

Asia-Pacific III 2011

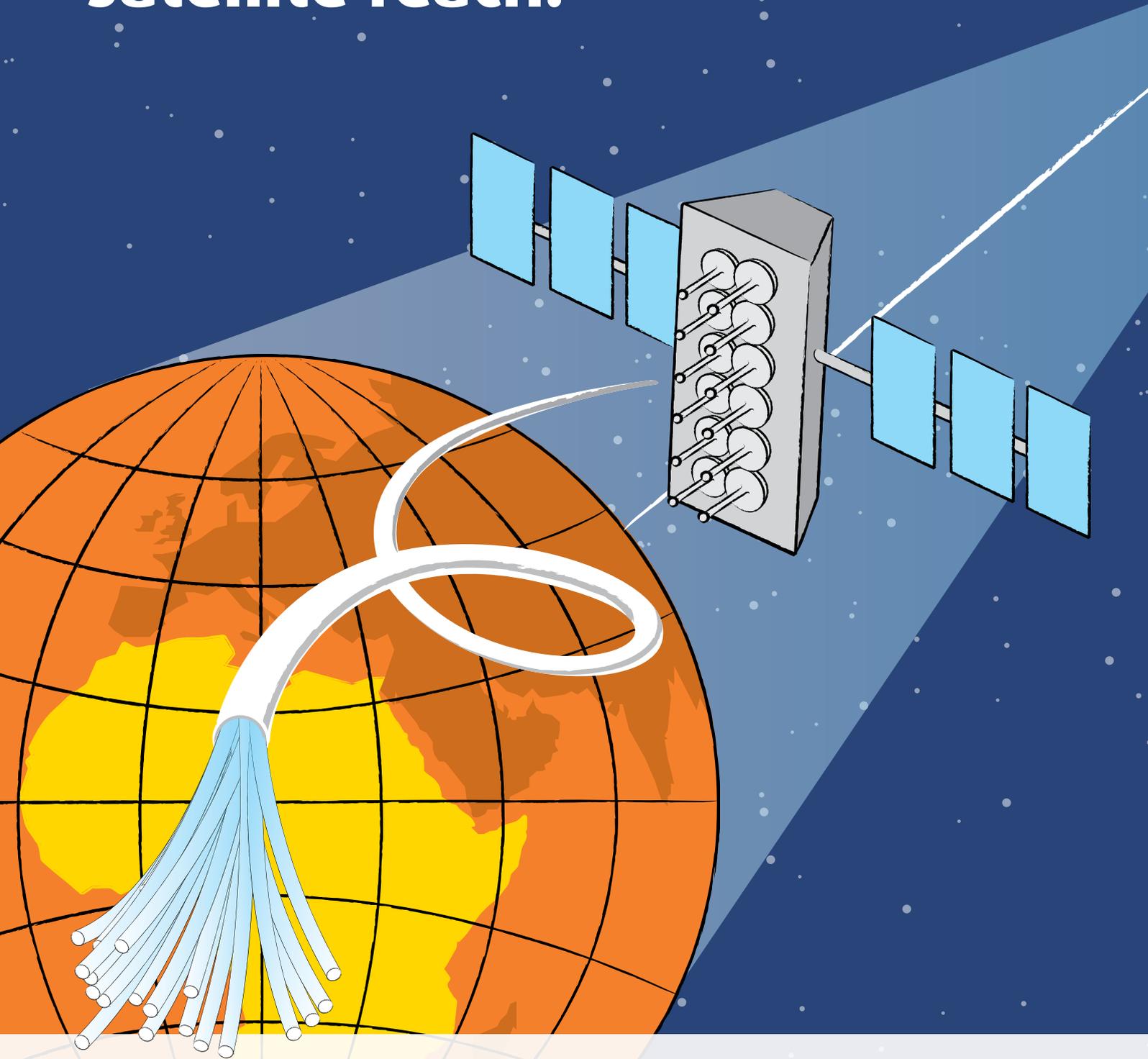
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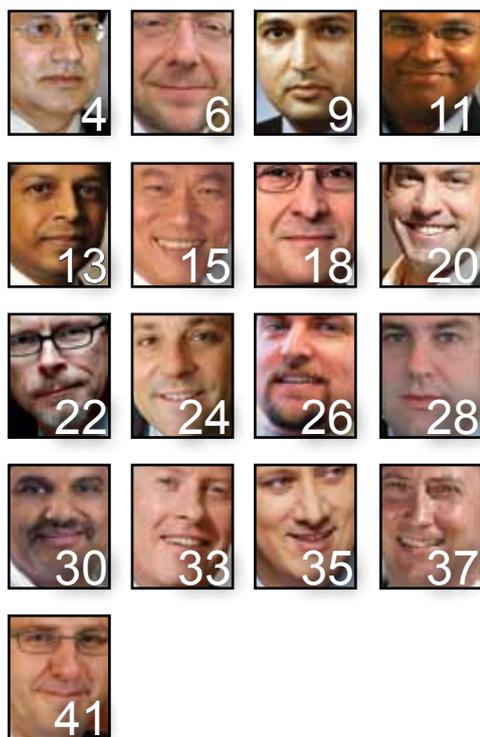
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CONNECTIONS

Connections



While smartphones deliver PC functions, PCs are used as communication tools, wired or wireless. The latest advent of slim-line tablets blurs further the traditional roles of devices. This gives rise to a new range of 'Mobility Services'. Such services range from shop-floor information flow that speeds up manufacturing, machine-to-machine (M2M) automation, mobile money and mobile eCommerce, which are slated to bring future growth.

These new services may be predicated on the devices' current and future capabilities, such as NFC (*Near Field Communication*) or image recognition, but their versatility comes from the constant connectivity to the Internet and to the Cloud. Content streaming in both upstream and downstream directions is essential to these new breed of applications, where 'Mobility meets Content'. The fusion of Content, in particular dynamic content, with mobility and immediacy is a mesmerising combination that is yet to spawn numerous innovative 'apps'.

With a multitude of devices per person, we need the same service environment delivered on several devices. Service ubiquity means more than just access wherever we are, but also availability on whatever smart device we prefer to use at the moment. As 'consumerisation' becomes widespread, work-life merges with personal life, and the same clever device becomes the 'remote control for life'. This is facilitated by the Service Layer moving to the Cloud, both 'fixed' and 'mobile' clouds. This has many advantages, not least the ease of introducing innovative services. Storing sensitive data in the protected custody of the cloud, instead of leaving it on vulnerable mobile devices that can get lost or stolen, helps to make crucial information available anywhere safely.

With the population of connected devices grows rapidly, the evolving supporting systems begin to groan. M2M services, both tethered and mobile, require a huge number of devices to be provisioned and dormant services to be activated as and when required. This not only increases the pressure due to volumes, but also demands integration of support systems for converged services.

The OSS sends an SOS message when another silo is needed to manage a new type of service. It signals that an entirely new thinking is required to unify management

of the multi-device, multi-technology network, and to address new concerns about security and quality. An example of a new requirement is the emerging need for service assurance for Internet video streaming, instead of the current unreliable 'best effort' approach. Another rising requirement is WAN (*Wide Area Network*) optimisation, extending the Enterprise network to remote sites and enabling it to deal with the growing packet volumes from both PCs and smartphone data services.

In fact, the merging of PC capabilities into mobile devices has already brought high pressure on the access and backhaul networks and caused carriers to revise their strategies. Carrying large data service volumes on 'flat fee' necessitates increased capacity at minimal costs. Therefore, carriers are revamping their third generation (3G) fast service and wireless fidelity (*WiFi*) capabilities, are optimising enterprises' global Wide Area Networks (*WANs*), and focusing on metro-Ethernet and Microwave Ethernet which are growing in popularity. The old 'Silk Road' is morphing into the 'Fibre Road', and both WiFi and Ethernet are back in vogue.

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Mobile phones vs. PCs - how mobiles outgrow PCs

by Dr Mohammad Yaseen, Chairman, and Muhammad Amir Malik, Director for ICT, Pakistan Telecommunication Authority (PTA)

PC and mobile phones are invading each other's traditional application space, but this competition brings 'win-win' results. Mobile Internet growth outpaces growth of Internet via PCs, especially in the developing world. In Pakistan, mobile Internet users increased 18 times faster than PC users. The PC still has its place, due to its native advantages, but the combination of mobility and ubiquitous access to the Internet on smartphones is particularly engaging. There is no longer a distinction between devices that deliver Voice and those for IT services. Regulators must consider this for issues of privacy, mobile advertisement, intellectual property rights, data protection, security and mobile spam.



Dr Mohammad Yaseen is the Chairman of the Pakistan Telecommunication Authority (PTA). Prior to joining the PTA, Dr Yaseen served as Director of Strategy at PTCL Pakistan, as Senior Consultant for Advanced Networks and Systems, Australia, as a System and Project Engineer at Alcatel Submarine Networks Australia, and as a Senior Research Officer at Essex University, England. Dr Yaseen has produced 30 international and national publications on telecom technologies, ICT growth, strategies and design of telecom networks. Dr Yaseen represented the PTA at various international and national forums, including the Asia Pacific Telecommunity (APT), where he was appointed Vice Chairman of APT Study Group 2 (Networks).



Muhammad Amir Malik is the Director for ICT at the Pakistan Telecommunication Authority. He is responsible for policy and research-based studies of emerging and current ICTs. Mr Malik provides liaison with the Ministry of IT, Government bodies and ICT operators to foresee issues and latest trends in the ICT market by studying international regulations and practices, and the implications of future technologies on the ICT sector of Pakistan. Mr Malik is responsible for devising and implementing mechanisms and policy recommendations in these areas. He has also served at the Ministry of Information and Technology as Project Director, as a Project Manager with Finlays, at SAP AG as Senior Technical Support Consultant, as a Research Engineer at Air France, as a smartcard programmer at Schlumberger and as a Site Installation Engineer at Alcatel CIT. Mr Malik is an Electrical Engineer. He earned an M.S. in CS and Telecommunication Engineering from ENSIMAG, INPG, France.

The world of digital devices is getting more interesting. A device is introduced with specific facilities, followed by an enhanced version (or, otherwise, another device), inheriting the basic functionality of the previous device as one of its added properties. The latest era of convergence has dramatically changed the landscape of computing and mobile devices, where

in the first place both types of devices were introduced with no cohesion at all. Computing devices like personal computers have been known for carrying out general purpose tasks such as word processing, creating spreadsheets and databases, Internet browsing, sending emails, undertaking digital media playback, and playing games, as well

as personal productivity applications. Similarly, mobile handsets have been produced for making mobile telephone calls across a wide geographic area.

However, advancements in mobile phone technology and the smartphone revolution have led to a situation where people are wondering if they even need a personal

computer any longer. Today's mobile phone is operated by specialised operating systems and is fitted with a whole new world of software applications. It offers robust multimedia experience, holds handsome data storage space, provides rich Internet-browsing facility and, above all, enables mobility of usage - 'anywhere, anytime'. Moreover, smart devices like the iPhone have introduced screens carrying a four inch of display providing viewing advantage to consumers.

The PC is now in competition with mobile phones and it appears that this competition has brought a win-win situation. One can play games on a PC, use the Internet, access entertainment and exercise it for all sorts of creative things, but primarily, the PC is a personal labour force. Equipped with peripherals to input and output information, a reasonable viewable screen, fast multi-core processors, large memory and a keyboard/mouse to play around with, the personal computer is still useful with these unique features. However, the primary popularity gained by mobile phones is 'connectivity with mobility'. If you need to check an important work email while at dinner, it's just a matter of reaching into your pocket, whereas no one would carry a personal computer to a dining table. The mobile connectivity is getting faster and more reliable while offering access to Internet and online services. Now that 4G wireless is on the market, faster data rates and quicker connectivity is within reach.

Steve Jobs (former CEO of Apple Inc.) has predicted that the ongoing shift in technology away from the PC and towards mobile devices will continue. He compared the role of the PC with that of the truck. "All cars were trucks because that's what you needed on the farm," he said. Now trucks are one in 25 to 30 vehicles sold. "PCs are going to be like trucks. They will still be added: "This transformation is going to make some people uneasy."

One of the most demanding factors of mobile phone comparison with computers is the Internet accessibility. Today, the personal computer remains the dominant platform to access the Internet globally. However, the number of people accessing Mobile Internet is growing fast. It is expected to overtake the PC as the most popular way to get on the Internet within the next couple of years.

Especially in reference to the new generation of Internet users, Internet consumption via mobile devices is becoming a growing habit. As consumer dependence on mobile phones grows, they increasingly engage themselves with new applications. Mobile phones are poised to become a dominant Internet platform outside the home. According to global market research firm Ipsos Insight, Internet access via the mobile phone has actually outpaced wireless access from a notebook PC in many areas of the world. Furthermore, there is also some proven evidence of successful delivery of several electronic services to rural populations through mobile phones, particularly in developing economies.

Internet browsing via a mobile phone is showing rapid growth in global market. Research reveals that France, Japan and UK are exhibiting the leading growth in this regard. Taking the example of Pakistan, the following chart highlights interesting Internet usage trends over one year span (June 2009 - June 2010).

The number of PC Internet users was increased by a small margin of 0.5 million in a year (19.0 million to 19.5 million) whereas the number of mobile Internet users shot up by a margin of 8.9 million during the same period of time. This indeed represents a case of the growing popularity of mobile Internet users in developing economies.

According to the latest research, the PC penetration in the industrialised world households is now 71 per cent, whereas the mobile penetration in these countries is

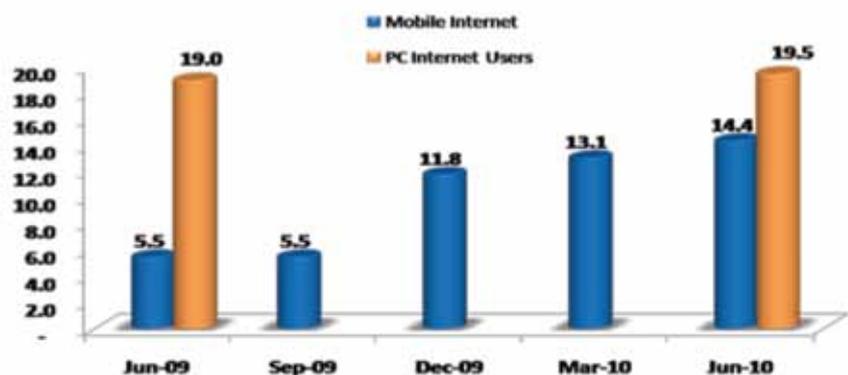
96 per cent of households. In the emerging world countries PC penetration is 23 per cent of all households, whereas 59 per cent of households in these countries have at least one mobile phone.

According to latest data available with IDC, vendors shipped 100.9 million smartphones during the fourth quarter of 2010, while during the same time period 92.1 million PC shipments were logged by IDC. This is said to be the first time smartphones surpassed PC shipments.

While the mobile phone is rapidly becoming a primary medium for various applications and a platform for delivery of Internet content, regulators are preparing to address issues such as access to services, privacy for the user, mobile advertisement, intellectual property rights, data protection, security and mobile spam. The merger of IT devices with Communication services is ultimately at the core of convergence trends with virtually no distinction between the device-end delivery of voice and data.

While these communication networks, media and devices are converging, regulators can foresee new trends and challenges in a digital future. In a nutshell, the mobile phone is part of the natural progression of the PC, and an extension of it. The mobile phone may grow to be more significant than the PC, while the combined technology brings even more benefits and winning prospects for all! ●

Mobile Internet & PC Internet Users



Source: PTA

Asia-Pacific and the converged digital home

by Duncan Bees, CTO, HGI (Home Gateway Initiative)

The HGI publishes agreed requirements for home network equipment to help broadband service providers (BSPs) converge services on whatever device is most convenient. Due to the great appetite for content consumption in the APAC region and the rapid mass adoption that often occurs here, such services can bring a great advantage to service providers. The HGI's Next Generation Communications (NG-Com) project identifies services for the digital home, especially for Voice integrated with Internet services. These services, e.g. home automation, energy management, medical monitoring and home surveillance, may run on TV set-top box, mobile or PC and should be available in or out of the home. The HGI seeks consensus from its members, which already include the majority of equipment vendors from Taiwan, Japan, and China.



Since 2008, Duncan Bees has been the Chief Technology and Business Officer for the Home Gateway Initiative (HGI). Under his watch, HGI addressed many new topics, including an industry test programme, energy efficiency, Quality of Service, software modularity, and home networks. Mr Bees has also overseen redesign of website and internal processes, while growing its membership. His focus is on bringing value to all the members of the organisation.

Previously Mr Bees worked for eight years at PMC-Sierra in Vancouver, leading systems teams in broadband access, VoIP, voice quality, high-speed serial interfaces and switches. He gained a high profile for PMC at many industry bodies, both at technical and steering committee level, and led in-depth technical dialogue with carriers and customers. He also worked for nine years at Bell Northern Research in Montreal, where he led DSP and development teams in wireless speech, mobile data, and voice recognition systems. His team deployed a wide range of technologies from DSP cards for mobile networks to newly designed speech processing algorithms. Mr Bees started his career at MacDonald, Dettwiler and Associates where he developed circuitry to support remote sensing satellites. He holds a Master's Degree in Electrical Engineering from McGill University and a Bachelor's Degree in Applied Science from the University of British Columbia.

The challenge of service convergence

The last few years have seen the near-ubiquitous rollout of fixed broadband services to consumers in many areas of the globe - including many regions within the Asia-Pacific market. In the same timeframe, we've seen the deployment of highly advanced smartphones, tablets, PCs, and terminals of all types that provide wireless access to the Internet - either from within or from outside the home.

Fixed broadband now offers very high speed access at an economical price, and offers services - such as streaming HDTV - that may be impractical on commonly available wireless networks. Yet wireless access speeds have also increased, and wireless terminals available to consumers are far more capable than even three years ago. At the same time, wireless data prices have also declined, and the range of broadband services available from wireless - from checking email to accessing social media - has become more similar to those available on fixed broadband.

All this has changed customers' expectations. They expect to receive consistent service no matter where they are, and no matter

which terminal they are using. That presents both opportunities and challenges to service providers. The opportunities are to present consumers with a service package that integrates fixed and wireless services within a common framework and makes the services work seamlessly. This offers service providers the potential to differentiate their service offerings, prevent churn of their customer base, and also to extend their traditional revenue-generating services like wireline voice, to be offered in new ways on new platforms (smartphones, tablets, even televisions) and in new scenarios.

The challenges involve integration of a broad range of technologies and service enablers. Service providers, particularly those that offer both fixed and wireless services to the same consumer, must solve this challenge to deliver a compelling and modern set of services - otherwise, consumers may shift their preferences to vertical 'over the top' service offerings. While service providers have the opportunity to integrate services in a compelling way, they also have the challenge to tie these services together. This also involves outreach to a broad range of consumer electronics

manufacturers on whose devices the services can reside (smartphones, TVs, tablets). Having in mind energy management and home automation scenarios, this also needs to involve white goods manufacturers or service utilities other than telecommunication operators.

This is the opportunity and challenge behind the concept of convergence as it is being discussed within industry bodies such as the HGI (*Home Gateway Initiative*). In this article, we provide a short introduction to some of the candidate services, describe some of the challenges being addressed and relate how these services may be perceived from the consumer's point of view.

Converged services examples

A service scenario can be defined as convergent when a typically vertical service developed as a standalone application is blended with at least another one, sharing resources at various layers (from connectivity to service logic, terminals, user interfaces, etc.) and building up a new enriched experience for the final customer.

The converged digital home is a concept in which consumers can access communications,

entertainment, home automation, and home office related services - irrespective of their location and from the wide set of terminals that consumers now expect to 'consume' their services upon. While we speak of a converged digital home, consumers should be able to access their service both from within and from outside the home.

Let's start with examples based upon communications. In the HGI project called Next Generation Communications, broadband service providers are working together with consumer electronics manufacturers to re-think the forms that traditional voice communications services take. Currently, many consumers access voice communications on in-home wireless phones (DECT, for example). Those wireless phones may have some advanced features like displays and address books, but in other ways are close to traditional fixed telephones - not integrated with Internet services or other home services.

NG-Com is addressing more integrated call scenarios. Some examples of convergence regarding communications are:

- when the consumer is watching television, he or she can be notified when an incoming call arrives - using a message shown on the television screen - and can be given options for disposition of the call;
- while the consumer is browsing the web on his or her laptop, an incoming voice can be delivered to the laptop using the same speakers and microphone used for VOIP.
- the smartphone at home can switch to WiFi rather than 3G or 4G wireless - potentially, saving money for the consumer;
- the same address books used with mobile smartphones can be used with in-home wired or wireless phones;
- video calls initiated on a laptop could be transferred to a television.

Another set of examples of convergence services involve media and entertainment services. Many broadband service providers are already delivering television services over the Internet. This provides an opportunity to integrate additional services and content within the entertainment experience. For example:

- sharing of personal videos and photos on the television.
- personalized content searches to integrate non-broadcast content from the Internet on the TV.
- use of the TV to present information services.
- in many of these services, the smartphone can act as a remote control to allow the user to select content, initiate service requests, and respond to prompts.

A final set of examples that build upon similar elements (broadband access, advanced terminals such as smartphones, and advanced home networking technologies) are services

that access a range of networked devices in the home and allow the user to interact and manage them. Examples are home automation (control of lighting, door locks, etc.), home energy management (presentation of and management of home energy utilization), medical monitoring (collection of signals from medical monitoring devices), and home surveillance.

While some of those services are already available, convergence offers the promise to tie them in to innovative, integrated service offerings. For instance, a consumer who would like to check the household's energy use for the past two weeks could tune the TV to a special information channel, or could check a screen available on the smartphone. Thus devices designed for other purposes are integrated (converged) with new sources of information to form new services.

Converged services challenges

Within HGI, we're addressing the technical challenges to deliver those services. Some of the key pieces to the puzzle are:

- the platforms - where the service logic is located;
- the communications protocols - how the devices and platforms communicate both at physical and logical levels;
- the formatting and rights management of the digital media.

In converged service offerings, the logic behind the services can reside in a variety of locations. In fact, the challenge from the provider of the services can be to integrate service logic from disparate platforms. Some of the key platforms involved are:

- the Home Gateway (*HG*). This is the broadband access server that interconnects the subscriber's broadband connection with the home network. The HG provides wireless and wired networking within the home, and it is increasingly used to deliver value-added services such as those described above;
- the smartphone, including in-home and mobile wireless phones;
- PCs and tablets;
- the TV set-top-box or the smart television;
- servers located in the Cloud.

Those platforms talk to each other using, for the most part, standardised communications protocols. Again, finding agreement among the platform developers about the choice of protocols and the use of the appropriate profiles is one of the challenges that industry forums like HGI address. Some key choices involve the extension of voice communications signalling (which has traditionally taken place within the domain of the service provider) onto devices in the home network. Alternatives being addressed include SIP, IMS, and UPnP telephony.

From a physical point of view, there is a range of home networking media. HGI is setting requirements for the HG and devices in the home network for required support. Key technologies include WiFi, DECT, Ethernet over dedicated wiring or over home power wiring, and a range of low power alternatives for wireless or wired networking to the devices involved in home automation, home energy, and related services.

Consumer point of view

What does all this mean to the consumer? From the consumer perspective the converged home chimes well with modern lifestyles, in which there is an increasing demand for entertainment, information and communications to be available at any time, anywhere in the home, on whatever device is most convenient. Associated with this growing desire for on-demand consumption of content, many Asian consumers now expect the conveniences - and possible cost savings - that are delivered by the remote control of, and networking between, in-house utility, security and environmental systems.

At the same time, a number of government-sponsored initiatives in the Asia-Pacific region are aiming at rolling out and using networks of smart meters to manage better energy consumption, and potentially cut consumers' household bills. Broadband service providers are well placed to offer this service to their customers.

Many of the Asia-Pacific markets are characterised by rapid mass adoption of new technology, applications and services, and will see quick take-up of convergence services.

HGI's role in convergence

HGI plays a key role in translating the near and mid-term service plans of broadband service providers (*BSPs*) into published requirements for home network equipment and technologies. By agreeing common requirements and testing strategies for convergence among the service providers and the supporting ecosystem vendors, the HGI helps to consolidate the understanding of what is needed, bring additional vendors into the ecosystem, and speed the evolution from services concept to deployment reality. Convergence services being addressed will bring new and innovative services to customers in Asia-Pacific.

Service providers and equipment vendors from Asia-Pacific play an important and growing part in HGI activities and achievements. HGI currently represents the majority of equipment vendors from Taiwan, Japan, and China in the HG market, as well as selected consumer electronics companies and key Asian service providers. ●



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The rise and rise of mobile money

by Sanjay Mewada, Vice President of Strategy, NetCracker Technology Corp.

The next big thing must be mobile money, but the road to success is not straight and the triggering conditions are very different around the world. Availability of smartphones and tablets is essential, as is favourable regulation, but forging strong partnerships with banks and point-of-sale are also key ingredients. In the case of Japan, a huge market has opened up, with innovative mobile services and thriving advertising. This important set of functions adds to the versatility of the mobile smart device - it makes the mobile phone “a remote control for life”.



Sanjay Mewada is Vice President of Strategy in NetCracker Technology Corp. Since joining NetCracker in 2005, Mr Mewada has been instrumental in leading the company's growth through strategic initiatives that have accelerated the company's growth and success. In his current role of Vice President of Strategy, Mr Mewada is responsible for the company's image and market development, corporate communications, media relations, and brand management.

Prior to joining NetCracker, Mr Mewada worked at Yankee Group as the Vice President of the Telecom Software Strategies (TSS) Decision Service. There he managed research and programs to improve Communications Service Providers' business results. Specifically, he helped clients make decisions regarding the use of business and operations support systems (BOSS) software and services. Before joining Yankee Group, he worked at MCI, Intelsat and the World Bank in Product Management and Technology Evaluation functions. Sanjay Mewada holds a Bachelor's degree in Physics and an MBA from Bombay University. He also holds a Master's degree in International Business from the Fletcher School at Tufts University.

It can be argued that mobile money has taken more than a decade to arrive. Ten years ago the industry witnessed clever advertisements that depicted smiling salespeople handing over badly wrapped items and asking viewers whether they wanted to “pay with cash or phone”. Companies experimented with different techniques and approaches, but were generally defeated by the lack of infrastructure, smart chips or some other key ingredient. Now, however, mobile money has arrived.

The meandering path to success

Almost every day there are dozens of news items about mobile money from a range of markets. For example, clearXchange has launched in the United States a service that allows Bank of America, JPMorgan Chase

and Wells Fargo customers to transfer money via mobile phones or email addresses. Similarly, Google has announced a major investment initiative to bring digital wallets to mobile phones, leveraging NFC technology and partnerships with major global banks. At the same time, Uganda's mobile money infrastructure reportedly has reached \$400 million in transfers. In Kenya, 13 million people transfer money via mobile, and Nigeria and Ghana are poised to ‘lead the way’.

By anyone's standards, the opportunities presented by the broad and varied mobile money market are huge. In a recent survey of more than 50 Communications Service Providers (CSPs), NetCracker Technology, in conjunction with Pipeline magazine, placed the opportunities provided by mobile

money and commerce as second only to home networking.

Several factors lie behind the success of this market. They include smartphone adoption, uptake of mobile applications, emergence of enabling networks and point-of-sale technologies, and the potential to leverage existing customer relationships. Japan, a market that is often cited as a living laboratory for new technology (iMode, for instance), is already a thriving mobile money market. It points to a clear and extraordinary opportunity for CSPs.

However, the path to success for CSPs is not a straight line. In each market, success or failure depends on the relationships developed with partners, the regulatory

bodies, the technology platforms and the challenges involved. Each market has different barriers and challenges for those trying to address them. CSPs have driven the spread of high-capacity access and networks as well as smart device and application adoption. Yet they are still figuring out their exact place in this new ecosystem. That said, the fact that CSPs possess the technology that enables mobile money transactions, have existing financial relationships with customers and can influence the technology (i.e. mobile devices) in customers' hands, positions them advantageously to seize this new opportunity.

Is a Tablet a mobile device or the new PC?

Mobile phones have become central to customers' lifestyles. Surveys suggest that in many markets the theft or loss of a mobile phone is more traumatic than the loss of keys or a car. The phone provides a single, personal and increasingly trusted device to run their lives, to buy things, to download and use applications. Essentially the mobile phone is becoming a remote control for life.

It is not only phones. Their close relatives, tablets, are increasingly gaining trust in the technology. According to Berg Insight, the use of tablets such as iPads is leading to a 20 per cent increase in the value of transactions taking place on smart devices. This gives rise to an interesting question about the function of the tablet and whether it is a phone or a personal computer. Wherever that conversation might lead, the truth is that tablets bridge the gap between the types of user behaviour found in both formats. Further, tablets increase the use of personal and personalised devices and therefore increase the potential of a range of new markets, including mobile money.

Differing drivers across markets

Still, each market is different and has unique requirements. Demographics, geography, the extent of mobile penetration and the maturity of the banking and money market shape these requirements. Across Africa, for example, the market has flourished because of a low level of banking and credit card usage. Credit is low and the infrastructure is under-developed. These factors have given rise to the large market opportunities that have emerged. Conversely, the North American and European markets, where the level of credit and the use of credit cards and banks is high, has created an equally large but very different opportunity based on convenience and speed.

Market maturity also plays a key role in determining the relative maturity of an appropriate mobile money offering. In Japan, for example, many transactions take place, driven by the widespread availability of point-of-sale technology and the ubiquity and maturity of mobile phone usage. In markets such as Brazil and Africa the drivers are very much the need to transfer and settle money and, to a lesser but growing extent, to enable access to micro capital.

Nothing of course, happens without the right regulatory environment, not only for CSPs, but also for their partners as well, most notably the banks. The regulatory environment determines whether a CSP partners or competes with a bank, whether the bank's own infrastructure can handle credit cards and settlements, or whether there are gaps that the CSP can fill — as long as the regulatory authority allows it.

Partnerships and platforms

It is important to understand that whatever role the CSP plays, it is not about replacing or competing for an existing relationship. The keys to success are to choose the right partners and to develop the most relevant and workable relationships. If partnerships and ecosystems are made to work, the possibilities for innovation are almost endless. For example, in Hong Kong mobile operators have partnered with the transportation authority to enable mobile phones to act as tickets. Partnerships with vending and cash register providers mean that the mobile device enables point-of-sale access. These relationships create seamlessness and liquidity across the ecosystem, albeit built on critical enabling technology.

The enabling platform in the background must provide the mechanisms that allow the ecosystem to grow organically without technical barriers. Robustness, scalability and accessibility are givens. Exemplary security in regard to encryption and authentication is absolutely necessary. The platform must also support all billing models from prepaid to postpaid to hybrid models and be able to conduct settlements. It must support the extraordinary number of machine-to-machine transactions that happen among the mobile devices, networks, servers and applications to glue the transactions together.

Revenue Models

Another fundamental part of the mobile money equation is the choice of revenue model. A much-discussed topic in almost

every industry, the mobile money market gives rise to many possible approaches: settlements, fixed fees, service charges, and advertising-funded models.

Advertising itself is a huge opportunity. Once the service is in place, CSPs have the ability to understand customers' buying behaviours and preferences. This is, of course, valuable information for targeted advertising campaigns and brings the potential to develop reward schemes, loyalty and retention programs. In Japan, the mobile money market has spun off a US\$1.4 billion segment based on mobile advertising revenue alone.

NTT's Model for Success

Success in the Japanese market has resulted, in large part, from the right partnerships being put in place at the outset. NetCracker, as part of NEC Corporation, has been involved in mobile money in Japan since 2004. Sony, NEC and NTT DoCoMo came together early on, to drive the market for mobile commerce in a significant way.

The success was greater than anyone expected and has generated a completely new revenue stream for NTT. Penetration is almost 60 per cent of the population, and more than 50 million subscribers use mobile commerce in supermarkets and vending machines across Japan. NetCracker's role was to provide the end-to-end technology offering, including the ability to bill, rate and charge every transaction, and to provide the kind of availability and service assurance that is expected in carrier-grade OSS applications.

Conclusions

Ultimately, CSPs have a massive opportunity as enablers that can pull together working-partner ecosystems built on effective technology platforms that make mobile money functional. They can drive market maturity and technology adoption. They can deliver secure and reliable transactions. They can enable a range of useful and lucrative business models. Most importantly, CSPs can also make the strategic investments that generate the critical mass necessary to ignite mobile money's explosive growth in key markets. With those advantages in hand and well understood, mobile money represents a superb, new revenue opportunity for the global CSP industry. ●

Building a profitable M2M business model for connected CE devices

by Jahangir Mohammed, founder and CEO of Jasper Wireless

The M2M opportunity may result in 50 billion connected devices of a very wide range. This market dynamics and expected volumes require an entirely different approach. The business model of additional fixed fee is not effective for a user base suffering from ‘subscription fatigue’. They may still be tempted by ‘impulse-buy’ of various M2M services. This means that huge numbers of devices need to be provisioned on an ad-hoc basis and dormant services need activating at the appropriate time. Billing systems need to cope with numerous micro-payments, often in various currencies. Therefore, service providers entering the M2M market must automate and scale up their business and operational processes.



Jahangir Mohammed is the CEO of Jasper Wireless. Mr Mohammed founded Jasper Wireless in 2004 and serves as the company's chief executive officer.

Prior to founding Jasper Wireless, Mr Mohammed founded and served as the CEO of Kineto Wireless. Kineto pioneered the convergence of WiFi and Cellular technologies. Kineto's technology has become a GSM standard. He continues to serve on the Board of Kineto. Previously, Jahangir Mohammed worked at AT&T Bell laboratories and Lucent.

First coined as a phrase in 1999 by RFID (*Radio Frequency Identification*) expert Kevin Ashton, the ‘Internet of Things’ has become shorthand for the next phase of growth in connected devices as we start to look beyond not only PCs, but also smartphones, as channels for new services. Whichever numbers you believe, the implications are significant. While there are already more than five billion activated mobile phone subscriptions globally, four times the number of PCs, some vendors forecast there could be as many as 50 billion Internet-connected devices by 2020 across both fixed and mobile networks.

Looking specifically at cellular-based connected devices, the scale of the opportunity for mobile operators, device manufacturers and their M2M (*Machine-to-Machine*) partners is clear. With new categories of connected devices comes a new

ecosystem. At the heart of it is the question of how to monetise both these new connected devices and the relationships behind these new services.

M2M Opportunities in Asia

The market for connected wireless consumer devices is still in its early stage, but poised for a period of dramatic and significant growth. Driven initially by connected device categories such as mobile PCs, Internet tablets, e-readers and PNDs (*Personal Navigation Devices*), in 2010 growth was fuelled by Internet tablets with embedded connectivity shipping in large commercial volumes. According to industry analyst Berg Insight, the number of connected consumer devices shipped is set to almost double during 2011 to reach 39 million units and grow to more than 270 million devices with embedded cellular connectivity by 2015.

However, it is not enough that there is a rapid growth in devices with embedded connectivity - the connectivity must also be used with the device activated and attached to a cellular network. To this end, the cellular attach rate for connected CE (*Consumer Electronic*) devices is expected to reach over 50 per cent by 2015. It is the combination of these two trends that is creating a major new opportunity for mobile operators, CE device manufacturers and their M2M platform partners.

In this world of connected devices, we have to look beyond simply mobile phones and laptops and to new categories of devices that are viable for connectivity, including personal navigation devices, e-readers, gaming, healthcare, tracking and in-car navigation systems. Within this, there are some regional differences in the applications and connected CE devices seeing uptake. For example, while in Europe telematics applications are

more focused on logistics and navigation, in some Asian markets it is in-car infotainment services that are proving popular and driving automobile manufacturers to look at embedding connectivity into their vehicles.

In Asia, particularly in developing nations, connected CE devices are leapfrogging fixed networks and WiFi connectivity and going straight to cellular. While Japan has long been at the forefront of innovation in CE devices, today we are also seeing rapid growth in connected devices in markets such as China and Singapore.

Although there is an immense amount of potential in this market, many operators are only now entering it with vigour. Keen to understand the implications for their network and business models of deploying connected consumer devices, operators had delayed entering until they were certain that the potential would translate into business success. However, with operators such as AT&T in North America, Telefónica and KPN in Europe, Telstra in Australia and América Móvil in South America now delivering M2M services, the market is hitting the mainstream.

Service providers entering this space are faced with a key challenge: the dynamics and applications necessary for servicing this market are entirely different to those of the traditional handset market. As much as they have the network capabilities to enable devices with connectivity, they lack sufficient automated and real time provisioning, activation and scalable management processes that are capable of supporting millions of varied connected devices whilst also creating significant new revenue sources.

An Apple a day keeps 'subscription fatigue' away

As mobile operators in Asia look to monetise new opportunities around M2M services, the growth in connected consumer electronic devices attached to their network is a compelling area for new service launches. Connected CE devices can act as a channel for these new revenue-generating services. To unlock this new channel and launch new services such as in-car infotainment, operators need to be able to manage and monetise a new category of services based around a new business model. However, for the end-user consuming these services, there is a real danger of 'subscription fatigue'.

Over the space of a month, consumers might be willing to give Apple £25 in return

for several songs, or a couple of movies to watch while away on business or to keep the kids occupied on vacation. This boils down to the premium price consumers are willing to pay for immediacy. However, if those same consumers were asked at the beginning of every month if they would be happy to commit to £25 in advance for the promise of some great content in return, or at the start of a year to commit to 12 x £25 per month, they would, in all likelihood, steadfastly refuse.

The typical subscriber is already overwhelmed with monthly bills. Between their phone bills, data card bills, Netflix (movie streaming) bills, cable TV bills and a list of other utilities, the last thing a subscriber wants is yet another monthly service charge. Simply put, they already have 'Subscription Fatigue' - they have too many content and service subscriptions and they are tired of them. However, this emphatically does not mean that they are also tired of consuming more content or services. Their appetite for content is nowhere near sated. This is why the Apple model works so well. A 99p song here, a £1.99 app there - these are easy micro-transactions which subscribers gladly pay when and where they want them.

When it comes to developing a connected device strategy, a mobile operator or service provider must address not only the technology, but also the business model. The M2M platform must support not only the technical requirements, such as the automation of operational processes and the delivery of a zero-touch experience that enables the customer's device to work out of the box, but also address how the new services will be monetised. When it comes to services used by consumers, the most important thing is to get the consumer to actually buy the service.

From price-per-megabyte to connected-business-strategy

The market has been conditioned by mobile operators to think of connected services in terms of a monthly subscription that commits the consumer to at least eighteen months, and often over two years or more. However, just as Apple has successfully proven that this no longer need be the case, so consumer electronics and automotive companies are able to set aside old models and embrace what consumers clearly want - the ability to buy content and services when and where they want it.

Micro-transactions allow subscribers to purchase digital content on-demand, and it is these 'impulse' buys that hold the key for expanding revenue streams in the connected device market.

Transparency is key to the consumer uptake of micro-transactions. To ensure sales, the automated purchasing process must appear effortless to the consumer. Operators must ensure they can eliminate the complexity associated with micro-transactions and that they have the necessary tools in place to support recommendation engines, simplified billing and instant provisioning systems.

The issues associated with micro-transactions, however, should not be underestimated. Both OEMs and service providers need to have the tools in place to process and bill for a multitude of small payments, often from a multitude of currencies. Devices can lie dormant on a retail store's shelf before needing to be activated out-of-the-box when the consumer first purchases the device and turns it on, meaning the billing and charging infrastructure needs to be able to cope with spikes in demand around seasonal peaks such as Christmas, when many devices are activated on the mobile network for the first time.

By partnering with M2M platform providers, OEMs (*Original Equipment Manufacturers*) and service providers can harness the necessary intelligence required for the nuances of micro-transaction provisioning. Finding a flexible business model that takes into account the unique usage profile of devices, across all demographics, can also help OEMs to optimise costs.

An M2M platform provider can offer the intelligent rate plan management and sophisticated automation necessary to support this ever-changing market. Connecting devices for the first time requires specific intelligence and provisioning, creating grey areas for operators that prevent or delay them from entering this market. Connecting CE devices requires additional agility and flexibility skills in order to cope with a permanently changing environment, fast pace product development cycle and changing customer expectations. Getting the platform is one step ahead, but maintaining its innovative and competitive advantage is another. However - get this right, and the potential for M2M is huge. ●

Mobility in Asian manufacturing

by Saj Kumar, VP, Discrete Manufacturing, SAP

Consumerisation (using consumer communication devices at work) is now permeating all industries at all levels, from top floor to shop floor, empowering employees with up-to-the-minute information accessed on the spot, wherever it is needed. This brings some security risks, for example - to sensitive data stored on lost or stolen devices. However, workforce mobility brings higher productivity, enables moving from preventive to collaborative maintenance and provides real-time business visibility. Issues can be raised and decisions communicated within minutes, helping to reshape the entire manufacturing process. In fact, new processes, indeed new business, can be based on this new paradigm.



Saj Kumar is Vice President, Discrete Manufacturing, SAP Asia Pacific Japan. As Vice President with the Industries & Solutions Group (ISG) at SAP Asia Pacific Japan, Mr Kumar holds responsibility for defining and developing SAP's business strategy for Discrete Industries in Asia Pacific, as well as driving the development and adoption of industry-specific solutions for SAP's strategic customers in this segment. This includes companies in 'High-Tech' sectors, Automotive and Industrial Machinery.

Mr Kumar is an industry veteran, starting his career over 20 years ago working with simulation systems. He has many years of direct experience designing and implementing supply chain solutions in the manufacturing industry and has a keen interest in applying constraint-based planning techniques to solve complex manufacturing problems. He is passionate about software applications and their role in solving real-world engineering problems.

Saj Kumar brings a wealth of experience to SAP from his previous roles at Oracle and i2 Technologies, where he held various customer-facing and solutions management roles.

Introduction

With the rising pervasiveness of tablets in 2011, mobility is changing the way we operate today at two levels: personal consumers and corporations. In the not too distant past, we had Mobility 1.0, which brought us the ability to extend the enterprise - to create a mobile organisation where field sales and services were enabled off-site. Previously desk-bound employees were able to work remotely too, but this was largely restricted to email access through the use of PCs.

The advent of mobile convergence brought us smartphones and with that, access was

available anytime, anywhere. Then with tablets came a whole new explosion of applications generated both for consumers and for businesses. Desktop virtualisation has also spawned a new culture. Emerging mobility trends in companies today include the acceptance of employee-owned devices in the workplace. In fact, with the rise of IT consumerisation, companies are starting to recognise that by allowing employees to bring in their own choice of devices, they are not only creating a flexible workplace and culture, but also able to significantly reduce IT hardware costs.

Mobility 2.0 has brought about the transformation of enterprises. The way

companies sell, market, operate and innovate is set to change. Mobility has spawned new industries and new markets and its pervasiveness is extending across multiple industries from banking, utilities and logistics through to manufacturing and retail.

At a very basic level today, the consumer at a bank is now able to use their mobile devices to not only log in and perform transactions, but also as added security devices. Logistics companies can use the device to track and trace their shipments and street level routing. Smart meters are used by utilities companies for remote reporting, while manufacturers can operate better with visibility across the manufacturing value chain.

At another level, it has also extended across the entire ecosystem of consumers through to business users. Current top level executives recognize that the way we operate today can only move forward. To truly embrace mobility across their organization and its value chain, they need to put together a mobile strategy. For complex manufacturing organisations, this is all the more important, as the top-down drive to design a mobile strategy has to do with every level - from point of procurement and manufacturing to distribution. Importantly, manufacturers are constantly faced with fierce competition and cost pressures, coupled with consumer demands and the need for innovation and adaptive manufacturing processes.

If we look into what manufacturers are working towards - it is building the Perfect Plant. In the Perfect Plant you have visibility of all operations including production performance and your assets, providing a 360 degree view of your operations. This visibility of your plants provides the ability to respond faster to operational issues and minimise impact to your business and bottom line.

With mobility, the entire process is accelerated, from planning to execution and through to asset management - this makes it more adaptive and nimble, enabling plants to operate better.

First, let us look at asset management. Equipment downtime is critical to a manufacturing operation. Plant managers need timely and accurate information on asset performance. With the right information, they will be able to move from "preventive maintenance" to "collaborative maintenance", improve asset performance and utilisation, reduce downtime, ensure parts availability and, importantly - improve assets efficiency. By making plant workers and technicians mobile, manufacturers are allowing real-time visibility and information to flow across the operations. Precious time is cut out of the process by enabling field workers to access parts information and availability, asset performance history and reports, warranty information, etc. Mobile plant workers are now able to access and react to issues within minutes instead of days or hours. With higher asset performance, cost savings of millions can be realised.

With lesser disruption due to equipment failure, and with enhanced asset

performance, this improvement in turn leads to on-time delivery and reduced variability in operations scheduling. With mobility offering real-time visibility and control of your manufacturing process, decisions can now be made and communicated from the top floor to shop floor within seconds. Changes can be communicated in real-time, resulting in adaptive manufacturing process and reduced costs. With this, manufacturers can afford to be more innovative and can focus on increasing brand value. Mobility provides them with one of the most coveted assets for competitive advantage - the time to innovate.

Having recognised the benefits of mobility in manufacturing, the flip side of the coin for most companies today is the need to justify this implementation, namely, what is the return on investment for this? The key benefit of introducing mobility into manufacturers is increased productivity. Tangible benefits can be quickly calculated through efficiency improvement calculators that measure productivity at the rate of cycle times.

Another challenge and concern for management is security risks. Besides enabling their shop floor employees with mobile devices to drive better manufacturing processes, companies are also recognising the increased demand for employees to access enterprise information through their personal devices. There is a huge implication here, as security risks need to be mitigated and addressed. How do manufacturers ensure that in the event of phone loss, in which case corporate information may be compromised, that there are clear and swift measures in place to react and wipe that information out? This is where for mobility to be pervasive across the organisation, it is imperative that the management identifies clearly the objectives, calculates the return on investment, defines the risks, and formulates a strategy that is readily adopted and embraced across the company.

When we look beyond the manufacturing operations and review the business landscape, the impact of mobility on manufacturers is also happening on a totally different level. As mentioned, we see new markets created from mobility. If we look at the high-tech market, we are seeing an increased demand in tablets and smartphones. These are set to overtake the PC market and manufacturers are seeing the revenue growth for mobile

devices increasing at a more rapid rate as compared to laptops and, definitely, in comparison to desktops.

The business shift towards creating a more mobile workforce has a direct correlation with the shaping of the next generation high-tech industry. This is only the start, as other industries embrace high-tech mobility and it becomes an integral part of their business. The convergence of high-tech and automotive, for example, has resulted in automobile makers recognising that consumers require access for their mobile devices in the car. As mobility pervades, we will see an entire generation shift towards all industries changing the way they do business, and powering a much faster and efficient business environment. ●



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Control, experience and security for the mobile generation

by Mr Ng See Sing, General Manager, Portal City, a business unit of NCS Group

As phones are getting smarter, organisations need to push boundaries to stay relevant and merge computing and communications. There are three underlying concepts affecting this evolution: Control, Experience and Security. A smartphone with no content is like a shell without the pearl, but today's content comes with the inevitable handing control over to the user, which many in corporate management find scary. This content provides ever-improving experience and users demand good network support, as they grow to rely on it. With sensitive data stored on mobile devices, security must be now high on the agenda, but it must not impede business processes and user enjoyment, so it all depends on hitting the right balance.

Mr Ng See Sing is the General Manager for Portal City, a business unit of NCS Group. With more than 20 years of experience in the IT and Infrastructure Engineering arena, Mr Sing's leadership sets the strategic direction to harness the benefits of active collaboration and integration of the services. He has managed autonomous service-based business entities under NCS that focused primarily on smartcard technology, loyalty and lifestyle programmes, payment gateway services, e-commerce and m-commerce.



Mr Sing began his career by working with a number of national level projects such as the National NRIC Project, Automated Passport System, and Immigration Auto-Clearance Smartcard System and Security Services. Having helmed Portal City since October 2005, Mr Sing has been instrumental in shaping it into a key player in an increasingly vibrant e-marketplace through syndication and market collaboration. Mr Sing's portfolio also includes leading the company in capitalising business opportunities in the burgeoning cloud computing space. He led a team in developing cloud-based tools that deliver greater business value for organisations. Notably, he is the brains behind OnePlace™ (mobile communications, social media and business analytics on a single cloud computing platform) and OneCal™ (customisable official calendar alerts).

Ng See Sing has been recognised for his contributions to the local IT arena with several accolades such as The Minister of Home Affairs Awards for Outstanding Work Performance in 1994, SingTel Leaders Award in 2010, GemPlus' New Partner Award Asia in 1999 and the Frontier award in 2006.

The concept of mobility is one that intrigues everyone in the IT industry. Questions like, "How can I make this device more mobile?" and "How can I reach my consumers while they're on the move?" are de rigueur in today's competitive tech landscape. Gone are the days where 'mobile' was a term only used to describe transportation. Today, to be 'mobile' means that one has to be savvy with technology and stay connected to content and communication wherever, whenever and however. No longer satisfied with just being mobile, cellular phones are increasingly getting 'smarter' as well. Some manufacturers are claiming that their smartphones can double up as one's PC, notebook or laptop.

With the ability for devices to do more, it is not surprising then that the transformation of the humble mobile phone is well received. In March 2011, market research firm Ovum reveals that Asia will account for 30 per cent of global smartphone sales, which will hit 653 million shipments by 2016.¹ In a later survey carried out by Ovum and Telecom Asia in April 2011, it noted that "smartphones and tablets have superseded netbooks and laptops to be the top two device drivers of mobile broadband traffic in the Asia-Pacific region".² In this survey, 50 per cent of respondents identified smartphones as the main driver of mobile broadband traffic in Asia, while 25 per cent felt that tablet devices are leading the way. These numbers confirm what we are seeing around us.

In light of this, the two questions I am asked most often are: "Will we one day see a consolidation of our communications and computing needs?" and "How are organisations going to adapt in an increasingly competitive product and services marketplace?"

I firmly believe that the rise of smartphones will not make PCs obsolete. In fact, smartphones should be seen as complementary to computers. Mobility enables seamless continuation from the desktop experience of gaming, online shopping, e-transactions and the likes onto the mobile platform. The tablet, as a hybrid of the smartphone and the PC, provides an option for this experience to be extended.

¹ <http://www.zdnetasia.com/asian-smartphone-market-to-double-by-2016-62208011.htm>

² <http://www.zdnetasia.com/smartphones-tablets-to-drive-apac-mobile-broadband-62208253.htm>

Mobility has driven innovation at a pace and scale which was once deemed unnecessary or even unthinkable.

Former classifications of Generation X and Generation Y may be grouped into one category for future generations - Gen M (*Generation Mobile*). The demand for hardware, as indicated by earlier statistics, bodes well for device manufacturers as this creates a market for them to cater to this generation. However, a smartphone without the content is as good as an empty shell. This is the area that fascinates me because the possibilities for developers to push the boundaries in delivering content that enhance the end-user experience are endless.

In the April 2011 survey, respondents cited social networking, video consumption and web browsing as the three activities that will help steer the growth of mobile technology. The underlying concepts that bind these activities together are control, experience and security. These concepts become pertinent as technology and user demands grow in sophistication.

Control

Mobility is a game-changer because it forces organisations to relinquish control to the end-user. More than just enabling consumers to access content on the go, technology has also changed the way that organisations (in both the private and public sectors) and their consumers interact. Communication is no longer carried out on a one-way street, but on a dual carriageway. Consumers want to be heard and they want to be engaged knowing that the organisations are listening and responding to their views.

Consumers are further empowered by social sharing made accessible on the mobile platform, allowing them to share their experiences of a particular brand or product with their friends instantly. Relinquishing of control to users is a scary proposition for organisations and rightly so. During a crisis, this can add fuel to fire when the conversation on the various portals becomes over-active with people commenting at the same time. However, we must not discount the same opportunities that are there to engage the audience on a channel that they are familiar with.

Experience

Apart from engaging the audience, the next important component is delivering enhanced

user experience. Consumers are constantly looking for better ways to experience their content and even communicate with others. From voice calls and text messages to video calls and instant messaging (*IM*), the landscape is changing and it is pushing developers to support these enhanced needs. There are high definition (*HD*) PC peripherals to facilitate video calling - who knows, we might even see 3D calling direct from smartphones in the future! This augmentation of reality will take the functionality of the mobile phone to a whole new level.

Today, the digital compass on mobile phones aims to guide users effectively towards the right direction. Apps create an opportunity for an ecosystem of businesses to come in. Using the digital compass example, a user can now find the way to the destination, and also discover points of interest along the way, like a florist on the way to the hospital. The creation of such an ecosystem is a win-win situation for all - businesses get an additional avenue to market their products and services, while consumers can get content that is timely and relevant.

Security

Even with the exciting possibilities of mobile technology, the issue of security still weighs heavily on people's minds. With an increasingly mobile workforce, this is especially important as it exposes organisations to more threats. The IDC estimates that by 2013, the mobile work population will grow to 1.19 billion, accounting for 34.9 per cent of the workforce. It also notes that the largest numbers of mobile workers today are to be found in the Asia Pacific region. Organisations will not be able to reverse the tide of mobility. In fact, they won't! Mobility facilitates productivity. Take Customer Relationship managers for example. When they go for a meeting with clients, they need to have the relevant information at their fingertips and be ready to provide a demonstration of the product. Such demonstrations have more impact, but usually involve risking security breaches. The key is to find a balance between security and usability. There is no point having a safe system if no one can use it.

Vendors need to understand the trends and the nature of the mobile workforce and to develop middleware solutions to achieve this balance. In Singapore, the Government is leading the region in its use of e-services and mobile services to enhance convenience for the people in their

transactions. With the sensitivity of data involved, security is paramount.

The evolution of mobile phones is fascinating, not just in form but also in the way we rely on the technology. As consumers, we have already evolved. We have been shaped by the technology we use and crave information all the time. I am sure everyone can identify with the frustration when our smartphones fail us or are slow to load information. We are becoming more demanding and more sophisticated and that puts developers on their toes to overcome these challenges continually. The true value of the smartphone ultimately lies in its functions. Consumers can expect an evolution of the value of the smartphone as companies continue to maximise its potential. ●



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Top five things carriers should know when deploying IaaS

by Gustavo Alonso, Chief Technology Officer, Zimory GmbH

Carriers are well placed to provide IaaS to the Enterprise market. Compared with Internet service providers, carriers already have trust relationships with Enterprises. They understand the importance of providing a locally customised service and regional regulations. They can provide higher security and performance for reliable access to the cloud and have already systems that can monitor usage and provide billing. Carriers are also used to interworking with other networks, providing multi-vendor solutions, a variety of operating systems and linking to several clouds.



Prof. Dr. Gustavo Alonso is the Chief Technology Officer at Zimory GmbH. He is also a professor at Swiss Federal Institute of Technology Zurich (ETH), and brings extensive experience in databases, enterprise application integration, transaction processing, data replication and middleware platforms. In addition to his academic role, Prof. Gustavo has worked extensively as an IT consultant. He was also a researcher at IBM Almaden working in workflow management and transactional messaging before joining ETH in 1995.

Prof. Dr. Gustavo Alonso has an engineering degree in telecommunications from the Madrid Technical University in Spain (1989) as well as a M.S. and Ph.D. in Computer Science from UC Santa Barbara (1992 and 1994).

Network carriers are uniquely positioned to become Infrastructure as a Service (IaaS) providers. Unlike many contenders, carriers already have the necessary know-how, the infrastructure, and the business processes, and they already enjoy a trust relationship with their potential enterprise customers that other cloud providers do not have and may never have. All these aspects are a significant advantage to carriers if played correctly. So, what are the main things that a carrier wanting to become an IaaS provider needs to pay attention to?

1. Location, location, location: as in real state, the last years have made it clear

that for enterprise customers, the actual geographic location of the cloud services plays a crucial role due to regulatory, legal and even practical constraints. A carrier can play this card to great advantage, ensuring that deployments are confined to well-defined geographic regions, providing a legal framework that is local to the customer, and operating under legislation that is not, by definition, detrimental to the customer (e.g. the Patriot Act affecting US-based companies). Cloud computing 'made in country X' is a concept that might seem to contradict the principles of global access associated with the cloud. However, corporate IT deployments are unlikely to

move across regions blindly, given the many problems that this can cause from the operational and legal standpoints.

2. Ease of access: the network is one of the biggest problems when considering enterprise-grade cloud deployments. Cloud providers operating exclusively through the Internet can only support limited bandwidth in and out of the cloud and protect the data traffic between the customer premises and the cloud. This probably suffices for the occasional user renting a few virtual machines. For enterprises, it is just not enough. Carriers are in a position to offer a much more

“...carriers can leverage much of their infrastructure and know-how when becoming cloud providers. They must geographically define their services, pay attention to the network connecting to the cloud, take advantage of their in-house charging and billing processes, be ready to embrace heterogeneity, and support distribution across separate data centres to provide carrier-grade availability of the cloud services.”

complete and integrated cloud service that includes wide area network services with enhanced performance and higher security - a must for many corporate decision makers. Such integrated services may include, for instance, hardware deployed at the customer that provides a secure link, acts as cache, and compresses the data in flight to enhance performance. In extreme cases, the old-fashioned lease lines might become part of the cloud service packages a carrier has to offer.

3. Charging and billing: many upcoming cloud providers, especially smaller ones, are confronted with the harsh realities of cost and complexities associated with maintaining and running the necessary business processes for billing customers. Cloud computing is attractive because of the ‘pay-as-you-go’ model. Unfortunately, this is often easier said than done on the provider side due to the overhead of monitoring deployments with hundreds of users and thousands of virtual machines. If not done carefully, the overhead involved can result in prohibitive costs to the provider - just as it was for the early Internet providers. Carriers have the necessary experience and equipment in place for charging and billing. If employed correctly, and combined with an attractive offer, carriers can make very appealing offers to enterprises in terms of costs savings over traditional in-house infrastructures.

4. One of each: cloud computing is the ultimate realisation that in IT one size does not fit all. Enterprise IT landscapes are not homogeneous. They are also not about to become so just because they move to the cloud. A clear legal framework, a high-speed link and an attractive cost structure are of no relevance if the cloud service does not support the software needed by the customer. Carriers need to be prepared to provide a heterogeneous set of options in terms of operating systems, virtual machines and tools for managing the virtual infrastructure. Carriers can help customers to avoid software lock-in by providing them with options to follow multiple vendor strategies, which in

many cases are the result of organic growth within the company. Pretending to change that as part of the adoption of cloud services will only delay the deployment. Thus, when choosing a software infrastructure to run the cloud services, carriers must aim for those that are extensible and that support a variety of environments. Otherwise, the number of potential customers and services that can be provided will be reduced even before hitting the market.

5. No ‘one cloud to rule them all’: as the recent incident with Amazon’s cloud services demonstrated, cloud deployments need redundancy. Ability to provide fault tolerance and disaster recovery mandates distributed deployments across geographically separated clouds, so that the same services remain available even in the case of a major breakdown in a given data centre. Some customers will even insist on having support for seamless interconnection across clouds of different providers. Carriers know how to work with the entire value chain and other providers to form a network of services that benefit end-users and providers alike. Cloud deployments will be no different. Carriers that understand this need and facilitate highly available deployments through federation of clouds (private, public, hybrid, and across vendors) will have a significant advantage in attracting enterprise customers.

In summary, carriers can leverage much of their infrastructure and know-how when becoming cloud providers. They must geographically define their services, pay attention to the network connecting to the cloud, take advantage of their in-house charging and billing processes, be ready to embrace heterogeneity, and support distribution across separate data centres to provide carrier-grade availability of the cloud services. These aspects are playing an increasingly important role in the decision-making of enterprises that are considering moving parts of their IT infrastructure to the cloud. Carriers can address these needs and in doing so, put together very

attractive offerings that will open new lines of business and create broader ties to corporate customers. ●



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PC versus mobile is yesterday's battle

by Rajeev Singh-Molares, President, Alcatel-Lucent, Asia-Pacific

The battle is over. PC and mobile phones are converging but still have their own special space. The large screen will become a home-based video centre from the armchair, while smart mobile applications will receive constant streams of context information anywhere, whether they need high or low bandwidth, and use new or existing technologies. With such a wealth of opportunities, there will be new winners appearing from nowhere, and surprising losers, too. Companies such as IBM and HP leave the PC market in search of better margins, while companies like Apple, Google and HTC successfully continue to innovate, in the world of shortening product lifecycle and rapidly changing user requirements.



Rajeev Singh-Molares is president of Alcatel-Lucent's Asia Pacific region and a member of the management committee. He is responsible for overseeing the company's APAC business including China and India, and is Vice Chairman of Alcatel-Lucent Shanghai Bell - a Chinese government joint venture. In 2011, Mr Singh-Molares was appointed Chair of the World Economic Forum Global ICT Agenda Council. Rajeev joined Alcatel-Lucent in 2009 as Chief Strategy Officer.

Prior to joining Alcatel-Lucent, Mr Singh-Molares was a partner at Monitor Group, a global professional services firm that combines strategy consulting and merchant banking. Before that, he was at Chemical Bank in its Banking and Corporate Finance, Latin America Division.

Rajeev Singh-Molares holds a Diploma from the United Nations International School, a Bachelor's degree from Georgetown University's School of Foreign Service, and a Master's degree in International Affairs from Yale University.

As PCs and mobile phones rapidly evolve, the lines that separate the two will quickly fade while a new generation of devices emerges, with two features in common: all will be connected, and all will act like personal windows onto a vast pool of computing power that not only takes orders from users but also offer advice. These new gadgets will talk to one another and compute through the cloud over a wide array of networks, from wireless to wired. They will stay in touch constantly or on demand through bandwidths, both broad and narrow, depending on the applications and other factors such as urgency.

Gadgets and devices like PCs and mobile phones are unquestionably here to stay, with an estimated five billion handsets and more than one billion PCs in use today - enough to supply a device to every person in the world. Add to this the booming sales of new computing devices

like electronic readers, tablet PCs and portable game players, and it is clear that the number of computing devices will only grow over time to cater to different needs and interests.

In such a fast-moving environment, the PC versus mobile phone battle is clearly a distinction for yesterday. From the technological side, rapid advances in communications technology mean applications like video-conferencing and movie streaming are increasingly feasible from both the desktop and on the move. Many of today's 3G networks can already handle such complex applications. The quality is only improving with a global roll out of 4G networks worldwide and the introduction of other new wired and wireless technologies. At the same time, innovative companies like Apple and Google are changing the very paradigms for how we use phones and computers, and what we use them for, by creating friendlier

interfaces, opening up the applications development process and moving more computing power into the cloud.

The clumsy prompt-based computers of the 1970s gave way to the mouse and more intuitive icon-based systems. Now the world stands on the cusp of the next generation of touch screen and voice recognition computers that will tap the muscle of the cloud over high-speed wired and wireless networks to make life even easier.

This powerful combination is bringing a wide array of new products to the market. They cater not only to a limited segment of consumers in rich, developed nations, but also to hundreds of millions of people in emerging markets who connect via US\$20 and US\$30 mobile phones, smartphones costing as little as US\$100 and netbooks and other low-cost PCs that don't cost

much more. As communications technology improves and networking equipment makers reach economies of scale, the cost of basic and advanced mobile services will become even more affordable. This will put such connectivity within reach for billions around the world, further driving down product and service costs and driving economic development.

Exploding sales

IT consulting firm IDC estimates smartphone sales will reach a hefty 472 million units this year, up 55 per cent from 2010, and believes the number will again double, nearer the one billion mark, by 2015. At the same time, IDC predicts that tablet PC sales will jump by more than three-fold this year, to 54 million units. Another market-tracking firm, In-Stat, sees the number of tablet applications downloads soaring from under one billion this year to more than eleven billion by 2015.

The story is quite different for PCs where growth is clearly slowing, with the market showing a rare contracting in this year's first quarter. While the global downturn is clearly responsible for some of the sluggishness, most industry watchers expect growth to slip permanently into single digits in the years ahead, as less traditional devices like tablets and e-readers become more popular.

Fuelling the rapid growth in these more flexible non-PC alternatives are huge advances in hardware, especially in wireless technology that allow them to link up with the Internet to provide products and information that users want. IT research house, Gartner, estimates that the number of mobile connections worldwide will reach 7.6 billion by 2015 as mobile applications boom and the networks become more sophisticated, helping to propel mobile data revenues to more than US\$500 billion by 2015. Gartner adds that the rapid growth will also drive more advertisers to the wireless realm, with mobile ad revenue expected to reach US\$20 billion by 2015, accounting for four per cent of all advertising budgets. The investment in creating packet-based networks is proceeding all over the world, and this accelerates dramatic improvements in the end-user quality of experience. Therefore, it is both the new devices and the underlying networks that drive the growth.

In this new world of constant connections, the traditional PC will gradually be replaced in the home by a broader category of larger devices, led by the television. The TV will

become a home-based centre that can be connected with wires or short-distance technologies like WiFi to the Internet, allowing users to do everything from reading the morning paper to adjusting their thermostat from the comfort of their armchair. These big windows onto the network, by virtue of their large screens, will always have their place in the computing universe by offering the kinds of visual experiences that users cannot possibly get on the go.

Mobile application diversity

The world will be much more diverse outside the home, with smartphones and tablet-style devices as the main stars, supported by a cast of more specialised gadgets, ranging from portable e-readers to game players. For example, car-based devices can help drivers plan their daily commutes using a wide array of information from such diverse sources as traffic control, other commuters and even one's own car, as it interacts with the road and surrounding traffic.

Future devices will not just wait for user queries, but will also try to anticipate their needs and offer advice using a steady stream of data from their surroundings and the Internet. To do that, applications need to stay on constantly to provide users with continually updated information. San Francisco offers a great example of a city hard at work on creating the kinds of virtual information flows that will make these devices tick. Realising that much of the traffic congestion is caused by people circling the streets in search of parking spots, the city has launched a trial program, using sensors in a third of its parking spaces. Incoming data will allow monitoring how full the parking lots are, and adjusting prices based on demand. This information that will then be accessible to drivers over their PCs and mobile devices, enabling them to plan out their journeys efficiently while on the road or even before they leave their homes.

In India, developers are working on ways to make the country's limited pool of heart specialists more available to the millions of Indians who suffer from congestive heart disease by giving patients inexpensive wired stethoscopes, which then allow doctors to review their vital statistics remotely and make decisions as to the best courses of treatment. Such simple devices offer examples of decidedly lower-tech, bandwidth-friendly applications that will improve lives while limiting their demands on communications networks.

Winners and losers

There are huge opportunities for both the PC and smartphone makers, as demand will only grow for computing devices in the years ahead. A prominent place at today's table is no guarantee of survival in the future, in a world where new product categories could emerge in just months and disappear just as quickly, leaving time for only the most innovative companies to cash in. In this new world of shorter and shorter product lifecycles, consumers are likely to call more of the shots in new product demand, a role previously held by businesses, as devices become increasingly customised to the individual.

All of this means that the ultimate winners could be both everyone and also no one among today's most prominent PC and mobile phone makers. Neither of these devices will exist in their current form, although it is quite possible that Apple, Lenovo or HTC will still be among the world's most prominent brands. IBM may have invented the modern PC and was once a titan in the sector, and yet chose to yield the space to others in search of higher margins. HP looks set to do the same with its recent announcement that it will leave the PC business, and other former giants that once defined a sector, such as Compaq and Palm, no longer exist. Even my own company, Alcatel Lucent, chose several years back to leave the mobile phone space to focus on its core business of building the networks that support all of today's wireless devices.

At the same time, Apple, which made its name as a PC maker, has risen from a near-death in the 1990s to define a new generation of smartphones and tablet PCs. Amazon, which earned its stripes as a retailer, has gone on to become a pioneer in electronic books and readers.

Clearly, the field is open to anyone who can innovate by discovering what the market needs and providing it quickly. That could be a maker of PCs, smartphones, or none of the above. It could be one of today's giants like Apple or a growing newcomer like HTC, and no doubt, many of the big names of tomorrow do not even exist yet. Tomorrow's computing world will offer devices, large and small, providing windows onto the knowledge that people and even other machines need for the hundreds of choices they make each day. It will be all about giving people the data and services they need based on their personal preferences and their lifestyles. ●

The merits of cloud-based service environment for mobile operators

by Bob Drummond, OpenCloud's Vice-President of Asia-Pacific

The need for fast response to market trends is even more urgent today than ever before. Two solutions for operators' service environment are compared: one that is a proprietary 'box' solution from a vendor, and another that is a standards-based network framework for service creation and execution. This article shows how operators, who increasingly need service creation agility, benefit from the open cloud based framework in terms of decreasing integration time, lowering development complexity, eliminating functional duplication and reducing costs and time to market.



Bob Drummond is VP of Asia-Pacific at OpenCloud. As VP of the Asia Pacific, Mr Drummond has overall responsibility for OpenCloud's sales team and fast-growing business across the region.

Mr Drummond has over 20 years' experience in the Telecommunications industry, first in technical and management roles at Deutsche Telekom in Germany, developing data communications applications and services. He later joined German telco billing and prepaid solutions vendor LHS, where he was VP Marketing & Business Development. Mr Drummond subsequently worked for UK billing start-up Geneva Technology, and following its takeover by Convergys Inc. went on to manage the eastern EMEA region. He joined OpenCloud in 2006 and now divides his time between OpenCloud's offices in the UK, Indonesia and New Zealand.

Bob Drummond has been a regular speaker at industry conferences over many years. He holds a bachelor degree in Engineering from Auckland University and an MBA from the London Business School.

Mobile operators in the Asia-Pacific region have long been recognised for innovation in service development and delivery. Their now well-refined approach enables them to move faster than many of their European and US counterparts.

The industry has experienced declining revenues from traditional voice and messaging services, whilst demand for mobile broadband and data services is increasing. Operators in the Asia-Pacific region have responded to this transformation with an agile approach, providing value-added services to cater for subscriber demand, thereby generating new revenue streams for voice, messaging and data.

Informa forecast that global mobile telecom revenues will rise to US\$1.1tn by 2015. It is estimated that 40 per cent of this revenue (US\$440bn) will be generated by data services. These figures demonstrate a growing appetite

among the subscriber base for new applications and services, which agile over-the-top (OTT) service providers are intent on satisfying.

This ever-growing demand for mobile applications, and the competition from OTT players, however, is forcing carriers to become more service-driven. Operators must leverage this demand to regain control from the OTT service providers, who are effectively diluting the operator's brands. There is a pressing need for operators to enhance their own service portfolios in order to generate new revenue streams. Innovation is critical, especially in the emerging markets, due to carrier goals of managing churn, enhancing margins and improving the end-user experience.

Carriers worldwide are clearly aware of the situation. One of the hot topics at the Management World Forum in Dublin earlier this year was the need for operators to

introduce greater agility into their processes, if they are to increase the pace of development.

Since operators in Asia-Pacific are more aware of the need to innovate, they appear to be more adept at driving their business through innovation. In response to the shift in emphasis of subscriber needs, they bring services to market quickly and efficiently, keeping up with demand and staying one step ahead of the competition.

In order to illustrate how operators achieve high levels of service innovation, we explore and compare two different approaches: the 'boxed solution' method established in the Asia-Pacific market, and the open service layer framework - an alternative approach rapidly gaining traction. Our scenario is based on two operators: Operator A deploying a proprietary boxed solution and Operator B with an open service layer framework.

Operator A has chosen to adopt the established model of deploying new services as largely self-contained 'boxed' solutions, developed by independent third-parties and requiring a limited amount of integration. This model defers the time, effort and cost of service development to third-parties who are keen to see their innovation installed in the network and generating a healthy revenue-share in return.

Reduced integration requirements lower any implementation barriers for operators. In order to maximise uptake, developers include as much of the service functionality as possible within the 'box'. Some functionality already available in the network is actually replicated within the solution, to relieve operators of the integration burden. It is almost a 'plug-and-play' option for operators, shifting most of the risk often associated with any new service over to the third-party developer. With less at stake, Operator A can afford a more adventurous approach to developing service delivery propositions. New services can be integrated quickly and cost-effectively. If the service fails, the third-party developer takes the hit, but if it succeeds, it can be scaled up.

Despite the developmental flexibility of this approach, there are three issues to consider:

(1) Integration costs - although reduced by the 'boxed' solution, such costs still exist and can still be significant. Also of note is the fact that proliferation of boxes on the network, as successive innovations are deployed, can be complex.

(2) The development cost conundrum - by replicating functionality rather than re-using it, third-party development is more costly than it needs to be. Although payment of the third-party is deferred until the service is generating revenue to be shared, the operator will ultimately be paying a higher price.

(3) Third-party dependency - innovation occurs at a rate determined by third-parties. New ideas that may be conceived in-house risk being watered down to meet the third-party's agenda.

The ability to be agile, implementing innovative new services to meet demand, is critical. A recent study by research firm Vanson Bourne revealed that 54 per cent of network executives ranked architectural agility as one of their top three priorities and 67 per cent stated that agreed industry standards would provide them with a flexible service layer framework. Ensuring

operational efficiency in the provision of new services was also a key focus, with 56 per cent estimating that the adoption of existing standards would free up 1-16 per cent of their annual budget, and 75 per cent stating that current 'systems integration' costs were higher because of inconsistent standards adoption.

Operator A's approach, based on the non-standardised, closed and proprietary third-party 'boxed' solution goes some way to addressing these issues, allowing flexibility in the development of new services.

Now to Operator B - the approach here follows the same two principles of leaving third-party developers to carry the cost of development and minimising integration costs. Operator B, however, has chosen to adopt a service layer framework based on open standards. This approach takes both principles a step further and addresses the issues encountered by Operator A. In this case, the service layer framework is integrated into the network that provides the execution environment for innovative services, as developed by the third-parties.

Integrating new systems into the network is a time-consuming and costly exercise. With Operator A's boxed solution, this exercise would need to be repeated with each new system added to the network. Operator B's service layer framework also has to be integrated into the network, but this is a one-time need. Once it is integrated, each new service deployed represents a cost saving for Operator B compared with Operator A, since no further integration is required. Consequently, Operator B can also bring new innovation to market much faster.

The problem of increasing network complexity which was noted with Operator A (each new 'box' is adding more interconnections) is not an issue when only one 'box' (the service layer) is added. It entails just one set of interconnections. The integration of a service layer framework is also simple and straightforward since the application server is network agnostic. It can be applied to an operator's core network, whatever the design or scale, whether next-generation or legacy.

Because the service layer itself is already integrated, the duplication of functionality within a self-contained solution is unnecessary. Using the service layer approach enables developers to re-use existing network capabilities within their own innovative services without increasing

integration costs. This method also reduces the amount of development required and it ultimately saves costs for the operator.

A service layer framework allows re-use of existing services to extend others or create new services quickly. It permits new Instant Messaging Services, for example, to be used by legacy network services. Application server functionality allows entirely new applications to be scripted quickly and easily by providing access to core voice, messaging, data and charging functions as well as location and presence servers. Operator B can also take advantage of subscriber and market data, as developers harness this business intelligence to create bespoke applications.

An open, standards-based, service layer framework, for example one based on JAIN (Java APIs for Integrated Networks) SLEE (Service Logic Execution Environment), further simplifies service development and provides operators with greater independence to innovate freely. Using open APIs and the widely used JAVA language makes development accessible to developers without them needing deep telecoms expertise. As skill levels are reduced, the supply of suitable developers increases, which brings development costs down. Operators can also undertake development in-house at significantly reduced cost, enabling them to fully own their innovation roadmap.

Mobile operators in Asia-Pacific already have strategies in place to differentiate themselves through the creation of new services. Adoption of an open and integrated service framework, however, will further enhance existing models, drive innovation and reduce costs.

The snapshot view of two different approaches outlined in this article shows that Operator B has distinct advantages over Operator A, with the service layer framework trumping the boxed proprietary solution. The service layer framework enables quicker service development and delivery through re-using functionality, rather than duplicating it. The creation or improvement of applications becomes cheaper, faster and less complex. This speed and ease of innovation allows Operator B to respond quickly to market demand and build new or improved services as and when the opportunities arise, or trends open up new avenues for service provision or tactical opportunities are identified. Operator B can respond to opportunities more effectively than Operator A, monetising new services quickly to generate incremental revenue, and minimising customer churn by improving the customer experience. ●

In a cloudy forecast, opportunity shines

by Scott Puopolo, Vice President and Global Lead, Cisco IBSG Service Provider Practice

Mobile phones and smart gadgets continue to challenge the position of the PC as the main personal tool for data services. In particular, ‘mobile cloud’ is contributing to this shift. It allows users to have ‘virtual desktop’ while on the move. It keeps all the devices up to date with current technology and removes some of the hazards associated with sensitive data stored on vulnerable portable devices. With the mobile cloud in place, a cheaper, ‘thinner’ client is required, so lower-income population can enter the smartphone era. The article quotes statistics on users that show that there is willingness to embrace mobile cloud by the majority of smartphone users and that they trust service providers more than web-players to deliver a viable cloud service.



Scott A. Puopolo is Vice President of the Global Service Provider Practice of Cisco® Internet Business Solutions Group (IBSG). Scott brings significant strategy, operations and finance experience in the communications, media and high-technology industries. Prior to joining Cisco, Puopolo was President of Smooth Engine, Inc., a merchant banking firm located in New York City, where he was responsible for defining and implementing the firm's strategy and overseeing its advisory activities for private equity and corporate clients in many aspects of the converged communications industry.

Puopolo spent nearly 15 years at Accenture, where he served as the lead partner for the firm's North American Telecommunications Strategy practice, and where he led the personnel for the firm's Eastern US and Canadian Communications, Media and High Technology Strategy Group. Puopolo's current focus is working with leading service providers to identify and create opportunities to compete more effectively through the delivery of cloud computing services. His team is also working with customers to identify market segments, develop go-to-market strategies and enable customers to stake out leading positions in cloud delivery services in their geographies.

Puopolo received his undergraduate degree cum laude from Harvard College where he was a Harvard College and Charles J. Paine Scholar. He received his M.B.A. from the Wharton School of the University of Pennsylvania, where he majored in Strategic Management and Marketing.

With their lightning-fast processors and vast storage capacity, PCs remain a central object of affection in the home and a pre-eminent utility in the workplace. So, whether your game is gaming, video production, or analysing extra-solar planets, the brute force of the high-powered PC is the way to go. At least for now. Increasingly, the PC's thunder is being stolen. A potentially more powerful bolt is building in the cloud. Specifically, the mobile cloud.

For as the PC's diminutive rival - the smartphone -- exploits the migration of apps, storage, and services into the cloud, the resulting paradigm shift from PC to mobile gadgets could radically alter the way we live, work and play.

Handheld devices like the iPhone, iPad, BlackBerry and Android smartphones are already dazzling consumers with their advanced features, increased computing power and anywhere/anytime connectivity. The mobile cloud will only accelerate this trend, although, paradoxically, the devices themselves may become less powerful and cheaper (at least potentially) as they summon their real strength from outside and above, in the cloud.

In the meantime, mobile consumers are beginning to tap some basic cloud services like email and content storage, while anticipating the dizzying array of next-generation cloud-based applications to come. Even advanced computing power is increasingly available in the palm of one's hand, accessed through a simple browser, tapping into the cloud.

What does it all mean for service providers? As the mobile cloud enables smartphones and their larger cousins, tablets, to edge out PCs for more and more functions, the trend will drive a growing dependence on the network. This is great news for SPs (*Service Providers*) but also presents them with daunting challenges. Consumers will demand greater reliability from their providers if they are to trust storing and accessing their most valuable content in the cloud. As a result, service providers may need to invest in re-architecting their networks. The demand for an ever-expanding array of cloud-based apps and services will drive SPs to rethink their business strategies related to monetising such services, while at the same time integrating their networks to meet both home and mobile needs.

Cisco's Internet Business Solutions Group (IBSG) undertook its Mobile Cloud Watch survey to understand better the mobile cloud market, including customer needs and strategies for service providers. The survey also looks to the near future - and the nearly limitless potential for more advanced mobile cloud services - while gauging the level of consumer interest in adopting them.

According to the International Telecommunication Union, close to 80 per cent of the world's population has access to some sort of mobile device. As the International Data Corporation (IDC) predicts, smartphone sales will overtake PC shipments by 2012. Cisco's survey of 1,016 American mobile consumers represents just a slice of this vast potential market, yet the results shed light on the current and future interests of such consumers throughout the developed world.

Among the survey's mobile-consumer respondents, 45 per cent already have smartphones, but that percentage could rise to 60 per cent by 2013. Many appear ready, able and willing to embrace the mobile cloud. In fact, the Cisco IBSG survey found that these mobile consumers already have their heads in the cloud. More than 50 per cent access web-based email, social networks, shopping, and music services through their handheld devices. One-fifth of surveyed consumers are expanding into advanced cloud services like web conferencing, content sharing, and online data storage.

In America, a picture emerges of a young, affluent and tech-savvy demographic of smartphone users. As the Cisco survey revealed, the average smartphone consumer is, at 37 years old, younger than the average non-smartphone user, who is 50. Smartphone users' average annual income weighs in at US\$96,000, while the average non-smartphone user earns US\$70,000. Not surprisingly, smartphone users are quicker to adopt new technology. Almost all of these survey respondents are already making use of some cloud services - including storing and sharing content - on their PCs. More than half expect to be using web-based email, social networks, and shopping on their mobile devices within the next two years. For service providers, the potential of this vast, growing and cloud-savvy demographic should be clear.

As for next-generation cloud services, the smartphone-using survey respondents showed great interest. There is particular enthusiasm for all things video, with 70 to 80

per cent of smartphone users looking forward to enhanced opportunities for watching, recording and calling visually. Seventy-five per cent showed a strong interest in utilising the speaker and microphone features on their devices for speech-recognition services. Seventy per cent of the smartphone users were interested in being able to transfer multimedia content across multiple devices. These are but two of the sophisticated next-generation services that will be best employed under the cloud.

Another survey reveals that few mobile consumers are ready to pack in their PCs just yet. In fact, they look forward to greater consistency, compatibility and connectivity with their home or office machine while they are on the go, thanks to the mobile cloud. One cloud-based capability - the virtual desktop infrastructure service (VDI) - would allow mobile users to view the identical desktop configuration as their home machine on a mobile device. More than half of the smartphone users surveyed rated this service seven out of ten on a scale of interest. Fifty per cent of the smartphone users surveyed viewed the inherent simplicity of such an arrangement as a key to greater productivity.

All of these services will be available on potentially cheaper, dumber, "thin-client" devices, since with the migration of data and apps to the cloud, processing power and hard-drive capabilities will become passé. Half of all smartphone users said they were very interested in such a scaled-down device. Consumers are drawn to the potential improved security, since storage of apps and critical media content is no longer limited to a single, vulnerable piece of expensive hardware. They are also attracted to the fact that the technology would stay current.

Although limited in power and storage, with access to the cloud, the capabilities of 'thin-client' devices appear limitless to forward-looking consumers. Giving less concern for storage capacity and power, makers of high-end smartphones could be free to add more sophisticated features like dual cameras and speech-recognition capabilities. The cheaper, simpler devices could potentially expand the audience for SPs by driving smartphone penetration into lower-income demographics while encouraging non-smartphone users to upgrade.

One ongoing concern, however, is the past reliability of mobile SPs. The fear of losing crucial content on a single gadget is real. Yet, with so much content and so many services

dependent on the cloud, consumers will need extra confidence in their service providers. Even one well-publicised security breach in a cloud-centric network could potentially disrupt the entire industry trend towards cloud mobility. This increases the need for SPs to deliver confidently end-to-end security from their data centres through their network environments and right down to the devices themselves.

Cisco ISBG also believes that consumer confidence will rise with the ongoing acceleration to 4G technologies and with further increases in stability and reliability. The good news for service providers is that consumers already like them. On average, Cisco's survey respondents rated their general level of satisfaction with their provider at 7.8 out of ten. Almost 50 per cent of mobile users cited SPs as their preferred channel for cloud services, compared to 20 per cent for web companies.

There is clearly a natural affinity between cloud mobility and service providers, but certain challenges stand out. For starters, the rising demand from cloud-gazing mobile consumers will drive the need for a quality of network experience that makes the delivery of apps, content, and services appear seamless. That means low-latency, high-bandwidth networks able to accommodate video and other high-data transport operations among multiple devices, fixed or mobile. As it stands, such demands may tax the functionality of some existing networks.

Overall, service providers will need to rethink their role in the value chain. As a minimum, they will need to provide the basic architecture to deliver cloud services. Beyond that, should they create, own and manage their own data centres? What role should they have with software developers? Should they be developing their own mobile applications, buying up third-party application providers, or partnering with them?

SPs will need to address carefully these questions and plan their strategies accordingly. Regardless of how they do it, they will need to deliver next-generation cloud-based services. Clearly, the mobile cloud presents an auspicious opportunity for service providers to monetise not only the retail experience, but also the wholesale relationship, which is here and growing fast. As smart gadgets continue to challenge the pre-eminence of PCs, and as consumers continue to embrace the mobile cloud, service providers have an opportunity they cannot afford to overlook. ●

The rise of video assurance: the importance of delivering high-quality multi-screen video

by Marc Todd, President and CEO, and Paul Casinelli, Marketer/Business Analyst, IneoQuest Technologies Inc.

Half of all Internet video traffic in 2015 is predicted to be Long Form video (over seven minutes) and it is expected to be revenue earning, even when it is streamed over the Internet. This is why good experience must be assured for HTTP streaming, not just by managed IP networks. Standards and metrics for HTTP video streaming are now emerging, measuring quality against 'Program Availability' or Media Delivery Index. End-to-end quality control for adaptive streaming video (with variable bitrate) should be monitored at several points, including when the content is encoded, between servers and at the client devices.



Marc Todd is the President, CEO and CTO of IneoQuest. Mr Todd founded IneoQuest in 2001 with the purpose of assuring video quality for service provider networks and validating OEM equipment. Under his leadership, IneoQuest has grown at an astonishing rate with a global presence and worldwide customer base that has expanded to content providers, broadcasters, government and the enterprise.

Prior to founding IneoQuest, Mr Todd was a Director of Engineering with Wind River Systems. With over ten years' experience in the video market and 20 years in embedded systems, he is recognised as an industry thought leader. He is a pioneer of video quality assurance theory and technology, leading IneoQuest to market share leadership by delivering the industry's only true end-to-end quality assurance solution. Mr Todd has developed new technologies for next generation network test and monitoring focusing on Video over IP, IPTV and Over-the-Top (OTT) Video. With IQ Labs, IneoQuest's research and development team, he has overseen the development of the industry's first adaptive streaming and video-conferencing and telepresence service assurance and monitoring solutions.

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According to industry research, more than three-quarters of consumers of all ages around the world are watching video content over the Internet via a PC or TV. As more consumers also access video over their mobile devices, the consumption of video over the Internet is becoming the new mass media - creating both opportunities and challenges for service and content providers. However, as companies look to position themselves in this new market, it will be crucial for communications service providers (CSPs) to consider the importance of video assurance as they invest in network management and monitoring activities.

Business drivers for investing in video assurance It is no surprise to readers that today's service providers are highly concerned about churn rates and long-term customer loyalty. As video quality becomes more important to consumers, communications service providers (CSPs) will need to stay focused on providing the highest quality of service to ensure customer satisfaction and loyalty. This article will highlight the importance of video assurance and the latest technology advancements in monitoring IP video and HTTP video streaming networks - with the goal of helping paint the picture of how practical steps in improving video service delivery will

impact the long-term management and security of customer relationships.

Video service quality and program availability

Today's service and content providers deliver vast amounts of video to millions of consumers through their managed IP networks. Competition in this market is stiff, primarily because today's video consumer is highly sensitive to quality impairment and will freely switch providers (churn) based on service quality. Consumers now purchase High Definition (HD) video services. The amount of packet loss causing a perceivable

error is substantially less for HD video versus Standard Definition (SD) video. Consumers pay extra to receive HD video and expect a high-quality experience. They become very upset when they do not receive the quality for which they pay. Not to mention the fact that consumers invest a considerable amount of money in HD TV's, which allow them to perceive impairments easily, that would be overlooked on an SD television. Thus, delivering quality experience is essential for maintaining customer loyalty and increasing revenues.

To cope with the challenges of deploying high-quality video experience to their customers, service and content providers need metrics and solutions focused solely on video assurance. Recommended practices (such as the ANSI/SCTE 168-6 2010 Recommended Practice for Monitoring Multimedia Distribution Quality) advise that service and content providers aim to deliver video to their customers at four nines (or 99.99 per cent) availability in order to provide a high-quality video experience that allows them to maintain customer satisfaction.

Achieving high availability video programming means that each and every packet must be inspected and monitored across the entire network. Losing just one packet or having an error packet can cause video impairments at the TV screen. To achieve such performance and deliver a high-end video experience to customers, providers need an automated video assurance solution through which they can drill down into the data on a per-program basis to identify, troubleshoot and proactively address the issues. This comprehensive monitoring solution must be able to monitor each packet and give insightful metrics, such as Program Availability or Media Delivery Index (MDI) on a granular level.

Program availability, as outlined by SCTE (*Society of Cable Telecommunication Engineers*) recommended practice, is the essential metric that simplifies the complexities in understanding the health of a video network. It is a percentage of time that a specific channel is viewable without impairment. By recording Program Availability statistics on a per-program basis, service and content providers can pinpoint problem areas in their networks in a way that both technicians and executives can understand.

Why is assuring HTTP video streaming different?

Today we are witnessing a fundamental shift in the way people consume video. The rise of Internet video services allows consumers to select content and personalise the video experience to match their interests. While delivering Internet video through HTTP video streaming offers new opportunities for providers, it also offers unique revenue assurance and customer satisfaction challenges. In short, video consumers will expect the same high-quality video experience with their TV Everywhere or OTT (*Over The Top*) services that they

received through managed IP networks. While successfully delivering a short video clip can be a simple task, delivering a TV show or sporting event is another matter entirely.

Mobile video is experiencing explosive growth and will comprise a significant portion of Internet video traffic in the future. Bandwidth limitations will vary constantly, even within the same viewing session, and dynamically changing video bitrate for a complex video over a long period of time is a difficult task to say the least. Furthermore, long form video, or video over seven minutes in length, will be half of all Internet video traffic in 2015 and will be mostly comprised of paid-for services, whether TV Everywhere, Video on Demand (VOD), or OTT. Significant portions of mobile and long-form Internet video traffic will be revenue generating, and in order to maintain customer satisfaction content and service providers will need to differentiate their services by quality.

HTTP video streaming networks will require their own set of quality monitoring capabilities different from today's managed IP video networks. There are a few reasons for this. HTTP streaming utilises adaptive bitrate (ABR) technology - depending on available bandwidth and the client device playing out the video, the size and quality of the video stream changes so that the video is uninterrupted by buffering instances. To ensure continuous streaming across all devices and maintain uninterrupted service, each video stream must be encoded into several data files of variant bitrate and delivered in small segments of that data file through the content delivery network (CDN) to the end device, using techniques such as Apple HLS, Adobe HDS and Microsoft Smooth Streaming.

There is also a complex web of communications within the CDN and between the CDN and the client device. For example, origin servers within the CDN must be able to publish video assets to the caching servers quickly and without error. Then, client devices must request chunks quickly enough from the CDN in order to queue up the next video segment before the current one is played out. The complexity of these operations will only expand as HTTP video traffic grows.

Without the proper monitoring tools and metrics focused specifically on delivering high-quality HTTP video streams, service and content providers may not be able to detect when impairments occur, leaving them powerless when it comes to video quality assurance. Fortunately, solutions and metrics for HTTP video streaming are emerging that provide ways to monitor adaptive streaming video networks.

In any Adaptive Streaming Monitoring Solution, there are four monitoring points that are necessary for a true video quality assurance solution:

- The first is content monitoring Pre- and Post-Encoder to assure that the quality of the

content going into the encoder and all the variant bitrates and protocols that are going to the CDN. If a network starts off with bad quality video to begin with, assuring QoS throughout the rest of the network is pointless.

- It is also essential to monitor QoS, with metrics such as VeriStream, between the encoder and the origin servers as well as between the origin servers and the caching servers. This ensures that all servers are receiving the correct video files in a timely manner with accurate control messaging.
- The third monitoring point is between the client devices and the caching servers. Here, an end-to-end solution monitors content availability to ensure that the desired asset is on the caching server so the client device can access and play it.
- Finally, a true end-to-end quality assurance solution monitors the quality and performance statistics of client devices at all geographic locations. Because these client devices play such an important role in the delivery of the video (they receive the video, display it, queue up files and determine the bitrate of the video file they will receive) they absolutely must be monitored.

Does it matter to customers?

Today's video consumer is extremely sensitive to video impairments, making a comprehensive monitoring solution and metrics, like Program Availability, essential for CSP's to deploy successfully video services and reduce customer churn. Just as IP video assurance has unique scenarios and chances for impairment, so does HTTP video streaming. In both cases, only a true, end-to-end monitoring solution can give service and content providers the tools necessary to assure high-quality video, improve experience and retain customers.

High-quality video services have not always been an important topic, but with the advancement of digital video and expensive HD services, customers' expectations have been elevated. Expectations are key here, as we have seen customers make it clear that they expect a certain level of service and are willing to change providers to get it. With the number of people watching video on the rise across the globe, we anticipate customer experience to have the most significant impact on business decisions that their service providers make.

An operator delivering video services of any kind should re-assess the ROI (Return On Investment) and customer relationship management issues that are at stake when weighing service assurance options. Our recommendation is to make sure your video quality does not get overlooked by the complexities and expenses of building out and maintaining your networks. Explore the latest standards on video assurance solutions and metrics, like Program Availability, so that you can make educated investment decisions that will positively impact your business for years to come. ●

Supporting the mobile data boom, without the OSS bust

by Christopher Smith, Chief Operating Officer, Clarity

Asia-Pacific countries are witnessing soaring numbers of subscribers, devices and applications. Such growth places great pressures on the OSS (*Operation Support System*). Legacy OSS systems have been augmented over time but are unable to cope with complex multi-vendor, multi-device and multi-technology networks. Eventually OSS will send an SOS message, especially when the only way to support a new technology is to create another OSS silo. Migration to a unified, efficient OSS platform can save operation costs and enables business transformation, but requires the organisation to modernise the tangle of critical operations and business processes.



Christopher Smith is Chief Operating Officer of Clarity. Mr Smith brings 15 years of business experience in the telecommunications sector to Clarity. Mr Smith joined Clarity in 2009 as Vice President Product Management and Development. He is responsible for driving forward Clarity's visionary product development.

Prior to joining Clarity, Mr Smith served as Vice President, Product Management at Telcordia Technologies where he was responsible for Telcordia's next generation OSS product line and managed a customer portfolio of more than 130 customers. Mr Smith also spent time as Director of Operations for Europe, Middle East and Africa at Syndesis, a leading OSS product company, offering service fulfilment solutions to Tier 1 operators. He developed his engineering and business skills at Alcatel in Australia, working in a number of roles including design and systems engineering.

Christopher Smith holds an MBA from the Australian Graduate School of Management and a Bachelor of Engineering (Elec.) (Hons.) from the University of New South Wales.

Over the past decade, wireless devices have become ubiquitous in almost every area of life. Subscribers now demand instant access to a range of high-bandwidth offerings including social media and streaming video that were once the traditional preserve of wired devices like the PC. Today's reality is that if such services are not available via mobiles, operators not only miss out on lucrative revenue opportunities, their customers may also become frustrated by the lack of flexibility and look elsewhere.

In line with this demand for wireless connectivity, many Asia-Pacific countries like Malaysia and Singapore have long since exceeded 100 per cent mobile saturation and are witnessing unprecedented data consumption over wireless networks. In Singapore, mobile

penetration is predicted to reach 160.5 per cent by 2015, as device adoption sees rapid growth.¹

Meanwhile, IDC has forecast that Asian smartphone shipments will reach 359m units by 2015, totalling 60 per cent of the global market.² This new breed of mobile devices has forced the volume of data travelling across mobile networks inexorably skyward. AT&T recently reported that wireless data usage has increased nearly 5000 per cent in the past three years and a similar trend is emerging across Asia.³

Operators are currently striving to differentiate themselves within an expanding competitive landscape by searching for ways to brand and bundle new services. For example, Indian operator MTNL recently launched a next generation Mobile TV offering, designed

to function over 2G and 3G networks.⁴ These services are crucial to not only raising subscriber ARPU, but also to attracting new customers and reducing churn. According to Frost & Sullivan, operators in the Asia-Pacific region see an ARPU increase of 25-100 per cent after the adoption of a smartphone, making them critical to every operator's business case.⁵

As consumers move from demanding high-bandwidth services on PCs to expecting the same user experience on mobile devices, the operational support systems (OSS) of mobile operators are coming under strain. Facing unprecedented pressure on their networks from both a rising demand for next-generation services and devices, how can mobile operators ensure that their OSS is up to the challenge of delivering a flawless performance?

¹ Source: Frost & Sullivan, <http://www.enterpriseinnovation.net/content/despite-saturation-singapore-mobile-market-grow-till-2015>, February 2011

² Source: IDC, http://www.warc.com/LatestNews/News/Smartphones_surge_in_Asia.news?ID=28007, March 2011

The net effect

Legacy operational systems still in use today by many mobile operators are often inflexible, network-specific and carry high maintenance costs. These OSS architectures can be extremely complex, having evolved organically over time to support different business initiatives, or through corporate growth and acquisitions. However, for mobile operators across the Asia-Pacific region to survive and thrive in the face of the mobile data boom, their OSS must be capable of supporting their key business needs.

With the number of smartphones and applications in Asia predicted to rise sharply, any OSS must be flexible enough to manage the rapid data growth associated with the boom in both the number of subscribers and applications on the market. China Mobile has just exceeded 600 million customers with an average of 5.6 million new subscribers joining each month,⁶ many of whom will be using smart devices for the first time. Clearly, networks that are needed to meet the demands of such high volumes of data must be extremely robust!

With soaring numbers of subscribers, devices and applications, a robust OSS is essential to managing network capacity and congestion. Congested networks result in call dropouts, hand-off management problems and slow data downloads that create a spiralling impact through packet re-sending. By monitoring key metrics such as capacity usage and packet re-sends against defined thresholds, a robust OSS can analyse the health of a network, identifying hotspots that may be in need of upgrades. Establishing systems and processes that enable proactive network monitoring can dramatically reduce the occurrence and duration of performance degradation and network failure.

To avoid further subscriber dissatisfaction, it is also vital for the OSS to manage the network's impact on quality of service. Many subscribers use high-speed mobile connections as a substitute to fixed access, particularly in remote and developing areas. In India, where PCs and fixed connections are prohibitively expensive for the majority of the population, mobile Internet is a viable alternative. As of 2010, there were only around 8 million broadband subscribers in India - a country of 1.2 billion people. Nevertheless, India is estimated to have in excess of 60 million Internet users across the country, a penetration of almost 5 per cent, which may be largely down to mobile Internet access.⁷

Thus, quality of service on mobile networks will increasingly become an essential part of the commercial offering for both businesses

and individuals who rely on these devices. In the same way that it can monitor the network, a modern OSS can also monitor the impact of apparent congestion on mobile services and correlate it to individual service impacts, locations or even device categories. An early analysis of performance can help pinpoint whether the underlying issue is with the service, device or network, so that the correct remedial action is instigated. For example, if a new mobile business device is released that is not optimised for network signalling, a number of customer complaints could arise from a business district - initially indicating that there is a localised network issue. Only with comprehensive performance analysis is the true cause identifiable - enabling directing resources where they are needed as soon as possible.

Meanwhile, Asia-Pac operators will also continue to feel the financial pinch of supporting network investment to satisfy increasing data usage, without a proportional increase in ARPUs. Internet giants like Google are delivering ever-increasing volumes of content over networks. This necessitates continued pressure to decrease operational costs for maintaining overall profitability.

An obvious antidote is the standardisation and simplification of the support systems architecture to reduce overheads and resource requirements. A modern OSS that is designed to manage any network (fixed, mobile, next generation or hybrid) can replace the silos of systems that inhibit business agility and process automation. The added benefit of such an OSS is that it future-proofs the business for the next generation of network technologies. With fundamental changes in mobile technology occurring every 10-15 years, and many incremental variants emerging in-between, it is essential for operators to be able to manage multiple technologies simultaneously and seamlessly.

Is your OSS sending an SOS?

So what are the warning signs that the time for an OSS overhaul is approaching? Mobile operators with an OSS insufficient to their needs will find themselves unable to deploy new network technologies without investing in an additional OSS silo. As a result, a solution provided by the associated network equipment provider is often implemented. However, these solutions are not inherently designed to manage performance across complex multi-vendor mobile equipment and backhaul network environments - seriously limiting any service, device and network mapping that is needed to manage proactively network performance.

Meanwhile, the same operator may find its margins are desperately thin, despite having higher prices than its main competitors, with profitability whittled away by the overheads of multiple systems and resources. The solution is deploying a unified OSS that can manage any number of networks, regardless of service technology or equipment provider. The unified OSS should manage any new network, but also take any legacy and future network builds into its fold to provide a truly unified view of service and network performance.

So, what is holding back operators from implementing a unified OSS? The organic growth of an operator's existing operational systems often results in a tangle of business critical processes and data spanning many disparate systems that can make the implementation of a new OSS a very difficult challenge indeed. For these reasons, many operators delay the implementation of an OSS refresh. This is a hazardous approach that pushes the existing legacy OSS to the limit before the need for an upgrade becomes too pressing to ignore. The reality is that operators who continue with such legacy systems risk being out-paced by competitors and ultimately suffer a high level of customer churn.

Instead, operators can take a lead from recent successful OSS deployments. A proven way to mitigate the risks of a new OSS deployment is to focus the delivery on specific business problems, which can be addressed consecutively. This can lead to an OSS being implemented in manageable phases (such as every three to six months) so that a unified OSS can first be deployed for the newest network requiring support and then a phased migration of other networks can follow. This provides immediate business benefits, along with on-going system consolidation and operational expenditure reduction.

Reaping the rewards

In the short term, a new OSS can bring immediate benefits, such as improvements to the time to identify service and network issues for prompt resolution. In the longer-term, a modern OSS enables business transformation, including increased operational efficiency, seamless support for next-generation technology rollouts and a management system that is aligned to industry best practices.

Once powered by a cutting-edge OSS, mobile operators can ensure that they are in a position to take full advantage of the mobile data boom, and harness the most lucrative segment of the Asia-Pacific market. ●

³ Source: 4G Wireless Evolution, <http://4g-wirelessevolution.tmcnet.com/topics/4g-wirelessevolution/articles/71325-managing-three-forms-network-complexity.htm>, December 2009

⁴ Source: MNTL, http://mumbai.mntl.net.in/dolphin/services/mobile_tv.html, May 2011

⁵ Source: Frost & Sullivan, <http://www.globaltimes.cn/NEWS/tabid/99/articleType/ArticleView/articleId/567501/Sales-of-smart-phones-in-Asia-Pacific-to-grow-significantly-by-2015.aspx>, March 2011

⁶ Source: BBC News, <http://www.bbc.co.uk/news/business-13153351>, April 2011

⁷ Source: BuddeComm, India - Telecoms, Mobile, Broadband and Forecasts, July 2010

Mobile device proliferation: key implications for service providers

by B.V. Jagadeesh, President and CEO, Virtela

The tremendous growth in mobile devices and their penetration into business life has a profound effect on service providers. This article highlights four areas of enhancements that are required to cope with this proliferation: local peering extending the reach nearer to the Cloud, network performance including WAN (*Wide Area Network*) optimisation, device management (merging personal and corporate use) and securing the ‘perimeter’ of enterprise data. Service providers can help enterprises in their mobility strategy and provide managed services that support these requirements.

B.V. Jagadeesh is the President and CEO of Virtela. Mr Jagadeesh has a proven track record of managing and building market leaders. Previously, he served as Group Vice President and General Manager of Citrix Systems' Application Networking Group after the company's acquisition of NetScaler, where he served as President and CEO. During his tenure at NetScaler, Mr Jagadeesh grew the company to become the market leader in Application Delivery Systems, leading to its acquisition by Citrix.



Prior to NetScaler, he co-founded Exodus Communications. While with Exodus, he successfully helped the company grow from start-up to a leader in the Web co-location market and was instrumental in its highly successful IPO (Initial Public Offering of shares). Mr Jagadeesh was also president and CEO of 3Leaf Systems, which was sold in a private transaction, and has held various management and engineering positions at Novell and 3Com.

Mr Jagadeesh serves as Chair of the board of NetMagic Solutions, a leading IT services company in India, and was a director of Ankeena (acquired by Juniper Networks) and Ocarina Networks (acquired by Dell).

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In the past year, there has been an explosion of mobile devices, particularly smartphones and tablets, used by both consumers and businesses. Currently there are over five billion mobile phones in use, and IDC predicts one billion of those devices will be smartphones by 2015.¹ Sales of smartphones and tablets will outnumber PCs this year, according to Deloitte.² Smartphones already have much of the same capabilities as PCs, but are more portable, allowing users to access the network, Internet and applications on the go. Because of this portability factor, the number of mobile Internet users is soaring. IDC also predicts that the number of Internet users (mobile and wired) globally will jump from two billion in 2010 to 2.7 billion in 2015. Mobile devices are slowly but surely pushing PCs out of the picture and it is just a matter of time before the desktop PC becomes side-lined.

So what does this mean? In simple terms, business models across the board must change. The influx of mobile devices is already having a tremendous impact on businesses that see the opportunity for new revenue streams enabled by mobile, but struggle with implementing the correct strategy. Whether you are a vendor, service provider or enterprise, no one will go untouched, and those who do not plan accordingly for a mobility strategy will be left in the dust. The role vendors are playing in response to this mobility trend is fairly clear: vendors are rapidly rewriting applications to be mobile enabled. The result is that a new wave of applications is coming to the market. These are not just consumer apps. We are seeing a trend toward major software vendors selling enterprise apps in cloud-based ‘storefronts’ modelled after Apple’s successful App Store.

This trend has a huge impact on the network, and particularly on network and service providers. Service providers will be greatly affected by mobile proliferation. They must take steps to ensure that they are adequately prepared for it. Outlined below are four key implications service providers must keep in mind as they help their enterprise IT customers implement a mobility strategy.

Local peering

The growing prevalence of mobile devices means users are positioned all over the world. No longer is demand for access to data and applications centred on fixed locations such as offices and homes. With smartphones, this demand for access to the Internet and private and public clouds can come from anywhere, anytime. This is forcing service and cloud providers to cast a

much larger net, geographically, in order to meet these demands.

It is unrealistic to expect that a service provider will have locations everywhere, all over the world. Providers must therefore have a local Internet routing solution that optimises and guarantees application performance and security for their customers — in country - whether they are on net or off net. This is where the idea of peering comes in. Peering partnerships give carriers a tremendous opportunity to offer new and better performing services to their enterprise customers by teaming up with local carriers and mobile providers. Carriers can leverage their own infrastructure and that of other providers to build extended, cost-efficient and secure highways to the mobile users' content sources.

Taking this a step further, the mobile user experience is primarily a function of how close users are to their content source (Internet, cloud or data centre). If a user is geographically far from the source he or she is accessing, a number of “hops” are required in order for this user to reach the desired location on the Internet. In other words, Internet traffic in one country is backhauled to another country, and this can happen multiple times. Cloud and Internet providers must therefore push the edge of their cloud as close as possible to their end-users to avoid poor experience. More often than not, this can only be done by partnering with local providers and utilizing their local points of presence to keep traffic in region. In addition, the growing role of ISPs/wireless access providers serving as the end-users' springboard cannot be understated. Cloud service providers must push the edge of their network to the doorstep of the local ISPs/wireless access providers in order to maximise the efficiency of cloud-based applications for end-users.

Network performance

As mobile devices continue to saturate corporate and consumer settings, network optimisation is critical. Service providers must continuously improve their networks to ensure that mission-critical operations are not negatively impacted and end-user frustration is kept to a minimum. Users will not accept network failure, and that expectation has now extended to mobile devices. Users expect access to the Internet, the cloud and other applications and they expect it fast. Business users in particular do not have time to wait for a mobile page to load because their Internet access is slow. This decreases productivity on the business side and results in frustrated end-users, whether business or consumers. In order to enhance the mobile device experience, service providers must

ensure appropriate performance of mobile devices and network connection.

Another way in which service providers can improve the mobile device experience is by adopting innovative technologies such as WAN (*Wide Area Network*) optimisation, which have the ability to accelerate mobile access and content delivery for the enterprise. Implementing WAN optimisation should not require a complete overhaul of a provider's network. With the rate at which mobile devices are entering the workplace, service providers would benefit from cloud-based mobile acceleration solutions that can speed content delivery and eliminate the frustrations workers face with unreliable connections, slow networks and dropped data transfers.

Mobile device management

Today it is common knowledge that smartphones can lead directly to increased productivity as users can access the network and applications, and easily accomplish tasks wherever they are. However, if enterprises do not have a mobility strategy in place, this increased productivity cannot be fully realised. As mobile proliferation continues in the enterprise, CIOs and IT departments are struggling with managing an influx of devices, both corporate and employee-owned. With the saturation of various makes and models of smartphones, managing corporate policies, apps and network security has become a major IT nightmare. Enterprise IT teams do not have the time to manage this problem, but cannot afford not to.

This presents a huge opportunity for service providers. Enterprises will increasingly look to their service providers to help manage and secure their mobile devices. In order to meet the needs of their enterprise IT customers, it is imperative that service providers have the capability to offer Mobile Device Management (*MDM*) solutions, helping customers to provision, secure and manage costs across a wide set of mobile devices. Service providers that do not have MDM offerings may find themselves getting marginalised by other providers that do. As more and more mobile devices enter the workplace and begin replacing PCs, having an MDM offering will become increasingly crucial.

Perimeter security

A major concern for businesses, particularly enterprises, is mobile security. A recent study shows that mobile malware increased by 273 per cent in the first half of 2011, compared to the same period in 2010.³ As the growth of mobile devices continues, this problem is only going to get worse. Corporate mobile users may unknowingly

download malicious content to their devices, and this poses a major threat to their company's network. Business-critical applications can be compromised and sensitive information uncovered through devices that get lost or stolen.

As enterprise IT departments struggle to keep their business secure, while strained for resources, they will increasingly look to their service providers to deliver the added mobile security they need. Service providers that adopt the cloud as a service platform will be better positioned to offer enterprises the type of mobile perimeter security they need, as cloud centres add a layer of security unmatched by anything else. With advanced security measures built in at the cloud centre, any threat will hit the provider's perimeter security before it ever reaches a company's data centre.

The bottom line

Businesses across all industries are already seeing possibilities and side effects of mobile device proliferation. As mobile technology continues to evolve, this is only going to strengthen. While this trend presents a huge opportunity for businesses to grow and expand, having a well-thought-out strategy will be crucial to a company's ability to leverage mobile technology successfully.

Vendors will continue to come up with new and creative ways to create or rewrite applications, optimising them for mobility - which will have a widespread effect on networks and service providers. At the same time, the rise of smartphones presents a unique opportunity to managed service providers in terms of opening up new revenue streams. Enterprises will rely, more than ever, on service providers to help them manage their mobility strategy - something they must be prepared for. Providers must constantly innovate and transform their networks, creating new offerings, partnering with other providers when necessary, and looking for ways to deliver the highest quality services to their enterprise customers whose needs are constantly changing. ●

¹ *International Data Corporation: Worldwide New Media Market Model, September 2011*

² *Deloitte: Technology, Media & Telecommunications Predictions, January 2011*

³ *G Data: Malware Report, September 2011*



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Mobile opportunities, smartphones vs. PC

Chris Bruce, CEO BT Openzone & Chair of the Wireless Broadband Alliance

Smartphones are becoming as powerful as PCs. Like PCs, smartphones need to rely on WiFi for gaming, video streaming and social networking. WiFi, previously ignored by carriers, is now an important alternative to 3G, especially for indoor connection. WiFi for mobile use still has some important issues that need to be resolved: coverage through solid structures, power consumption, authentication, connecting to the best access point, avoiding channel congestion and using VPN security.

Mr Chris Bruce, BT Openzone, CEO and chair, Wireless Broadband Alliance (WBA).



Chris Bruce is responsible for managing BT's public WiFi service, BT Openzone. In 2009, Mr Chris Bruce joined the board of the Wireless Broadband Alliance and in 2008 joined BT's East of England regional board.

Chris Bruce has over 20 years' experience of the telecommunications industry in a range of general management, product, marketing and sales in channel management roles. He has been with BT since 1991 and was responsible for business growth in the international data comms, mobile, Internet hosting, global voice and now wireless broadband sectors.

Most recently, he spent a twelve-month secondment with the British Government (DTI), responsible for managing the Government's Broadband Britain programme. Prior to this, he was Vice President, channel and distribution for BT's pan European Applications Hosting business and was a board Director of Inet Spa (a publicly quoted Italian hosting business of which BT was a major shareholder). In 1998 he was Sales & Marketing Director of Telfort Business Mobile (The Netherlands), launching the first 1800 GSM service in Holland and was previously Executive Assistant to BT's CEO.

Prior to BT, Mr Bruce held a number of positions in product marketing with Ericsson Business Systems, Ascom and CASE Communications PLC.

Smartphones are taking over from PCs - but what does WiFi need to do in order to ensure that data carriers, service providers and customers get the best from their phones?

The PC has made such a difference to our lives but it is now under threat. It came into our lives in the 1980s and turned our business and domestic lives upside down. From the now laughably mundane USP (*Unique Selling Point*) of 'maintaining your household accounts', which was heavily marketed by PC and software retailers back then, to designing aircraft, these devices will have their own section in any future museum of social and commercial history... such is the mark they have made.

However, the PC has serious competition. Like the fax machine, it could be heading for that museum faster than any of us thought. It is a fantastic device, but it has drawbacks. It may be big and clever, but it is not light and it is not fully portable.

Smartphones, however, are extremely portable. Had people been told years ago 'use these instead of PCs', they would have laughed. The screens are tiny - although tablets are now arriving in force, too. Of course, they were meant to be complementary, but now that their processors, memory and storage vital statistics are putting desktop computers to shame, people do not realise how little they turn on their PCs now.

Analyst IDC estimates that 365.4m feature phones (basic smart capabilities) and full smartphones were shipped globally in the second quarter of 2011. That is up 11.3 per cent year-on-year from the 328.4m phones that IDC estimates were shipped in Q2 2010. IDC says that sales of feature phones are now actually falling, so overall growth is now being driven by surging sales of high-specification smartphones.

Within two years or so, there will be more smartphones with Internet access

than PCs. Already over a quarter of UK adults (27 per cent) and almost half of teenagers (47 per cent) own a smartphone, according to Ofcom's latest Communications Market Report.

The mobile challenge

If smartphones are going to become 'truly PC and truly mobile', with superb connectivity, these devices will be useless without access to data. The services available via smartphones must be practical and simple to use, not just adaptations of what went before for PCs. The rise of the 'app' on smartphones and tablets is significantly altering the ICT scenario, and vendors, service providers and businesses of all sorts need to re-think their operations and business models.

Networks

Home and public WiFi networks have become a critical connectivity solution for

mobile devices. BT has created a significant public WiFi estate through public and dense city centre WiFi and hotspots broadcast by home and business broadband hubs. Mobile operators, once not keen on supporting WiFi, now use it to offload data from their 3G data networks. Many portable consumer devices can support both 3G mobile and WiFi connections, each with its advantages and disadvantages. WiFi has special advantages when it comes to burgeoning activities such as gaming, and Voice over Internet Protocol (VoIP), but 3G is more widespread. Ultimately, these technologies are complementary.

The unwired-data challenge involves technology and economics. Traffic growth, primarily generated in buildings, may be more cost-effectively served from fixed networks with WiFi than by wide area mobile networks. However, with continued data traffic growth and new mobile technologies including LTE and femtocells, the WiFi industry needs to focus on simplifying and enhancing customers' experience over WiFi. Numerous projects within the technical standards communities for both WiFi and 3G are looking at these solutions, and we expect the fruits of these activities to find their way into the devices within a year or two. The principal issues are described below.

Connecting

Connection managers on many WiFi devices can create a barrier to customer usage. Smartphones can fail to prioritise between different WiFi access points. This may be mitigated by using connection manager software. However, customer credentials must be entered into the devices and this process has to be repeated for all devices and WiFi networks. This process must be automated wherever possible.

Coverage

An advantage of the existing WiFi technology is that it mostly exists in indoor locations where most data is generated. However, varying building construction can lead to varying coverage levels. Using IEEE 802.11n standard equipment can improve this, with more sophisticated and expensive solutions giving yet better range.

AAA - Authentication, Authorisation and Accounting

There is a wide array of WiFi authentication methods and credentials. This has been automated for certain devices through the use of WISPr clients. The roll-out of IEEE 802.1x allows a range of alternative credential mechanisms to be used (e.g. digital certificates), along with more

automated provisioning systems being possible. This solution is currently being analysed. Taking this further, the Wireless Broadband Alliance is now developing and trialling specifications for the Next Generation Hotspot using the recently established IEEE 802.11u specifications.

Security

At present, BT's WiFi estate utilises unencrypted access for customer convenience, consistent with global public WiFi networks. Openzone provides VPN client downloads for PCs, Macs and Apple iPhones and iPads on the Openzone Portal to provide fuller protection. This is prominently promoted but usage is limited. The industry needs to do more to promote these solutions. WiFi protocol 802.1x provides air-interface security, and is beginning to become used on public WiFi networks (it has been rolled out to 90 per cent of BT premium hotspots) but open access remains important for ad-hoc users or in free-to-end-user public WiFi services.

Staying Connected

Once connected to WiFi, maintaining connectivity can be challenging. WiFi devices assume that all access points issuing a given SSID (*Service Set Identifier*) are part of the same local area network. As a result, devices may switch access points depending on detected signal strength. From a customer's perspective, their device is connected to WiFi but cannot be used. The 802.1x and newer IEEE standards help to alleviate this. In future devices may simultaneously connect to both networks, perhaps to provide different services across each bearer.

Enjoying the experience when connected

WiFi can provide a great customer experience. It often offers higher speeds and low latency compared to 3G, to make it the preferred network for services such as video streaming and on-line gaming. However, further improvements are required to ensure this is consistently achieved. WiFi uses unlicensed spectrum at 2.4GHz. This spectrum can suffer from interference caused by both WiFi and non-WiFi devices, such as video senders and baby monitors, as well as other neighbouring WiFi access points with overlapping coverage.

WiFi access points and the connected devices share usage of a common channel to transmit and receive data. Devices implement a variety of 802.11 protocols, from the slower legacy 802.11b to the latest fast 802.11n on the same channel. In addition, devices near the edge of coverage generate longer retransmissions due to weaker signal strength. This combination

of factors can result in congestion of the common channel and poor throughput for all customers on the access point. There is a variety of emerging techniques to address these, but progress is limited by the adoption rate of device manufacturers.

Battery life

WiFi is perceived as power-hungry technology and is often turned off. Crucially, WiFi consumes more power than a mobile equivalent during stand-by mode. For 3G devices, the 3G radio must be left on even when WiFi is on, increasing power drain further. Improvements in silicon design and implementation of newer standards mean that WiFi is now no worse than 3G for data transmission. In fact, some experts, such as Apple, say that it can be more efficient. Possible interim solutions include connection managers that switch off WiFi when the handset is outside the coverage area.

Apps - the opportunity for retailers

Retailers of both 'clicks' and 'bricks', who are not already doing so, need to explore urgently the potential that smartphone apps can offer. A simple download for customers can enable retailers to engage with customers through special offers, online shopping, price comparisons, coupons and loyalty programmes. Links from apps to social networking sites can provide brands with arguably the most powerful brand channel - word of mouth, so retailers who are already using apps must also ensure that social networking is part of their smartphone strategy.

Conclusion

WiFi capabilities are widespread and they provide customers with a valuable proposition for accessing data and applications wirelessly. Whilst current WiFi is not a substitute for wide-area mobile due to its limited coverage footprint, it has a significant role in providing a full customer experience.

There are areas where this experience could be enhanced with respect to usability in order to reduce barriers to adoption and thereby improve the commercial potential. In combination with broadband, the WiFi service could provide a significant competitive advantage in serving the burgeoning smartphone/tablet market sector.

Leading the new world of mobile technology

by Süreyya Ciliz, CEO, Turkcell

The availability of broadband and smart devices is propelling Turkey into the new digital era, towards mobile Internet - the platform of the future. 3G was launched in Turkey in 2009 and Turkcell has contributed to its high population coverage rating. High broadband speed and good coverage enables Turkcell to launch a wide range of advanced services, including mobile payment and NFC based transactions, thus keeping Turkey in the forefront of technology and transforming the ancient 'Silk Road' to the modern 'Fibre Road'.



Süreyya Ciliz is the CEO of Turkcell since January 2007. Before joining Turkcell, he held several executive positions in the Microsoft Corporation. In 1997, Ciliz was appointed as the Country Manager for Microsoft Turkey and in 2000 he was promoted to the Microsoft headquarters in Redmond, WA, USA. He held executive positions in the Microsoft Worldwide Sales, Marketing and Services Group from 2000 till 2007.

Between 1988 and 1997, Ciliz served respectively as Vice President, President and Chairman of Novasoft Systems, an enterprise document and workflow management company which he co-founded in Cambridge, Massachusetts. He started his business career as a software development engineer at Metagraphics in Massachusetts where he was later promoted to be the Director of International Sales and Marketing.

Ciliz has an MBA degree from Harvard Business School in 1983 and a BSE degree in Computer Engineering and Industrial & Operations Engineering from University of Michigan, Ann Arbor in 1981.

During the 2011 annual meeting of the World Economic Forum in Davos, the main discussion topic was the impact of mobile communications on our daily lives. Today, five billion people are connected by mobile phones. Thanks to 3G, the number of mobile Internet users, currently at two billion, is expected to rise to four billion by 2020. I am among those who think this number will be reached even sooner. As the demand for democratization and transparency increases globally, the speed and mobility that 3G offers can bring information and news flow to a remarkable level.

When we look back only half a century, we can truly appreciate just how much communications technology has transformed. The 'digital age' we live in has necessitated

a fresh technological vision for the new techno-economic period. Enhanced economic performance requires effective use of mobile technologies shaping the 'new world'. A professor at The London School of Economics and Political Science has estimated that each ten per cent rise in mobile penetration may generate a 0.6 per cent increase in a nation's annual growth rate. Independent research indicates that, by the end of March 2011, mobile line penetration was 82 per cent globally, reaching 102 per cent in the Asia-Pacific region.

The explosion in bandwidth for consumers and businesses drives customer growth while contributing to applications enhancement and greater availability of value-added services. Such large increases

in bandwidth support exponential growth in data, including voice, video and Internet. Smartphones and tablets further accelerate this trend. Global smartphone sales are expected to reach 41.4 per cent of total handset sales by 2015, as their sales are expected to more than triple from 2010 to 2015 in Asia-Pacific.

In Turkey, while mobile line penetration was at about 87 per cent as of the end of June 2011, we have seen a rapid uptake in smartphone sales since the 2009 launch of 3G in the country. The ratio of smartphone sales, which constituted five per cent of total sales in 2009, increased to 18 per cent in 2010, and is expected to reach 24 per cent by the end of 2011.

Accordingly, mobile data revenues are forecast to grow by 32 per cent from 2010 to 2014 on a compounded basis, spurred by 3G and smartphone devices and application downloads. As the sale of smartphones and tablets rises further, data usage will continue to increase, with a key contributor being video usage.

I personally believe that just as PCs have been the platform of the past 25 years, the next platform has become smart mobile computing devices. For a long time, we have been preparing for a new world where 'mobile Internet' plays the leading role. In order to create an ideal platform for mobile services, which is the platform of the future, we have set a good example in Turkey, this fast-growing country at the crossroads of the Middle East and Asia. We have introduced the nation to 3G, generating national value with one of the fastest and most sophisticated mobile Internet infrastructures in the world. We are proud of our contribution to the World Economic Forum and INSEAD's ranking, where Turkey came first in population coverage among 138 countries. In Ericsson's ranking, 11 3G exchanges were ranked in the top 11 among 639 3G exchanges in 53 countries, in terms of 3G data download speed.

While our country is taking a major step towards becoming an information society, we have prioritized the provision of equal opportunities in terms of information access, and are seeking to close the digital divide in Turkey.

We are currently experiencing the online integration of communication, information and entertainment. The key issue may be expressed under three headings: Mobility, Internet and Convergence. Hence, the possibilities presented by broadband will be the entire sector's focus of attention. We anticipate particularly exciting years ahead, as the world is now shifting its focus to the next chapter, which is clearly about 'mobile internet'.

I believe that operators should define themselves as mobile service providers, rather than solely GSM operators. Particularly in Turkey, as the market leader, we have focused on establishing one of the world's best performing 3G technology supported networks. Moving towards this vision, we have implemented HSPA+, one of the first to do so globally. We are now able to reach mobile Internet speeds well above those of domestic and global peers, at up to 43.2Mbps with the HSDPA multi-carrier solution.

Unsurprisingly, the smartphone market has been a key growth area. Last year, the Turkish market enjoyed rapid adoption of smartphone usage, as operators introduced their own branded smartphones at reasonable prices to take the smart-phone experience to a higher level of price-quality balance. Particularly, we have observed that users of our own Android™ type smartphone in our network had increased their mobile Internet consumption 18 fold. Currently in Turkey, smartphone and data-bundled packages drive the increase in mobile line penetration and growth in mobile Internet and service revenues.

We believe that new versions of these smartphones, such as our own, which embeds mobile services and applications, as well as NFC (*Near Field Communication*) capabilities, will further enhance consumers' lives. In this new era, the application arena is becoming increasingly important. Through application stores, operators can boost loyalty, decrease retention cost, increase ARPU and provide local and customized applications that are closely tailored to their customers' needs. This is why I view application stores as an indispensable component of a successful business plan.

Turkey is a country where a successful business plan can rapidly result in higher returns, with a larger share of the youth segment known to be keen on trying out new technologies and services compared to other European markets. Additionally, the operators have both the time and budgetary motivation to follow and respond to the competition's promotions. Accordingly, we expect to see a proliferation of smartphones which may be used as small-sized PCs by many people, and will continue to drive services relying on multimedia and mobile Internet. In particular, our cutting edge applications like mobile payment, mobile signature, mobile education, telemetry applications, e-government applications and various products and services have elevated Turkey to a country of firsts, especially in location-based services and Near Field Communication.

Mobile payment innovations, both on a local and global scale, have been introduced in Turkey. Turkey is shown as a model for technical implementation of mobile payment services, with the business model behind it. A recent mobile payment solution for iPhone users marks a European first, offering commercial mobile contactless payment. Additionally, the multi-application environment of NFC usage has also been

launched to realize Turkish subscribers' Mobile Wallet expectations. In the near future, we expect to see a boom in mobile financial services spanning from mobile payment to money transfer, fuelled by Near Field Communication, while location-based services will continue to thrive and increasingly include social networking.

The sizeable investments made in Turkey are not limited to mobile. Thanks to investments in our fibre network, Turkey is among the top-five countries in the world to offer residential Internet service at speeds up to 1,000Mbps. We are taking radical steps to transform the centuries' old Silk Road into a 'Fibre Road' and facilitate Istanbul in becoming the regional traffic exchange centre.

Before I conclude, we should address potential challenges that may arise from strong mobile Internet growth. As free Internet services increase, data traffic continues to rise. Consequently, the growing use of smartphones and tablet PCs means consumption of network capacity in terms of signalling. While this is good for boosting data usage, more smartphones in the network necessitates better and faster network and technology. Therefore, those operators failing to invest in their network will be left behind. Operators and vendors are already discussing possible proactive steps and precautions to be taken in order to successfully address this situation. To this end, we closely trace technological developments and invest in our network.

It is also necessary to translate the need for increased capacity into increased income. Therefore, we design our pricing strategies and investments with a focus on profitability, and advise operators to scrap unlimited data tariffs and introduce clear data price bands.

Additionally, the availability of IP version 4 addresses for the rapidly growing number of IP devices is decreasing fast. Therefore, there is a need for a transition to the new standard, namely IP Version 6. The transition is not simple, as terminals, infrastructure and content must all support this new standard. In Turkey, we are continuing our efforts towards a seamless transition to IPv6 from IPv4.

Today, the entire world is experiencing a transformation brought about by mobile communications. In tomorrow's world, the winners will be those cutting-edge countries that are ahead in the race today. ●

Global Ethernet services driven by enterprise and mobile phone demand

by Mike Powell, Vice President, Service Delivery, Global Markets,
Cable & Wireless Worldwide

The appetite for gadgets in the Asia-Pacific area is driving up data traffic, both mobile and ‘tethered’, and carriers have no choice but to look for lower cost backhaul solutions. Metro-Ethernet and Microwave Ethernet have emerged as cost-effective solutions that are faster than TDM and hybrid backhaul technologies and which have proved highly reliable. They also have other important advantages, such as simplicity, familiarity, and most of all - flexible scalability, even in small incremental steps. Metro and Microwave Ethernet are now set to be the technology of choice for the future backhaul.



Mike Powell is the Vice President of Service Delivery, EMEA, Asia-Pacific, India and USA in Cable & Wireless Worldwide. Based in the Singapore office, Mr Powell is responsible for running the Global Services Business, focusing on driving customer satisfaction and delivering service quality and consistency for all Cable & Wireless' Worldwide customers. In this role, he is directly responsible for driving service delivery transformation across all geographies around the world. As a member of the senior management team, he manages the teams responsible for pre-sales, service delivery, service management and project management.

Mr Powell's career in IT spans over 19 years, during which he has worked in key positions in the Banking & Finance and IT Industry. Prior to joining C&W, Mike was Senior Director, Business Services Optimisation division, CA (formerly Computer Associates). He has also been instrumental in the establishment, growth and management of pre-sales teams, professional services organisations and customer support functions for three multinational companies across Asia Pacific - Onyx Software, FileNet (IBM) and Microsoft Enterprise Services.

Mike Powell is a Commerce graduate.

In Asian countries such as Singapore, which is growing exponentially as a financial and wealth management hub, the majority of consumers have both a work desktop and a personal laptop. Coupled with the ferocious Asian appetite for all things ‘gadget’ (i.e. the latest tablet is a must-have), there will inevitably be a demand for the most efficient networks to facilitate the growth of communications technology. Therefore, when it comes to the debate between mobile phones and PCs in the technology stakes, we must remember that they are, in fact, both dependent on services that use technologies such as Ethernet.

Ethernet is forging ahead and promises significant growth opportunities for the telecoms industry. Global Ethernet services are projected to reach US\$40 billion by 2014, growing at a 17 per cent compound annual growth rate (CAGR) according to a recent Network World article (Nan Chen 29.06.2011 kl 16:45 | Network World).

Another study by Infonetics Research shows that service providers around the globe have increased their Ethernet services revenue by 20 per cent in 2010 over 2009, with Asia Pacific making up the biggest share of Ethernet services revenue at more than a third of the global total. Asia Pacific will continue as the leading region at least

through 2015, led by China, India and Southeast Asia.

PCs and the demand for global networks

Few remember that it took many years for Ethernet to ‘win’ the local area network (LAN) protocol wars, yet with the possible exception of IP, no other protocol has done more to progress how data networks move traffic, power enterprises and the usage of PCs. As computing needs grew more complex and bandwidth-intensive in the 1980s and 1990s, enterprises have increasingly turned to Ethernet to deliver efficient, high-speed, and cost-effective data network services within their LANs.

“As global organisations naturally migrate towards next-generation Ethernet services, these firms will employ global Ethernet with the peace of mind that this future-proof solution can facilitate the transition to all-packet networks with truly global scalability and lower total cost of ownership (TCO)”

The demand to expand networks beyond tight geographic boundaries saw Ethernet grow beyond the confines of LANs out into campus area networks (CANs) and metropolitan area networks (MANs). Over the last few years, progressive companies have begun demanding that their service providers offer these services over wide area networks (WANs). It is not a surprise, therefore, that as today’s enterprises expand globally, they look to Ethernet to supply its traditional benefits of scalability, ease of use, and efficient use of bandwidth throughout the entire world.

There are many reasons why Ethernet is the industry standard for networking - in the LAN, and now the WAN:

- Ethernet offers much more efficient bandwidth utilisation. This makes Ethernet

particularly valuable across vast stretches of expensive undersea cables.

- The ability to standardise on less expensive router interfaces lowers costs and enables deployment of uniform equipment worldwide.

- Ethernet offers ‘pay as you grow’ flexibility, allowing businesses to purchase bandwidth incrementally and easily upgrade it as their requirements expand.

- An often overlooked benefit is that of simplicity: internal enterprise support teams welcome Ethernet as a familiar technology that can now be used to link metropolitan, national and global sites.

Once restricted to IP networks, Ethernet is now capable of delivering meshed

networks that allow any site on the WAN to communicate with any other site. This meshing feature enables less expensive Business Continuity Planning (BCP) and can be important for optimising global voice and video calling. Further enhancements allow for differentiated classes of service (CoS) across the network. This allows a company to prioritise critical data services such as VoIP (Voice over IP) or SAP (System & Application Programming) based transactions over less important traffic such as Internet browsing.

Beyond just raw network efficiency and easier BCP, Ethernet also makes for more cost-effective circuits for intra- and inter-company integration and is now the leading delivery method of choice for algorithmic trading services. Leading edge network service providers are now leveraging Ethernet

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“Over time, the industry has come to accept that Carrier Ethernet will be the key technology for mobile backhauling as it is the ideal all-IP complement to the growth of LTE networks. Industry analyst Michael Howard of Infonetics Research has concluded that Ethernet is the only solution for next generation mobile backhaul networks.”

to facilitate External-Network to Network Interconnections (*E-NNIs*). These private Ethernet exchanges let the two providers efficiently extend their respective Ethernet footprints across the world with limited expense. 100-gigabyte Ethernet is now being deployed across special, high-demand links. Inevitably, this will become commonplace as GigE and 10GigE links today.

As global organisations naturally migrate towards next-generation Ethernet services, these firms will employ global Ethernet with the peace of mind that this future-proof solution can facilitate the transition to all-packet networks with truly global scalability and lower total cost of ownership (*TCO*).

Mobile phones

Another factor driving Ethernet growth is the exponential increase in smartphone uptake. With consumers increasingly surfing the Web through their mobile devices rather than on PCs, service providers worldwide are challenged to find a way to transit from networks built primarily for Voice traffic to one that will support increasingly large volumes of data and video traffic. The rapid surge in data traffic is therefore forcing mobile operators to focus on reducing the cost per bit of transporting data traffic over the backhaul network and into the core network.

As a result, mobile operators are left scrambling for more flexible mobile backhaul solutions as this data surge necessitates a network infrastructure refresh every 18 to 24 months. A new report from Juniper Research has revealed that the world's mobile operators will need to spend a combined US\$840 billion over the next five years to upgrade their backhaul networks for the coming data deluge.

Carriers have therefore turned to Ethernet as the medium to cushion the impact of this demand for mobile broadband. Carrier Ethernet is a good option for mobile backhaul technology because it offers an all-IP network for data traffic, which is flexible, scalable (even in small steps) and quickly implemented. Ethernet is also highly adaptable as it can run over copper,

fibre optics or microwave media, allowing flexibility of deployment.

Over time, the industry has come to accept that Carrier Ethernet will be the key technology for mobile backhauling as it is the ideal all-IP complement to the growth of LTE networks. Industry analyst Michael Howard of Infonetics Research has concluded that Ethernet is the only solution for next generation mobile backhaul networks. “When you take into account the popularity of iPhone, plus a new wave of competing feature-rich mobile devices, you can see the operators are under pressure to deliver a lot more bandwidth in a highly cost-competitive market. Legacy TDM and ATM (*Asynchronous Transfer Mode*) backhaul solutions cost too much and don't offer anything to match the scalability and other advantages of Carrier Ethernet,” he was quoted saying in India's Voice and Data magazine.

In a separate report, Richard Webb, directing analyst for microwave at Infonetics Research said that with TDM microwave spending declining significantly every year from here on, as service providers move to packet technology, the overall mobile backhaul equipment market is expected to grow to US\$8.2 billion by 2014, based mainly on the strength of Ethernet equipment. Mr Webb also added that with operators increasingly recognising Ethernet-based solutions as the best available means of accommodating backhaul traffic growth, and with microwave products now achieving 1Gbps in some scenarios, the Ethernet-only microwave segment is poised for rapid growth over the next few years, outperforming hybrid TDM/Ethernet solutions.

In conclusion, with the fast-paced evolution of both mobile phones and PCs, the one true fact remains - there has never been a better time to be a consumer, with so much power at your fingertips, be it either next to your ear or at your desk. The development of the global Ethernet network helps to facilitate this evolution, supporting ever-increasing communications demand in future. ●



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Mobile backhaul networks - the next generation

by Robin Mersh and Nikhil Shah, Broadband Forum

The backhaul network between the Radio Access Network and the mobile core must be expanded to meet the demand of bandwidth-hungry data services. It has to be flexible enough to cope with the transition period and co-exist with 2G, 3G and 4G technologies. The Broadband Forum proposes a framework for the backhaul that is based on IP MPLS, which has proven to be as reliable as current technologies. The framework recommends star-shaped topology (instead of hub-and-spokes) and L2/L3 VPN. Using MPLS has also the advantage of existing, well-developed management tools.



Robin Mersh is Chief Executive Officer, Broadband Forum. Mr Mersh joined the Broadband Forum as Chief Operating Officer in July 2006, and was promoted to Chief Executive Officer in July 2010. Mr Mersh has worked in the telecommunications industry for over 18 years, starting at Cable & Wireless and then moving on to BT. He has also worked in business development and alliance management for various OSS software companies in the United States, mainly in network and service provisioning and activation, where he negotiated and managed several large OEM agreements.

Originally from Cambridge in the United Kingdom, Robin Mersh received a Bachelor of Arts degree with honours from Queen Mary and Westfield College, University of London, in 1992.



Nikhil B. Shah is Chairman, International Development, Broadband Forum. Mr Shah is Head of Wireless Segment Development for Asia/Pacific region at Juniper Networks. He is responsible for developing wireless business, strategy, solutions and partnership initiatives. He also served on the board of Broadband Forum from 2006 to 2010, where currently he is a Chair of International Development. Mr Shah has over sixteen years of global telecom industry experience. He lived in the US for twelve years before moving to Asia. He is a frequent speaker at various industry conferences.

A traditional TDM approach to mobile backhaul networks has its limitations, making it difficult to meet the evolving demands of mobile networks. IP/MPLS (*Multi Protocol Label Switching*) has proved itself in both fixed-line services and in mobile core network. The transitioning of mobile backhaul infrastructures to standard-based IP/MPLS solutions allows operators to evolve their networks from 2G to LTE at their own pace. This aims to reduce operating expenses for mobile operators, allows them to scale efficiently, and most

importantly, enables them to themselves to compete effectively for the explosion in demand for data-rich mobile services.

Mobile network operators across the globe are experiencing enormous growth - although voice communications are growing in a linear fashion, the demand for data services is increasing exponentially, with consumers increasingly opting for bandwidth-hungry mobile services such as Internet access, photo sharing and music downloads. At the same time, mobile operators are under economic

pressure, and their backhaul networks are experiencing bottlenecks due to scalability, flexibility, and cost concerns. Operators are therefore looking for ways to future-proof their backhaul architecture to support 3G traffic, with the global wave of 4G LTE (*Long-term Evolution*) and WiMAX adoption. They also want to be able to provide a clear migration path towards all-IP 4G networks.

More and more consumers are accessing an increasing number of applications via the mobile network rather than over wires,

creating greater pressure on the backhaul network to meet the growing demand and to maintain end-to-end-user experience. While many consumers are still migrating from 2G to 3G, operators are already exploring and adopting 4G (LTE).

LTE offers high data rates at a reduced price per bit, better spectrum efficiency and latency. LTE also offers expected throughputs in the range of 100Mbps and latency should be in the range of 20ms. This can offer a rich user experience, comparable to that of fixed connections. LTE will therefore enable new business models around emerging services such as real-time online gaming, HD video streaming, video blogging, and Peer-to-Peer file exchange.

Mobile Backhaul is a crucial part of the mobile network, linking the Radio Access Network and the mobile core network. In designing the end-to-end mobile infrastructure, no area of the mobile network feels the strain more than backhaul networks - in scalability, performance, cost and ease of migration from one generation to the next.

A new approach to mobile backhaul infrastructure

Cell sites are becoming increasingly complex as operators adopt 3G technologies such as High Speed Packet Access (HSPA) and Evolution Data Optimized (EVDO) and already look towards 4G technologies. Even as they migrate to these next-generation services and architectures, they realise that 4G technologies (IP/Ethernet) and emerging 3G (ATM) services will need to coexist with legacy 2G (TDM) for some time. However, as traffic for high-bandwidth data services continues to grow, operators must find ways to reduce the mobile backhaul costs. US mobile operators have typically used leased T1/E1 lines in their mobile backhaul networks. In Western Europe and the greater part of Asia-Pacific, microwave-based (with TDM encapsulations) backhaul is widely deployed. TDM is known for its reliability, but it is expensive and does not scale easily.

Clearly mobile operators need a new approach to scale their mobile backhaul networks cost-effectively and many are shifting to Ethernet-based connectivity at cell sites. This approach, in addition to being highly scalable and reliable, must bridge the gap between legacy and next-generation networks and services - and provide the flexibility to support both.

The Broadband Forum - defining next-generation mobile backhaul networks

The Broadband Forum, a global standards organisation focused on end-to-end IP network optimisation, is tackling these backhaul challenges via its MPLS in Mobile Backhaul Initiative (MMBI). The Forum members are working together to define standards-based, interoperable architecture frameworks for 2G and 3G networks and for LTE networks. The MMBI proposes a framework for the use of IP/ MPLS technology to transport backhaul traffic over access aggregation and core networks. It describes possible deployment scenarios, provides recommendations on how to deploy MPLS in these scenarios, and describes how to design flexible, scalable and economical backhaul network.

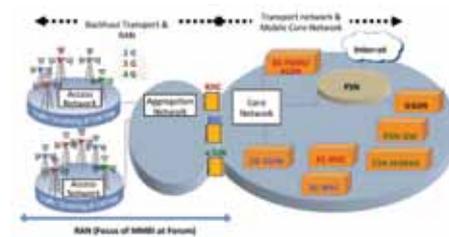


Figure 1: Scope of MPLS in Mobile Backhaul Initiative

The MMBI architecture allows operators to leverage their existing last mile access technology, such as TDM, Point-to-Point microwave links, DSL and Satellite. It is flexible and offers various options that enable the deployment of MPLS as close to cell sites as will fit within their architecture. Satellite is expensive but essential in regions such as Africa and remote parts of India, where fibre or copper are unavailable or uneconomical.

IP/MPLS is increasingly seen as the best strategic solution for backhaul. It offers the combination of cost, scalability and flexibility that mobile operators need in order to leverage existing investments while building out capacity for growing data traffic. It also supports features such as:

- co-existence of TDM (2G), ATM (3G) and IP/Ethernet (4G) transport;
- ATM-like Quality of Service (QoS) and traffic engineering techniques;
- rapid service restoration after failure detection;
- and, future-proof investment for migrating from 3G to all-IP based 4G/LTE.

Many equipment vendors offer MPLS features within their products, but the lack of a commonly agreed framework, architectures and deployment scenarios often results in additional, avoidable costs. To address this, the Broadband Forum now offers a Certification program for vendors, enabling service providers to choose standards-based, deployment-ready products and expediting the deployment of backhaul solutions.

Evolving from 2G/3G to 4G (LTE) in the backhaul network

The Broadband Forum defines two architecture frameworks, one for 2G/3G and the other for 4G/LTE, corresponding to the 3rd Generation Partnership Project (3GPP) work. In 2G/3G RAN (Radio Access Network), the base transceiver stations (BTS), or simply base stations, handle the radio interface with the mobile station. The base station controller (BSC) manages one or more base stations to provide control functions, such as radio channel setup and handovers. A hub-and-spoke topology enables communication from base stations to controller and controller to base stations, as shown in Figure 2. This topology is also known as centralised topology. In this architecture, T1/E1 connections (TDM for 2G and ATM for 3G) between BTS and the BSC are carried over IP/MPLS-based packet backhaul using pseudo-wire technologies.

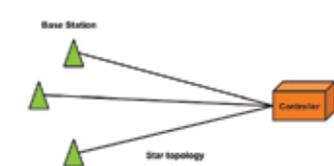


Figure 2: 2G/3G RAN Topology

In LTE RANs, the base station itself contains controller functionality and communicates with another base station directly via any-to-any topology. LTE base stations communicate with access gateways (aGWs) via a star topology, as shown in Figure 3.

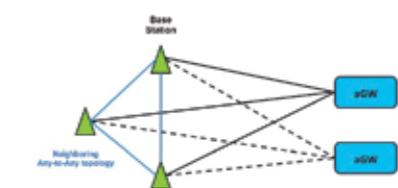


Figure 3: All-IP LTE RAN Topology

Coexistence, interoperability, roaming, and handover between LTE and existing 2G/3G networks and services are inherent design

goals, so that full mobility support can be given from day one. In LTE networks, IP is the only protocol used to support connectivity between the different mobile nodes as defined by 3GPP. To achieve any-to-any topology for LTE backhaul, the Broadband Forum has recommended leveraging L2VPNs (*Layer 2 Virtual Private Networks*) and L3VPNs (*Layer 3 VPNs*) such as VPLS (*Virtual Private LAN Service*) and BGP (*Border Gateway Protocol*) in BGP/MPLS-based VPNs.

Hybrid IP/MPLS and TDM backhaul architecture for 2G/3G

In a hybrid model, carriers can build out capacity to accommodate the data traffic growth without having to re-engineer the voice network. Operators can leverage cost-effective alternatives such as Metro-Ethernet networks or existing assets to support data traffic (e.g. using the DSL infrastructure to offload data traffic from the cell site). They are thus able to develop greater familiarity with IP/MPLS technology and integrate voice traffic into the packet-based infrastructure at a later date.

Timing synchronisation

Synchronisation is critical in order to maintain good voice quality, reduce interference and manage call handovers between base stations. There are several approaches to achieve this timing synchronisation, including Synchronous Ethernet, Adaptive Clock Recovery and IEEE 1588 v2. The Broadband Forum is currently assessing various requirements to support clock distribution to base stations, including frequency, phase, and time synchronisation and provides recommendations in terms of QoS (*Quality of Service*), resilience and efficient distribution based on topology (point-to-point or point-to-multipoint).

Matching SONET/SDH type reliability with IP/MPLS

SONET/SDH (*Synchronous Optical Networking/Synchronous Digital Hierarchy*) technology is known for its high reliability and fast recovery from failures, and carriers expect new packet-based backhaul to match this level of resilience. IP/MPLS has already proved itself in core networks to be as reliable as SONET/

SDH. The combination of Fast Re-Route (*FRR*) and carefully engineered primary and secondary Label Switched Paths (*LSPs*) allows IP/MPLS-based network to recover in tens of milliseconds - on a par with SONET-based networks.

Managing and troubleshooting IP/MPLS-based networks

In moving to a new transport technology, carriers need to feel confident in its Operation, Administration and Management (*OAM*) tools. With years of successful service provider deployments around the world, IP/MPLS includes a robust set of standards-based OAM tools that greatly reduce troubleshooting time, such as MPLS LSP-Ping, trace route, Virtual Circuit Connectivity Verification (*VCCV*) - test pseudo-wire state as well as Bidirectional Forwarding Detection (*BFD*) - a hello protocol to connectivity.

The Broadband Forum continues to advance the specifications and certification of mobile backhaul technologies that enhance interoperability and ensure that next generation backhaul networks meet the future demands of the industry. ●

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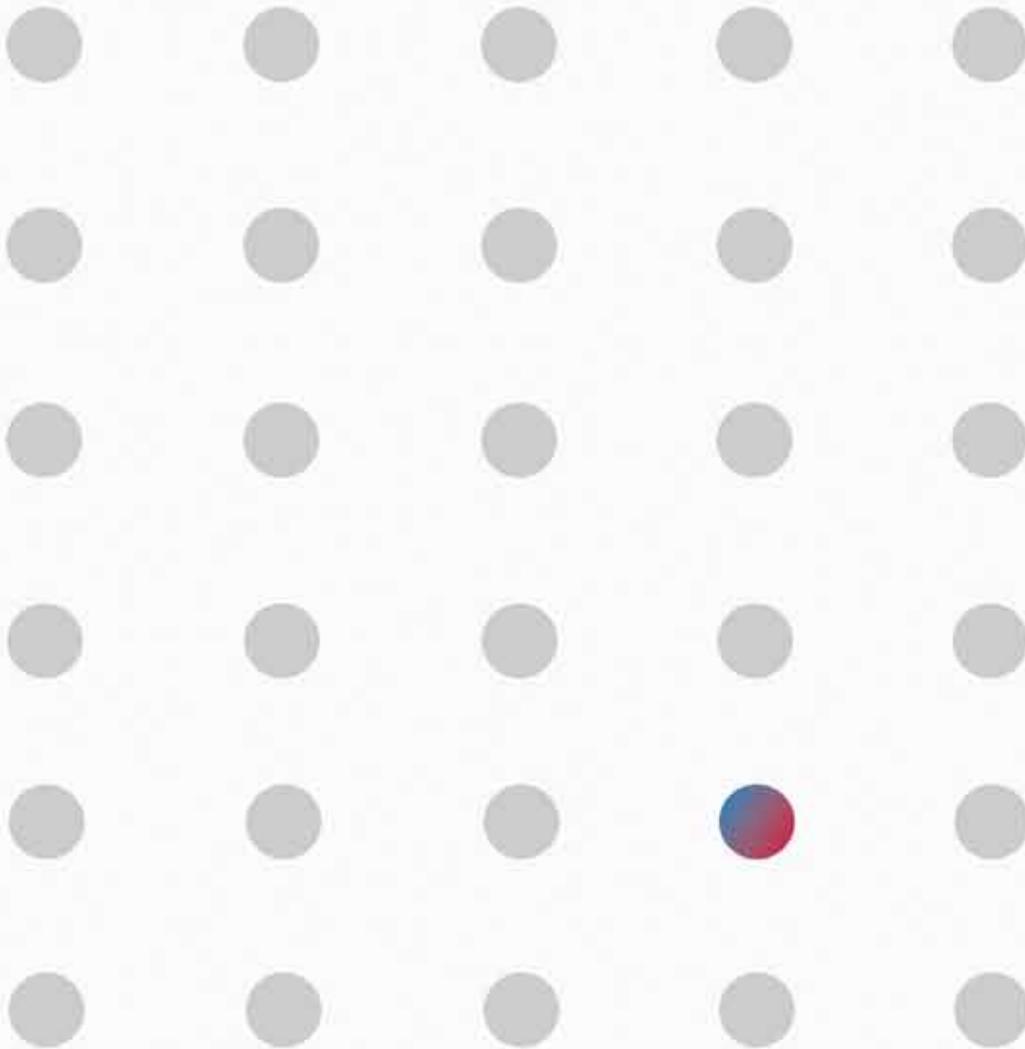
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