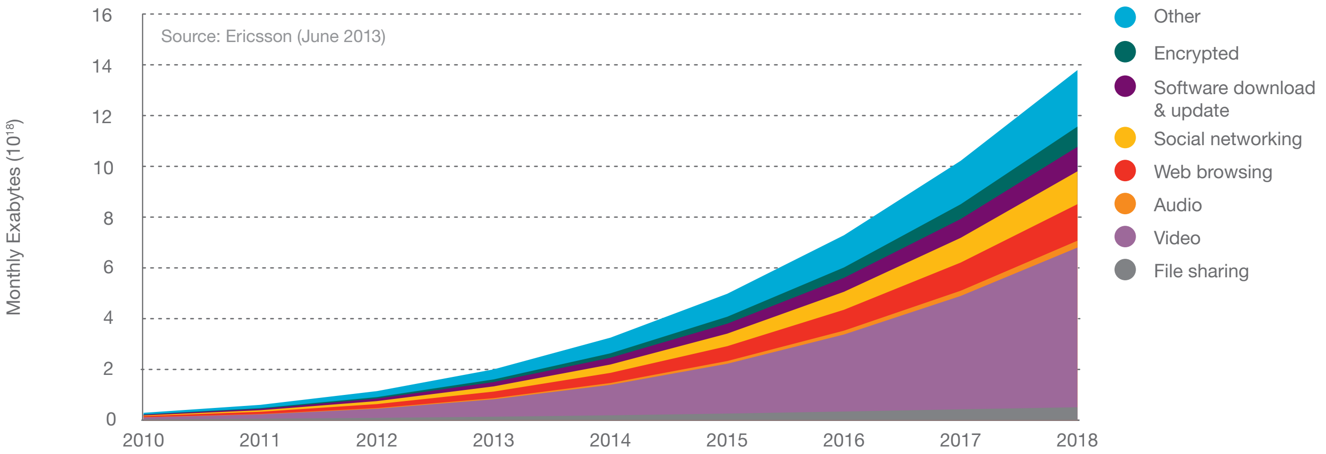



Source: Ericsson (June 2013)

Traffic refers to aggregated traffic in mobile access networks. DVB-H and Wi-Fi traffic have not been included. M2M traffic is not included.

VIDEO WILL ACCOUNT FOR AROUND HALF OF GLOBAL MOBILE DATA TRAFFIC BY 2018

Figure 16: Mobile data traffic by application type, 2010-2018




## Mobile data traffic outlook by application type

The growth in the number of mobile broadband subscriptions is a strong driver for mobile data traffic growth. More users are adding an ever-broadening range of devices to their subscriptions, such as smartphones, tablets, mobile PCs/routers, eBook readers and cameras.

The fastest growing segment in mobile data traffic is video. Increasing usage is driven by continual growth in the amount of available content as well as the better network speeds that come with HSPA and LTE development. Larger device screens and better resolutions will also drive video traffic as they will enable high definition and eventually even ultra high definition video.

Video streaming services in some markets have shown a very strong uptake: people use services such as Netflix, HBO and Vimeo on all types of devices. As video conferencing evolves beyond fixed facilities in meeting rooms to being used on mobile devices, it will also drive video traffic growth in mobile networks. Today, video makes up the largest segment of data traffic in mobile networks and is expected to grow by around 60 percent annually up until the end of 2018, by which point it is forecast to account for around half of total global traffic[1].

Music streaming is gaining popularity and audio is expected to grow with a annual growth rate of around 50 percent. There is a high degree of uncertainty in the forecast for audio traffic at this stage, as it is very dependent on how music streaming services develop over the coming years.

Web browsing and social networking will each constitute around 10 percent of the total data traffic volume in 2018.

The arrival of new types of devices or content can rapidly change traffic patterns by adding types not currently considered significant. Furthermore, there will be broad variations between networks with different device profiles – for example, some will be PC dominated while others will mainly facilitate smartphone users. Traffic will also vary between markets due to differences in content availability and content rights issues.

[1] Video is also likely to form a major part of file sharing traffic and a sizeable part of encrypted traffic, in addition to the identified application type 'video'.

## NEW COMMUNICATION BEHAVIORS DRIVE DATA TRAFFIC IN MOBILE NETWORKS

### User behavior and drivers

When a user changes devices from a feature phone to a smartphone, voice and text messaging continue to be used. Users tend to develop their application usage behavior over time as they discover new apps and services that capture their interest. Recommendations from friends, family, media and app stores for new and trendy apps play an important role in this development. New communication behaviors drive data traffic in mobile networks. A good example of this is sharing video via MMS or instant messaging.

Over time, users tend to use more advanced services that put greater demands on device capabilities. Today, smartphone users who subscribe to both music and video streaming services already consume more than 2 GB of data traffic per month on average. That's over four times the consumption of an average smartphone user. In many markets, legal streaming services for both music and video are gaining popularity. Given sufficient content, ease of use and the right price level, these services exhibit strong adoption rates.

The outlook for every category of mobile data shows significant growth through to 2018. The highest growth is expected from video traffic, and it is estimated to constitute around half of all mobile data traffic by the end of the forecast period. Video traffic, including the portion of encrypted and file sharing traffic which it forms, is likely to represent the majority of all mobile data traffic by 2018.

Figure 17: Mobile data traffic share by application type, 2012

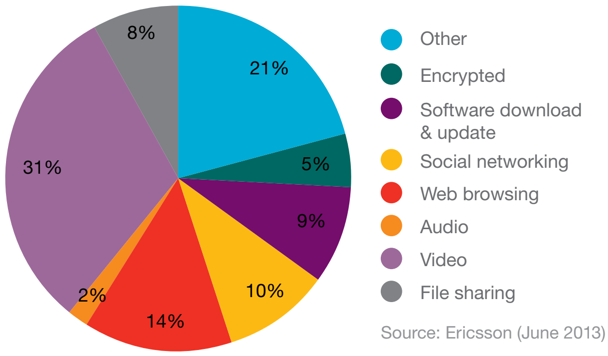
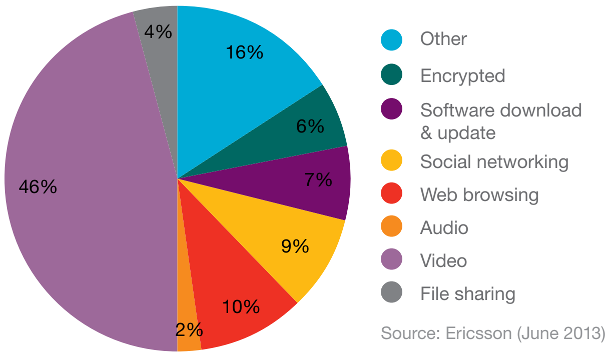



Figure 18: Mobile data traffic share by application type, 2018




# POPULATION COVERAGE

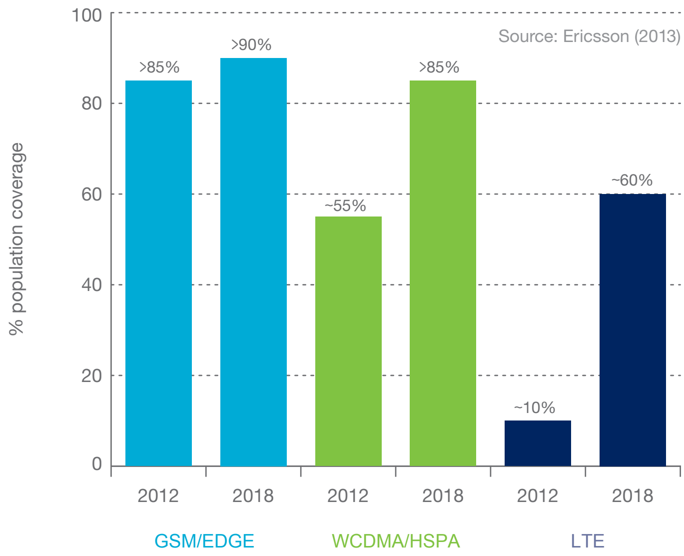
60%

LTE WILL COVER AROUND 60 PERCENT OF THE WORLD'S POPULATION BY 2018

Population coverage of the world's mobile networks is constantly increasing as more base stations are deployed. This article deals with trends and outlook concerning population coverage – the area in which a user has sufficient signal to connect to a mobile network.

GSM/EDGE technology has by far the widest reach and today covers more than 85 percent of the world's population. If Japan and Korea – two countries that have not deployed GSM/EDGE – are excluded, then the GSM/EDGE world population coverage would be around 90 percent. The areas that remain to be covered by GSM/EDGE in countries that use the technology are sparsely populated.

Figure 19: Population coverage by technology, 2012-2018




By the end of 2012, WCDMA/HSPA covered 55 percent of the world's population. Further build-out of WCDMA/HSPA will be driven by a number of factors: increased user demand for internet access, the increasing affordability of smartphones, and regulatory requirements to connect the unconnected. By the end of 2018, over 85 percent of the world's population will have the opportunity to access the internet using WCDMA/HSPA networks[1].

Despite being in the early days of roll-out, by the end of 2012 LTE was estimated to cover 10 percent of the world's population. Looking ahead 6 years, it is predicted that LTE will cover approximately 60 percent of the world's population.

## LATIN AMERICAN POPULATION COVERAGE

Latin America lacks a well built-out fixed telecommunications infrastructure. Because of this, the majority of people in the region will first become regular internet users over mobile networks.

Last year's GSM population coverage in Latin America and its subsequent forecast for 2018 closely mirrors the overall global situation.

The WCDMA/HSPA population coverage is somewhat lower in Latin America than the global average. It is estimated that by 2018, 80 percent of the population in this region will be covered by WCDMA/HSPA networks.

Brazil, Mexico and Colombia are early adopters of LTE compared to the rest of Latin America. It is forecast that this technology´s population coverage in Latin America will increase from approximately 5 percent to over 50 percent by 2018. During the same period the number of LTE subscriptions is expected to grow from about 200,000 to 95 million.

[1] The figures refer to population coverage of each technology. The ability to utilize the technology is subject to other factors as well, such as access to devices and subscriptions.

25%

OVER 25 PERCENT OF HSPA NETWORKS ARE CAPABLE OF SPEEDS UP TO 42 MBPS

## WCDMA/HSPA networks

There are over 500 WCDMA/HSPA networks that currently provide coverage to approximately 55 percent of the world's population. All of these networks support various speeds. All WCDMA networks deployed worldwide have been upgraded with HSPA. Around 85 percent of HSPA networks have been upgraded to a peak downlink speed of 7.2 Mbps or above and over 60 percent have been upgraded to 21 Mbps or higher.

Over 25 percent of HSPA networks now have speeds of up to 42 Mbps in whole or parts of the network following a wave of upgrades. We are already seeing evolutionary steps towards speeds of over 100 Mbps.

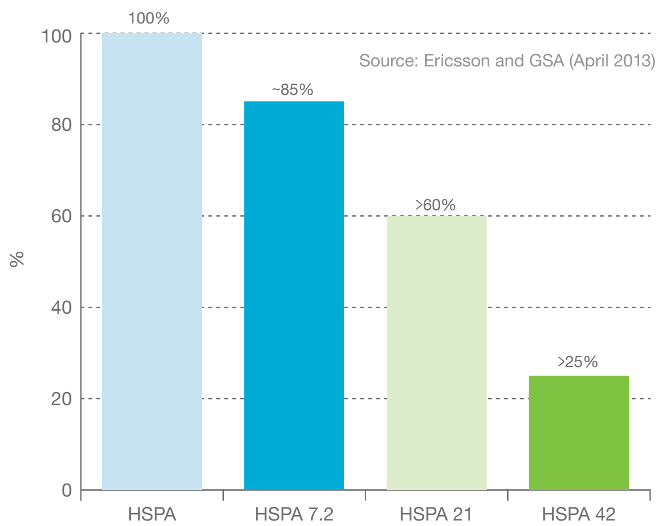
A further development that needs to be considered when analyzing WCDMA/HSPA network coverage is the increasing deployment of WCDMA/HSPA 900 MHz networks. 900 MHz networks can complement 2,100 MHz deployments to improve coverage and quality of service and enhance the user experience. In particular, WCDMA/HSPA 900 MHz provides better indoor coverage than is possible using 2,100 MHz. The first WCDMA/HSPA 900 MHz network was deployed in November 2007. Today, there is a well-established ecosystem for terminals and there are 64 commercial WCDMA/HSPA 900 MHz networks in 42 countries[2].

## LTE network rollout

Despite being in the early days of rollout, LTE networks can already provide downlink peak rates of around 100 Mbps, with current standardization allowing for even higher speeds. Today, peak speeds experienced by users are often limited by device capabilities. The evolution of LTE, also referred to as LTE-Advanced, enables peak data rates exceeding 1 Gbps.

LTE has become the fastest developing system in the history of mobile communication due to the fast speeds and high quality user experience that it offers. It has now been launched on all continents (except Antarctica), by 156 operators active in 67 countries[2].

Figure 20: Percentage of WCDMA networks upgraded to HSPA and to 7.2, 21 and 42 Mbps




Rapid deployment has been facilitated by the ability to re-farm spectrum and the utilization of multi-standard radio solutions. Re-farming enables an operator to quickly make new spectrum available for LTE, without the need to acquire new bandwidth. Multi-standard radio solutions enable rapid deployment of mixed technologies, enabling GSM/WCDMA/HSPA and LTE to be provided within the same radio base station.

The user experience can be further enhanced by aggregating multiple carriers across different bands. This enables the delivery of higher data rates across cells. Carrier aggregation is especially important for the user experience in performance-challenged areas, such as the cell edge.

[2] Global Supplier Association (GSA) estimates, Q1 2013.

# APP COVERAGE

APP COVERAGE – THE PROPORTION OF A NETWORK´S COVERAGE THAT HAS SUFFICIENT PERFORMANCE TO RUN A PARTICULAR APP AT AN ACCEPTABLE QUALITY LEVEL

The explosive growth of smartphone and app usage has put a new focus on cellular network performance. App coverage is a term used to describe this performance in a way that is relevant to the user. The concepts in this article will deal with varying performance levels within the area of population coverage.

Does a network enable a good experience when a particular app is being used? This question can only be answered in the context of the app and the demand it places on the network in terms of connection time (or time to view), throughput and latency. From a user perspective, app coverage can be defined as the area in which the network performance is sufficient to run a specific app at an acceptable quality level.

Figure 21 illustrates network performance declining within a cell in relation to distance from the radio base station. In reality, mapping network performance is more complex, due to motion as well as geographical and man-made obstructions to the radio signals between the base station and a mobile device. The level of network performance any given user experiences is also affected by the number of other users active in the cell and the demands their apps place on the network at any one time.

For social media or web browsing, the user experience is affected by how fast requested pages are rendered onscreen. For every second that passes between a user clicking a link and a page loading, the probability increases that the user will give up waiting.

Apps which involve streaming media such as video have even more stringent performance demands than web browsing. These apps use a range of mechanisms to smooth over variable network performance, such as adaptive codecs, local caching and buffering. If the throughput is not sufficient, time to view grows and the app may periodically freeze until it is no longer possible to stream, and then stop functioning altogether.

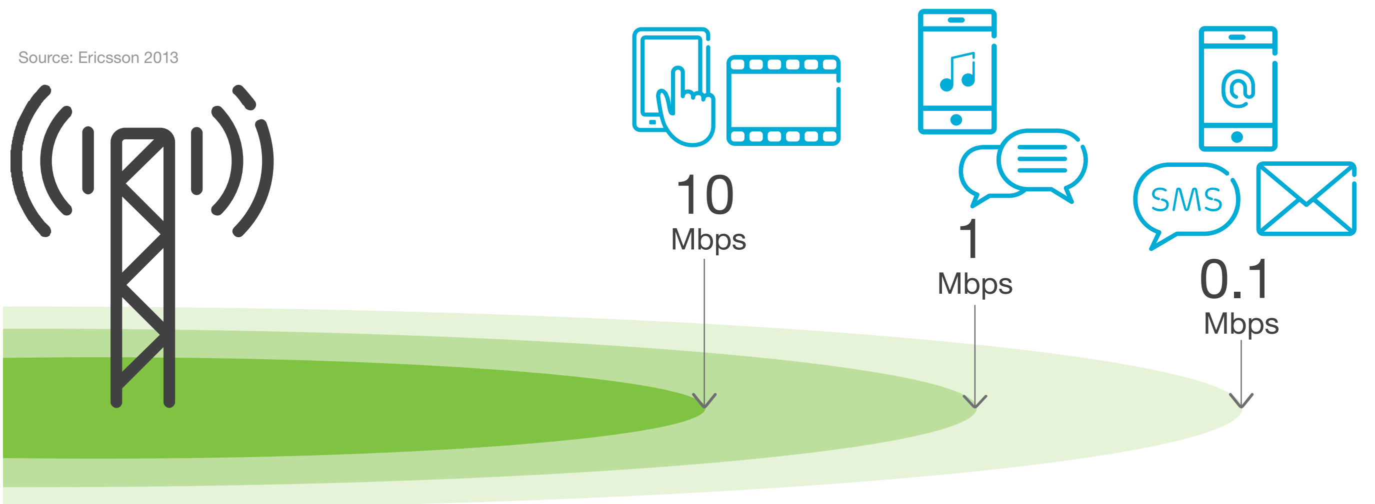
While downlink throughput is the limiting factor for many apps, real-time apps such as video conferencing put additional requirements on uplink and latency in order to provide sufficient quality for a good user experience.

## Network performance requirements

Requirements on network performance are both varied and complex. Given today's devices and apps, we can generalize and gain an idea of what level of downlink throughput is necessary for a good experience.

Figure 21: A conceptual view of app coverage

Source: Ericsson 2013



For simple web browsing, email and instant messaging, 100 Kbps would be sufficient. 1 Mbps would be sufficient for audio and video streaming as well as social media with multimedia content embedded.

A downlink throughput of 10 Mbps delivers a very good user experience, enabling higher quality video streaming and real-time video conferencing. These downlink speeds are indicative, and apply to typical devices and apps in use today. Requirements such as time-to-view, uplink throughput and latency should also be taken into consideration.

The radio technologies used to build today's mobile broadband networks are capable of delivering very high performance in terms of throughput and latency. The challenge is to build out enough bandwidth at site-to-site distances to enable a high probability of getting sufficient performance throughout each cell.

## Devices and apps

The device may be a factor limiting performance. A smartphone that supports up to 7.2 Mbps will not enable the user to experience the higher speeds available on today's HSPA networks. A device without LTE support cannot connect to a 4G network, regardless of the technology's coverage build-out. On the other hand, devices are replaced at a very fast rate.

Technological development is continuous. 3 years ago, high-end smartphones with 4-inch screens and 1 GHz processors supported WCDMA/HSPA 7.2. Today, handset vendors are launching high-end smartphones with 1.5 GHz quad-core processors supporting downlink speeds of up to 100 Mbps on LTE networks.

Some of these handsets feature screens of five inches or more with double the pixel density compared to the previous generation. There is a corresponding increase in performance for the high-volume, low-end and mid-range smartphone segments. Developers are designing apps to utilize these new capabilities. As these apps emerge, it will fuel user demand for better network performance.

## A new approach

In the smartphone era, there is a seemingly infinite variety of apps. Each has its own demands for network performance in terms of throughput and latency. The traditional way of viewing coverage – an area that meets a set of fixed requirements – is no longer enough. A new approach that takes a diverse set of performance demands into consideration is needed.

Using data from Speedtest[1] for the month of March 2013, figure 22 details the percentage of measurements with a given downlink throughput or greater. The statistics come from all radio access technologies except WiFi. It shows that most smartphone users experience sufficient network performance for voice, basic web browsing, messaging and email. However, there is a need for significantly more app coverage to run some of the more demanding apps, especially those that involve streaming or real-time video.

As app coverage is based on user experience, all things that affect network performance ultimately must be taken into consideration. This includes backhaul capacity from the radio base stations as well as the packet core and content delivery networks. App coverage requires a true end-to-end approach to designing, building and running mobile networks.

Figure 22: Proportion of Speedtest measurements with a given downlink throughput or higher, March 2013

| | Western Europe | Central & Eastern Europe | Middle East | Africa | Asia Pacific | North America | Latin America |
|---|---|---|---|---|---|---|---|
| 0.1 Mbps | 94% | 82% | 94% | 90% | 85% | 95% | 84% |
| 1 Mbps | 78% | 55% | 77% | 58% | 54% | 78% | 48% |
| 10 Mbps | 17% | 5% | 27% | 7% | 8% | 31% | 5% |

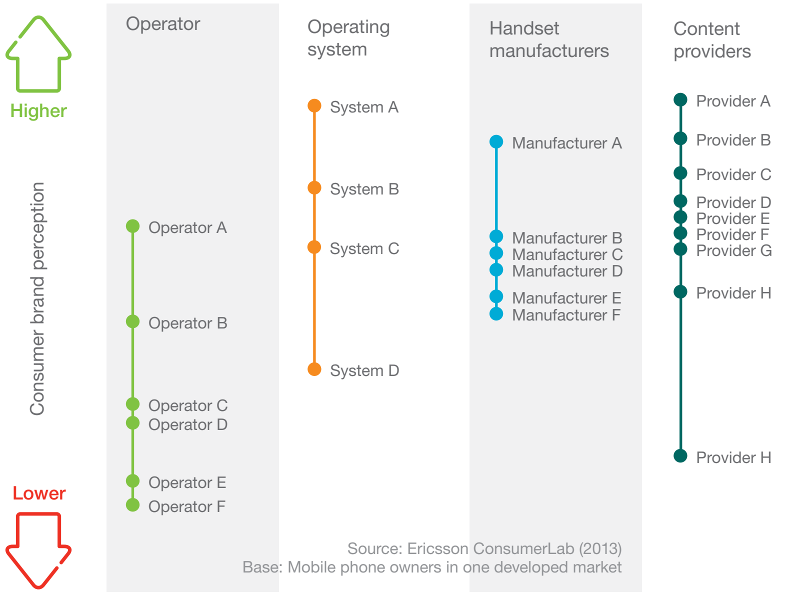
Source: Based on Ericsson's analysis of Speedtest.net results provided by Ookla (2013)

[1] The Speedtest app from Ookla.com is available for devices running either IOS or Android, allowing users to measure uplink and downlink throughput as well as latency. Each time the app is run, the results are stored in a database by Ookla, enabling statistical analysis. The database is growing rapidly and approaching 1 billion measurement records.

# CONSUMER LOYALTY AND NETWORK PERFORMANCE

No two operators are the same, and improving loyalty means evaluating and addressing important parameters such as customer care, pricing and network performance. An analysis of the latter reveals that on average, around 30 percent of users experience problems every day when using their smartphones to browse the web or use apps. As many as 60 percent experience problems weekly. An analysis of the most frequent smartphone issues indicates that users perceive networks as sometimes not meeting expected performance standards.

Figure 23: How consumers rank brand perception in a developed market




Content needs to appear quickly on the screen in order to ensure a good user experience. The most frequently reported complaints are about slow browsing, downloading and uploading of content, followed by lack of access to the mobile network. It has been found that 15-20 percent of users state that they experience problems very often and a further 45-50 percent experience problems occasionally. Their service expectations are simply higher than the service level that they receive.

Overall satisfaction with network performance is ranked lower than that for other important factors such as (in order of consumer satisfaction) initial purchase experience, billing and payment, account management, devices offered and customer support. Value for money and tariff plans offered are also among the important aspects where satisfaction is ranked lower.

Requirements on network performance are both varied and complex. Although such requirements are usually discussed in technical terms, ultimately the focus is on people accessing networks as part of everyday activities. Whereas the App Coverage chapter on pages 16 and 17 looks at how the consumer experience of coverage may vary when using smartphone apps, the focus here is on how that experience impacts loyalty towards mobile operators.

### Lower brand perception for mobile operators

An analysis of brand perception reveals that consumers rank operators lower than other mobile ecosystem players. Figure 23 shows this analysis for one developed market only – however the global pattern is similar.

### Great network – great loyalty

Consumer loyalty suffers when service factors such as reasonable waiting times and sufficient coverage are unsatisfactory. Net Promoter Score (NPS[1]) is a common metric used by various industries to measure brand loyalty. By breaking this measurement down into different factors, we can understand which areas are more important.

Figure 24 shows an analysis of NPS results. It reveals that network performance is the principal driver of subscriber loyalty to mobile operators, followed by value for money. These two parameters are correlated, implying that improving network quality will also improve perceived value for money at a given price level. Spending less on network performance and passing on savings to the consumer may also improve perceived value for money, but lowering prices provides little sustainable differentiation.

Figure 24 shows that addressing network performance has twice the impact on customer loyalty compared to measures such as improving customer support. It is four times as effective as introducing loyalty rewards.

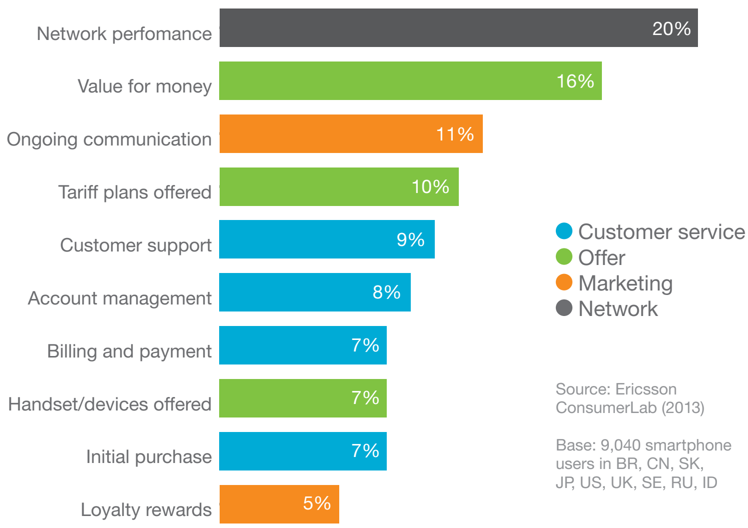
## Promoters recommend their operator

Figure 25 shows that network performance is the key factor differentiating promoters from detractors. The analysis also shows that up to 67 percent of promoters are very satisfied with network performance, compared to only 5 percent of detractors.

Although operators often promote attractive handsets to customers, figure 23 indicates that this mostly generates positive perception for the device brand. Instead, improving network performance may offer a sustainable advantage, as well as increasing an operator's share of promoters.

Overall performance for data services is perceived to be lower than expected by consumers and so there are opportunities for improvement, such as increasing app coverage. Addressing network performance may in itself be a way to differentiate offerings and also an effective way to improve overall customer loyalty.

Figure 24: Drivers of loyalty to operator brand (NPS)

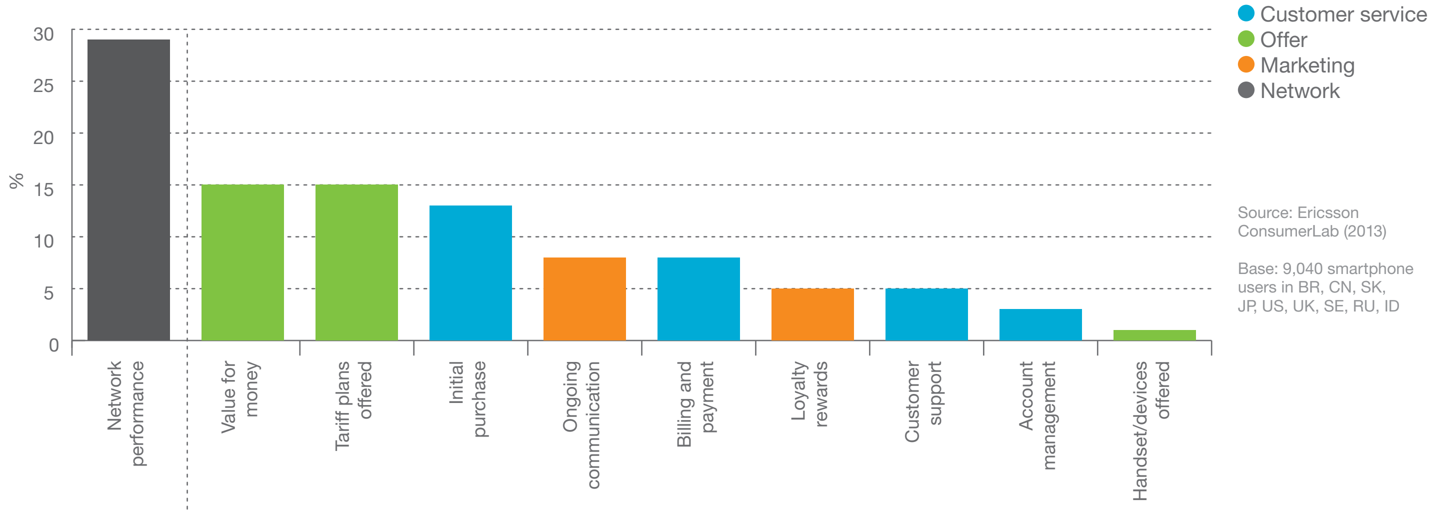



Source: Ericsson ConsumerLab (2013)

Base: 9,040 smartphone users in BR, CN, SK, JP, US, UK, SE, RU, ID

Shapley regression analysis, showing the relative impact between each driver and loyalty to operator brand (NPS).

Figure 25: Discriminant analysis, showing differences between promoters and detractors




Source: Ericsson ConsumerLab (2013)

Base: 9,040 smartphone users in BR, CN, SK, JP, US, UK, SE, RU, ID

Discriminant analysis, showing which satisfaction factors contribute the most to the difference in network operator advocacy.

Methodology: Online sample of 9,040 smartphone users in Brazil, China, South Korea, Japan, USA, UK, Sweden, Russia, Indonesia aged 18-69. The sample is representative of 350 million smartphone users globally.

[1] NPS is a quantification of the likelihood that a customer would recommend a company's product or service. Its customers are scored on a scale of 0-10 and then divided into three categories:

- 9-10 – promoters: loyal enthusiasts who keep buying from the operator and referring others, fueling growth
- 7-8 – passives: satisfied but unenthusiastic customers who are vulnerable to competitive offers
- 0-6 – detractors: unhappy customers who can damage your brand and impede growth through negative word of mouth

To calculate an operator's NPS, the percentage of detractors is subtracted from the percentage of promoters.

# INTERNATIONAL DATA ROAMING

In this section we analyze the share of subscribers who enable data roaming when traveling abroad and explore how device penetration differs between local subscribers and data roamers. We refer to data roaming as using mobile network data services in another country.

According to BEREC[1], international data roaming grew by 630 percent in the European Union (EU) during 2007-2012. During this period the average price per MB decreased. This, together with increased smartphone penetration, explains the growth in data roaming traffic.

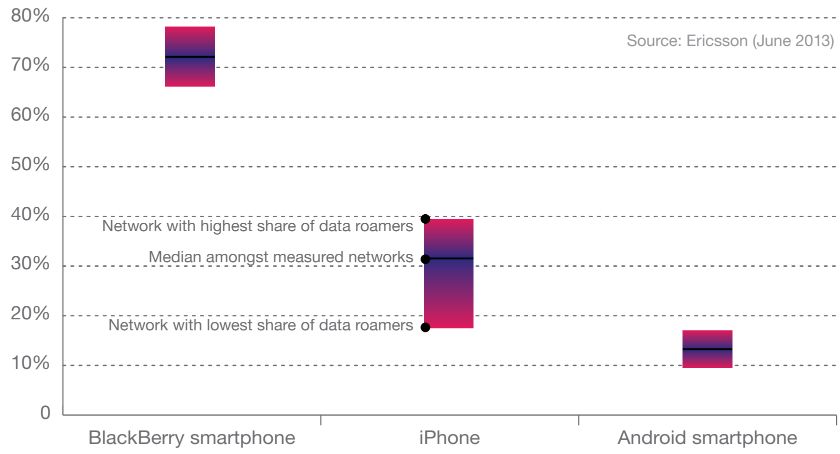
Ericsson global measurements show that the share of data traffic volume from roaming subscribers is lower than 0.5 percent of total mobile data traffic. There is great variation between the average per subscription traffic volumes for roaming users and local users. In some countries it can be as low as 10 percent, while in others – such as tourist destinations – it can be on par with local usage.

Figure 26 shows the share of roaming smartphone subscribers that have data roaming enabled and consume data. This share is by far the highest on BlackBerrys (65-80 percent) followed by iPhones (20-40 percent) and Android (10-20 percent).

Deeper analysis reveals that low-end Android models have only ~10 percent or even less data roaming share, while high-end Android smartphones have a share similar to that of iPhones at ~30 percent. The low share of data roaming in figure 26 for Android smartphones may be due to the high penetration of low-end models in many networks. Most subscribers with such a device do not have a data roaming service or have disabled it. Some do not even have a data subscription available on their home network.

[1] Body of European Regulators for Electronic Communication.

Figure 26: Share of roaming smartphone subscribers using data roaming services




Note: In this analysis, only 3G traffic is considered. 3G capable devices where subscribers turned off 3G capabilities and only generated 2G traffic are excluded.

For networks within the EU, the share of roaming subscribers with an iPhone or Android smartphone that have data roaming enabled is significantly higher for roaming subscribers from other EU countries, than from non-EU countries. This is most probably due to lower data roaming tariffs within the EU. Also, the majority of roaming subscribers on networks in the EU are from other countries within the region.

User behavior changes when roaming. While video dominates local subscribers' traffic it becomes negligible for those who roam. In contrast, the relative share of maps and email traffic is significantly higher for roaming subscribers.

## Regional roaming patterns

Few national regulators share data roaming information but the ones that do – Sweden and Switzerland for example – show that roaming patterns can differ a lot. In Sweden, 3 percent of data roaming traffic comes from non-EU countries compared to 23 percent in Switzerland. Share of local and roaming data traffic can also vary a lot within countries. For example, one European operator which had a 28 percent market share of total mobile traffic, had 66 percent of data roaming traffic and hence a larger share of the associated data roaming revenues.

DATA ROAMING IS DOMINATED BY BUSINESS USERS

## Business users dominate roaming

Figures 27 and 28 show that device penetration for data roaming subscribers differs from that of their local counterparts. Some devices are over-represented among data roaming subscribers – examples of this are BlackBerry smartphones, iPhones and M2M devices. In contrast, mobile PCs, Android smartphones, Symbian smartphones and feature phones are under-represented. Business subscribers are less sensitive to high roaming tariffs. This helps to explain the high BlackBerry penetration among data roamers in these measurements.

The dominance of business users is also highlighted in the relatively small seasonal differences in device penetration for data roaming subscribers, with no significant peak in vacation periods.

Device distribution for data roaming subscribers is more uniform than for local subscribers because the former come from all over the world, and therefore regional differences are leveled out. The larger uniformity can be seen in figure 27 as the variance is less for most devices compared to the variance in figure 28. The dominance of business users among data roamers is another factor that makes device penetration more uniform.

In contrast to smartphones, the penetration of M2M devices among data roaming subscribers shows a broad spread across networks. This is probably due to different levels of penetration among M2M devices in different regions and variations in transit traffic intensities. An example of this is when heavy cargo transit traffic utilizes vehicle tracking and fleet management M2M devices. Islands and central areas (in contrast to borders) of large countries tend to generate less data from roaming M2M devices.

Figure 27: Device penetration for data roaming subscribers

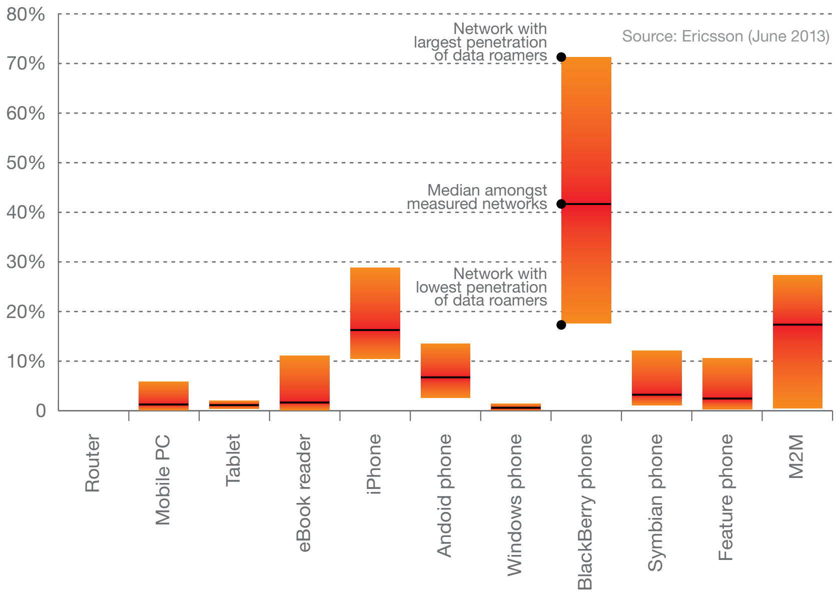
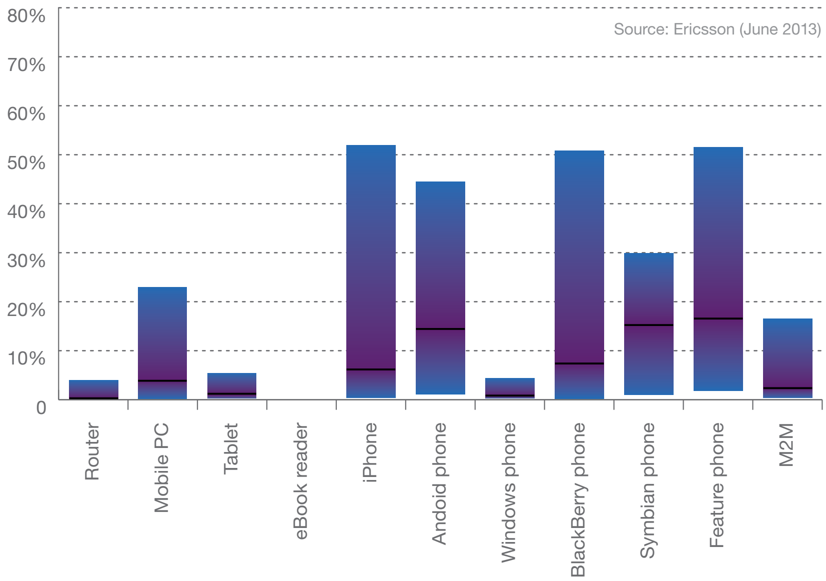



Figure 28: Device penetration for local mobile broadband subscribers




The results in this article suggest that data roaming is dominated by business subscribers. Data roaming penetration for consumers is lower, especially for low-end smartphone devices. This shows that there is an opportunity for operators to generate new revenue streams by making it attractive for subscribers that travel abroad to use their data roaming services.

The measurements in this section were made in a selected number of commercial WCDMA/HSPA networks in Asia, Africa, the Middle East, Europe and the Americas.

VIDEO IS THE BIGGEST CONTRIBUTOR TO TRAFFIC VOLUMES

# BEYOND BYTES

Today, the Byte is the most widely used metric to characterize mobile data traffic. However, other important aspects of traffic need to be considered when building and operating networks. For example, the signaling load of traffic from different applications impacts dimensioning of mobile data networks, while time spent using different applications is an important metric when analyzing consumer behavior.

In this section, we analyze both the share of mobile data traffic volume by device type, as well as traffic for different applications by Bytes per subscriber. We also introduce Minutes of Network Use (MoNU[1]), a metric estimating device time spent using different online applications. MoNU also correlates with signaling load – in other words, higher MoNU usually means a greater signaling load contribution. It is important to note that signaling load also varies significantly between network vendors and node configuration.

## Mobile data traffic volumes by device type

Figure 29 shows how the most widely used online applications contribute to overall mobile data traffic volumes, and how these contributions vary by the type of connected device. The chart shows average values from measurements in a selected number of commercial HSPA and LTE networks in Asia, Europe and the Americas. Actual values across individual networks can vary a lot. Regardless of device type, video is the largest contributor to traffic volumes (30-40 percent). For smartphones, social networking is already the second largest traffic volume contributor with an almost 15 percent average share.

Figure 29: Application mobile data traffic volumes by device type

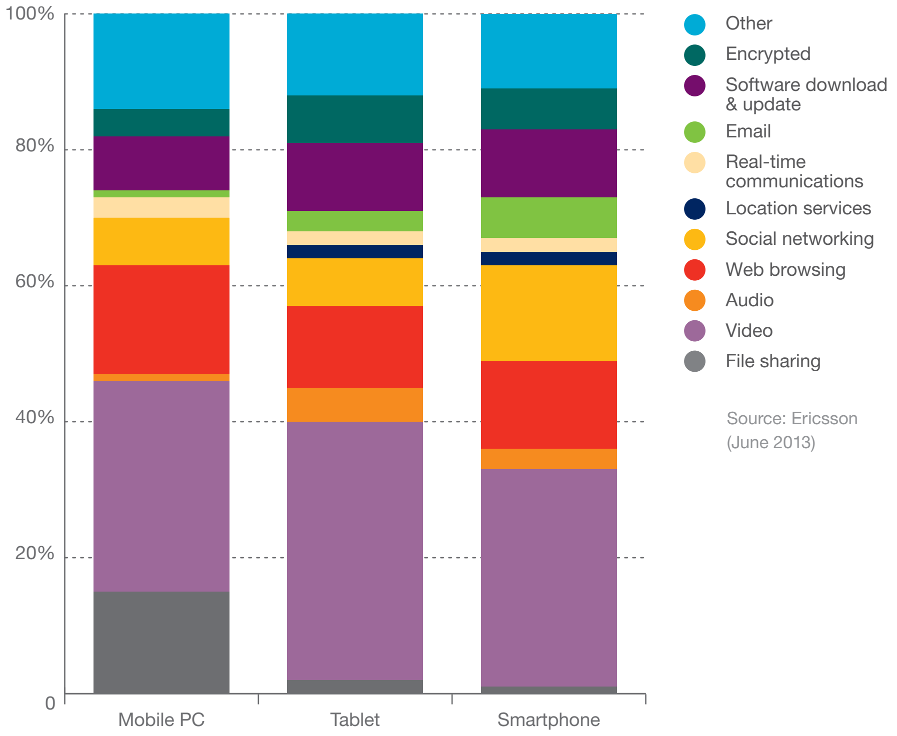



Figure 29 includes 4G, 3G and 2G mobile data traffic and does not take into account Wi-Fi offload traffic. Smartphones include Android and iPhone models only. 'Other' includes applications that were not possible to identify or that don't qualify as one of the listed applications.

Traffic drawn from mobile PCs is notable for having significantly higher file sharing activity than other devices, while online audio and email are important contributors to data traffic on tablets and smartphone devices. The file sharing part under smartphones and tablets comes from tethering traffic.

## Social networking a high MoNU contributor

Figure 30 shows traffic for different applications by Bytes per subscriber. Figure 31 shows the same information for MoNU. In terms of Bytes, video is the largest contributor in most networks both for mobile PC and smartphone (iPhone or Android) users. However, in terms of MoNU, video is lower and social networking and web browsing are the largest contributors. For smartphones, presence – a background process that ensures the smartphone

[1] Minutes of Network Use is measured by counting the number of minutes when a given terminal generates any data traffic using a given application. The MoNU metric also counts usage for background applications that generate background traffic without any user interaction such as presence. In contrast, usage for offline applications such as offline gaming is not included. Hence MoNU is not equal to screen time but can be a good approximation of actual screen time for most interactive applications.


## SIGNALING LOAD IMPACT

Dimensioning of mobile data networks is impacted by signaling load. Higher MoNU usually means a greater signaling load contribution.

is reachable for push notifications (new email, Facebook message, chat message, etc.) – is the biggest MoNU contributor.

It is interesting to compare mobile PC vs. smartphone usage for the three main interactive online application categories: video, web browsing and social networking. For video and web browsing, mobile PC usage is higher than smartphone usage both in terms of Bytes and MoNU. Larger screens boost usage for these applications. In contrast, differences in social networking are much smaller and in terms of MoNU, smartphone usage can even exceed mobile PC usage. The reason for this is that for social networking users, always having the device with them is a more important factor than screen size. It is important to note that Facebook is also widely used for non-social networking purposes, such as authentication for various online games and enriching phone contacts with social content. A significant part of Facebook MoNU on some smartphones can be attributed to such integration with other apps.

The spread between different terminal types in terms of total MoNU (for all applications) is significantly smaller than in terms of Bytes. Router devices and advanced smartphones with regular background activity have the highest average per subscription MoNU. This figure is lower for mobile PCs, which are usually only turned on when used.

Due to continuous presence traffic on smartphones, daily profiles for MoNU and radio signaling are significantly flatter than daily profiles for traffic volume in Bytes. This is because most people do not turn off their smartphones at night.

Based on our measurements, application usage and network impact varies a lot on different terminals depending on the traffic metric used. Video is the largest contributor in terms of Bytes on all terminals. However, in terms of MoNU, and not counting non-interactive background applications such as presence, social networking leads online usage. This is especially the case with smartphones[2]. Non-interactive background applications on smartphones, such as presence, are key drivers of signaling load in mobile networks.

Figure 30: Average monthly traffic volumes

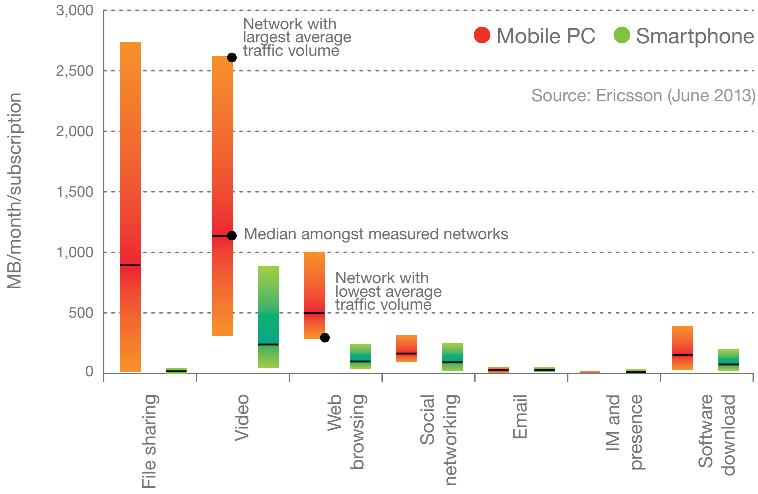
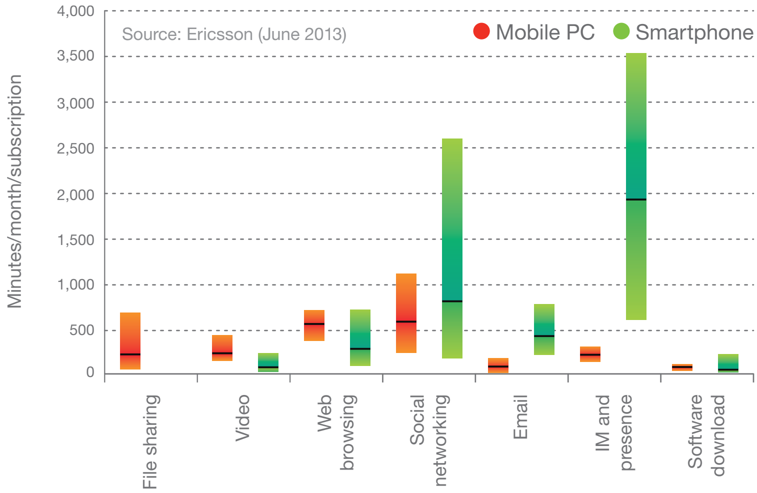



Figure 31: Average Minutes of Network Use (MoNU)




[2] Minutes spent gaming on smartphones can be even greater than on social networking. However, many of these games are offline and do not generate any data traffic during most of the usage period.

# THE SIGNATURE OF HUMANITY

As digital technologies become more widespread, data from communication networks allows us to better understand human behavior. The study of this data provides new perspectives.

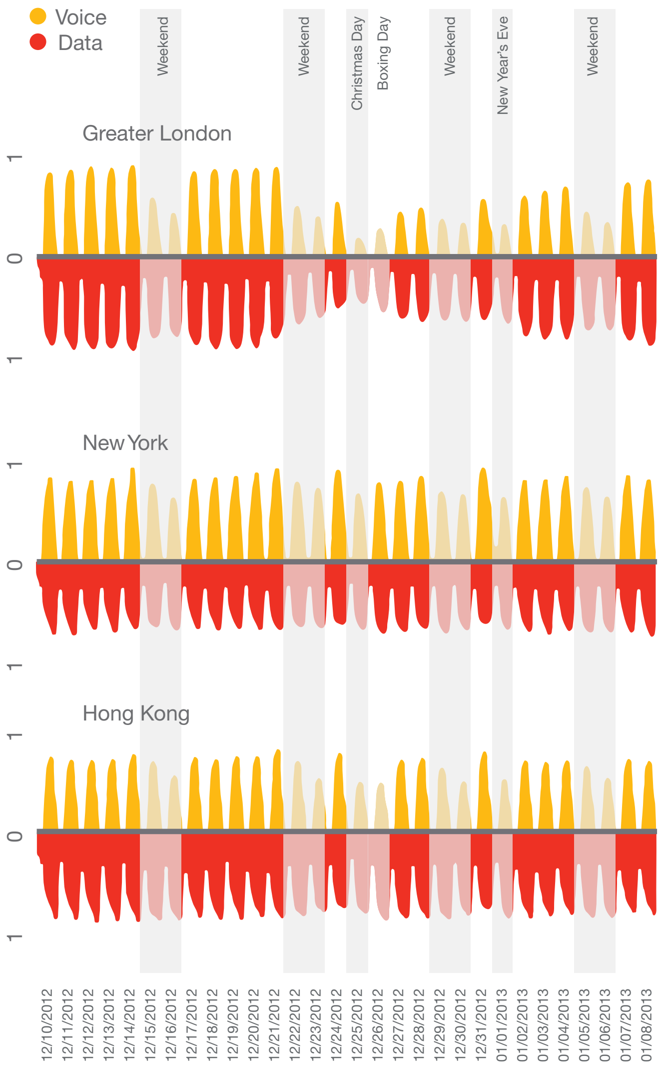
Both similarities and differences are revealed when comparing network usage around the globe. We see that Londoners vary their usage a lot depending on the day of the week, and also take a vacation from mobile networks during holidays. On the other hand, the pace in New York and Hong Kong does not change as much. This suggests that New York has more in common with Hong Kong than London when it comes to network usage, despite cultural differences. Nevertheless, with lower usage during the night than the day, people's daily routines follow a familiar pattern in all three places, and thus share a common pulse.

The data used in this article was collected between December 10, 2012 and January 8, 2013, from mobile networks in London, New York and Hong Kong. It shows where and when people accessed the networks to make voice calls, to use data and to send text messages (SMS).

## New Yorkers stay online

Figure 32 compares network usage in the three cities. Voice and data traffic volumes are plotted relative to the maximum in each geographic area. The figure indicates that there is an activity drop during weekends and holidays. Another interesting point revealed in the data but not illustrated in the graphs is that the activity drop is more evident in the city centers than in the suburbs. Most dramatic is the reduced activity in London's financial center, which can likely be explained by the large number of people commuting out of the area after work hours. What is visible in the graph is that in general, New Yorkers maintain a level of mobile activity at home, both for voice and data, similar to that at work. In Hong Kong, while voice traffic declines in the evenings, the pattern of data activity continues into the night. This is evident

Figure 32: A comparison of voice and data traffic in London, New York and Hong Kong[1]

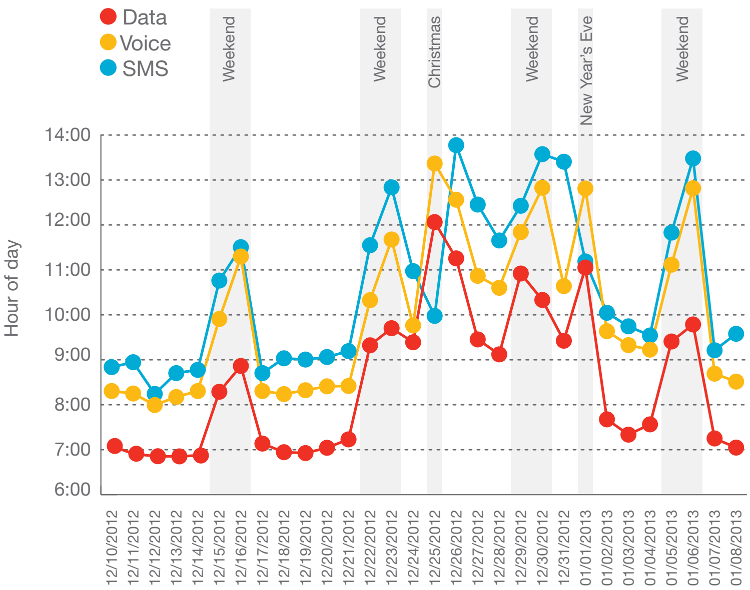



Source: Ericsson and MIT Senseable City Lab (2013)

in the data side of the graph in figure 32, where the measurements are far from reaching zero in between the daily peaks. People in Hong Kong use mobile broadband to access the web and watch video clips and movies during the night. This illustrates activity patterns that can be matched with geographical location and associated culture.

[1] Note that December 26 is a holiday in the UK and Hong Kong, but not in the US.

Figure 33: A comparison of voice, data and SMS activity for Greater London




Source: Ericsson and MIT Senseable City Lab (2013)

## Wake up to data

Figure 33 compares voice, data and SMS activity for Greater London. It plots the time when each activity typically starts, defined as the point when the traffic reaches half its daily peak. It illustrates that in Greater London data is frequently used earlier during the day than voice and SMS. Voice activity usually begins around office hours at 8am, while data activity begins earlier at 7am, when people commute to work, checking Facebook, emails or weather reports. SMS, however, tends to be used later than both voice and data, except for Christmas morning and New Year's Day. On the 31st of December, New Yorkers and Londoners wish friends and family a happy new year with an SMS. This causes a predictable SMS storm. In Hong Kong, the Chinese New Year has an even larger impact on SMS traffic (however this takes place over several days in February, outside the boundaries of this study).

The signature of humanity is a glimpse of collective behavior patterns that reveal a common pulse. The pulse itself is the point, derived not from the content of the communications, but simply from the volume and timing of network usage.

### A PARTNERSHIP ON THE PULSE

This article was written by Ericsson in cooperation with MIT Senseable City Lab.

MIT senseable city lab

# KEY FIGURES

| Mobile subscription essentials | 2011 | 2012 | 2018 forecast | CAGR 2012-2018 | Unit |
|---|---|---|---|---|---|
| Worldwide mobile subscriptions** | 5,800 | 6,300 | 9,100 | 6% | millions |
| – Smartphone subscriptions | 850 | 1,200 | 4,500 | 25% | millions |
| – Mobile PC, tablet and mobile router subscriptions | 250 | 300 | 850 | 20% | millions |
| – Mobile broadband subscriptions | 1,100 | 1,600 | 7,000 | 30% | millions |
| – Mobile subscriptions, GSM/EDGE-only | 4,200 | 4,300 | 2,100 | -10% | millions |
| – Mobile subscriptions, WCDMA/HSPA | 950 | 1,200 | 4,300 | 25% | millions |
| – Mobile subscriptions, LTE | 9 | 65 | 2,000 | 75% | millions |

| Mobile traffic essentials* | 2011 | 2012 | 2018 forecast | CAGR 2012-2018 | Unit |
|---|---|---|---|---|---|
| – Monthly data traffic per smartphone* | 300 | 450 | 1,900 | 25% | MB/month |
| – Monthly data traffic per mobile PC* | 1,900 | 2,500 | 11,000 | 30% | MB/month |
| – Monthly data traffic per tablet* | 450 | 600 | 3,100 | 30% | MB/month |
| Total monthly mobile data traffic | 600 | 1,200 | 14,000 | 50% | PetaByte/month |

| Traffic growth | Multiplier 2012-2018 | CAGR 2012-2018 |
|---|---|---|
| All mobile data | 12 | 50% |
| – Smartphones | 13 | 55% |
| – Mobile PC | 6 | 35% |
| – Tablets | 40 | 85% |

PetaByte = 10^15
*active devices
**Using active VLR subscriptions for India

*Monthly data traffic volumes by year end.

# METHODOLOGY

### Forecast methodology

Ericsson performs forecasts on a regular basis to support internal decisions and planning as well as market communication. The subscription and traffic forecast baseline in this report is based on historical data from various sources, validated with Ericsson internal data, including extensive measurements in customer networks. Future development is estimated based on macroeconomic trends, user trends (researched by Ericsson ConsumerLab), market maturity, technology development expectations and documents such as industry analyst reports, on a national or regional level, together with internal assumptions and analysis. Updates to the subscription and traffic forecasts are announced on an annual basis.

### Traffic measurements

New devices and applications affect mobile networks. Having deep and up-to-date knowledge of the traffic characteristics of different devices and applications is important when designing, testing and managing mobile networks. Ericsson regularly performs traffic measurements in over 100 live networks in all major regions of the world. Detailed measurements are made in a selected number of commercial WCDMA/HSPA and LTE networks with the purpose of discovering different traffic patterns. All subscriber data is made anonymous before it reaches Ericsson's analysts.

# GLOSSARY

**2G:** 2nd generation mobile networks
**3G:** 3rd generation mobile networks
**APAC:** Asia Pacific
**CAGR:** Compound Annual Growth Rate
**CDMA:** Code Division Multiple Access
**CEE:** Central and Eastern Europe
**CEMA:** Central and Eastern Europe, Middle East and Africa
**DSL:** Digital Subscriber Line
**EDGE:** Enhanced Data Rates for Global Evolution
**ExaByte:** $10^{18}$ Bytes
**FDD:** Frequency-Division Duplex
**GB:** GigaByte
**GSA:** Global Supplier Association
**GSM:** Global System for Mobile Communications
**HSPA:** High Speed Packet Access
**HTTP:** Hypertext Transfer Protocol
**IMEI-TAC:** International Mobile Equipment Identity – Type Approval Code
**LA:** Latin America
**LTE:** Long-Term Evolution
**M2M:** Machine-to-Machine
**MB:** MegaByte
**MBB:** Mobile Broadband. Defined as CDMA2000 EV-DO, HSPA, LTE, Mobile WiMAX and TD-SCDMA
**Mbps:** Megabits per second
**MEA:** Middle East and Africa
**MMS:** Multimedia Messaging Service
**Mobile PC:** Defined as laptop or desktop PC devices with built-in cellular modem or external USB dongle
**Mobile router:** A device with a cellular network connection to the internet and Wi-Fi or ethernet connection to one or several clients (such as PCs or tablets)
**NA:** North America
**OS:** Operating System
**P2P:** Peer-to-Peer
**PetaByte:** 10^15 Bytes
**TDD:** Time-Division Duplex
**TD-SCDMA:** Time Division-Synchronous Code Division Multiple Access
**VoIP:** Voice over IP (Internet Protocol)
**WCDMA:** Wideband Code Division Multiple Access
**WE:** Western Europe
**xDSL:** Various technologies for DSL

Ericsson is a world-leading provider of communications technology and services. We are enabling the Networked Society with efficient real-time solutions that allow us all to study, work and live our lives more freely, in sustainable societies around the world.

Our offering comprises services, software and infrastructure within Information and Communications Technology for telecom operators and other industries. Today 40 percent of the world's mobile traffic goes through Ericsson networks and we support customers' networks servicing more than 2.5 billion subscriptions.

We are more than 110,000 people working with customers in more than 180 countries. Founded in 1876, Ericsson is headquartered in Stockholm, Sweden. In 2012 the company's net sales were SEK 227.8 billion (USD 33.8 billion). Ericsson is listed on NASDAQ OMX, Stockholm and NASDAQ, New York stock exchanges.



Ericsson
SE-126 25 Stockholm, Sweden
Telephone +46 10 719 00 00
Fax +46 8 18 40 85
www.ericsson.com

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