Telecoms Infotech Forum

Briefing paper

Fixed Mobile Convergence

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Telecoms InfoTechnology Forum

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Fixed Mobile Convergence (FMC)

Convergence of access, services and applications across fixed and mobile networks marks an effort to remove obstacles created by fragmented network domains, protocols and devices. Informa Telecoms & Media estimates that there will be 92 million FMC subscribers and US$28 billion in FMC services revenue globally by 2011, and that 47 million units of dual-mode handsets which can access both fixed and mobile networks will have been sold by 2011. Nevertheless, it is important to note that the above subscription figure will still only constitute three per cent of overall global subscriptions, and the above handset unit figure only five per cent of global handset sales.[1] Even with operators moving toward IMS adoption and NGN implementation true end to end convergence at the network level around IP remains a long term goal, with Ovum expecting OECD countries to have the fixed network elements of next-generation networks in place by 2012, but the mobile infrastructure not until 2020.[2] So the incipient phase of FMC is more likely one of trepidation and testing, especially when it comes to gauging customer demand and preference for converged services, never a simple task. And if returns for FMC services are poor there is the risk that investment will not be sustainable. Technology is an enabler but operators' embrace of FMC will be driven by the business case each service provider can build, and of course by the actions of its competitors. Against this backdrop, regulations, as they stand, can either act as a facilitator of FMC, or as an inhibitor.

Convergence theoretically could have occurred years ago with the advent of digitalization but it is with the ubiquitous deployment of broadband technologies (fixed, wireless and fixed-wireless), access devices and services in advanced markets that convergence has become a pervasive possibility. With the widening of distribution channels for content and applications a services-based argument is possible.[3] Pre-broadband convergence did not fare well and past failures cast doubt over consumer demand for future FMC services. For example, some like Telstra offered unified fixed and mobile billing but demand proved weak as consumers regarded the fixed phone as primarily for business use and the mobile phone for personal use and did not want the two bills combined. Other examples include Cingular Wireless's FastForward initiative: Begun in 2003, FastForward enabled consumers to place their cellphones in a cradle and make wireless calls over their home phones; however, by the end of 2005, the company was phasing the service out, as so few consumers were using it.

Recent surveys try to paint a different picture altogether of consumer and business demand: one argues that bundled offerings[4] are ahead of fixed-mobile network integration (i.e. technology convergence) and will play an important role in driving full convergence; research commissioned by AT&T shows the desire to improve customer relationships is a key driver for enterprises to move to converged networks;

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[1] In terms of regions, the research company predicts the U.S. will lead the way with 33.2 million subscribers by 2011 compared with 30.6 million in Asia Pacific and 26.2 million in Europe. (April 2006)

[2] These investments are partly driven by the long run opportunities to reduce capex and opex.

[3] Where quality of service is one variable, BT Infonet says it can provide application-specific SLAs.

[4] For integrated operators, those with both fixed and mobile arms, margins will be lower on bundled packages as a result of price discounts, but the higher customer loyalty to bundled services will reduce the enormous subscriber acquisition costs, and that should offset the lower margins. According to Julio Linares, Telefonica's director general for business development and synergies, 'fifty percent of [Telefonica's] revenues by 2009 will come from bundles and integrated solutions'.

and the large number of mobile workers within American and European enterprises is encouraging mobile operators to push their fixed-mobile substitution strategies.[5] Other surveys depict a growing group of 'cord cutters', people who, attracted by 'big bucket wireless calling plans', use their mobile phone as their only phone.[6]

The long term vision for convergence is for end users to access any communications service from any device, anywhere at broadband speed. But with the initial focus of FMC services on voice and uncertainty over wireless data services, such as mobile TV ('place shifting') or video telephony,[7] demand will be that much more difficult to predict, which leads some to believe that the current push is more industry-driven than customer-driven.[8]

The questions that arise over FMC acceptance in general – as laid out below – give an indication that operators might adopt a more moderate and deliberate pace, in their response to the threats and opportunities presented by FMC, than that often found in the headlines.

> Very little is known about consumer buying patterns and preferences, even when it comes to voice. For example, other than lowering cost by substituting low-cost VoIP for expensive radio minutes, what are the key drivers of converged services? What is the customer buying experience? Are these services integrated, simple, user-friendly and easy to buy? Are existing and new users easily supported? Early deployments of FMC have shown that these aspects have been quite challenging. Near-term FMC services can help provide a reality check on many common technology components. These include devices, voice over Wi-FI, back-office systems support and mobility management platforms. (*Telephony*, 26 June 2006)

Fixed And/Or Wireless

In the November 2005 TIF 'Broadband, Broadcast and Content: Where Does Hong Kong Stand?' a speaker from a European fixed-line company described mobile operators as 'bankrupt utilities'[9] and noted that they plied their trade in a sector that was mature and saturated. The speaker went on to allude that the pendulum had swung in favor of fixed-line operators, that they are best positioned to deliver large bandwidth and manage the distribution of rich media content. In the face of, among others, Local Loop Unbundling, Naked DSL, VoIP, Fixed Mobile Substitution (FMS) and eventually Fixed Mobile Number Portability (FMNP) national telcos and

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[5] According to the Yankee Group, '38% of all workers in the US, and 40%-45% in Europe are mobile workers: in other words, they spend more than 20% of their time away from their primary workspace.' (*Total Telecom*, 1 July 2006)

[6] Leap Wireless (US) offers customers an all-you-can-eat wireless plan starting at US$40 per month that provides unlimited local and long-distance calling and, according to Leap, 52 per cent of its Cricket customers have 'cut the cord'. (*Wireless Week*, 1 July 2006)

[7] '"There's a human aversion to video calling," said Neil Montefiore, chief executive of MobileOne, which is now offering customers free video calls between Singapore and Malaysia to spur the market.' (*International Herald Tribune*, 31 July 2006)

[8] 'Mass-market adoption will require simple services delivered at a significant discount. In our view current plans are a long way from delivering ready-to use services. There are opportunities, but we are concerned that current investment plans may substantially overestimate the potential rewards.' (Bridgewell, June 2006)

[9] http://www.trp.hku.hk/tif/papers.php

incumbents in Europe have launched new fixed-mobile services to retain customers and protect market share.[10]

BT, for example, plans to spend 10 billion pounds to roll out an all IP network (21CN),[11] with the aim to switch off its national PSTN network by 2009, and in 2005 it launched the Fusion service which offers a dual-mode handset that uses Unlicensed Mobile Access (UMA) technology to encapsulate circuit-switched GSM traffic for transmission over a fixed-line network, initially using a Bluetooth connection to a DSL router and now transitioning to a WiFi hub in the home. Fusion charges users at lower fixed-line rates when they are in or around the home, and at higher mobile rates via an MVNO service on the Vodafone network when outside. But short-term subscriber gains have been less than impressive and 'BT Fusion has reported just 25,000 subscribers in its first eight months of service, for a monthly acquisition rate of just over 3,100, according to Current Analysis.'[12]

Notwithstanding BT Fusion's early returns, more a testament to the immaturity of UMA services experiencing teething difficulties,[13] integrated operators such as France Telecom, Telecom Italia, and Deutsche Telekom have also launched, or are planning to launch, FMC services based on UMA technology; France Telecom is repositioning its fixed and mobile broadband services under the Orange brand;[14] Deutsche Telekom began, in July, to sell a GSM-DSL-WiFi bundle, T-One, centered around a subsidized dual-mode phone (from an Asian supplier); and Telecom Italia's new UMA-based service, Unico, lets customers call any fixed-line number in Italy and any Telecom Italia Mobile phone from their fixed line, dual-mode home phone[15] (and two TIM numbers, plus one PSTN number while using GSM away from home) for Euro15 per month, plus the fixed line rental fee. Whether any of these services will meet with greater initial success than BT's Fusion is still anyone's guess.[16]

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[10] 'Convergence, in all likelihood, is not going to be about wealth creation. It's going to [be] about wealth maintenance.' (*Telecommunications International*, 1 July 2006)

[11] 'Once BT's network is fully transitioned to IP [scheduled before the end of the decade] it too will be able to compete aggressively [in the UK] by having a far lower cost base [managing one network rather than the current 16].' (*Telecommunications International*, 26 January 2006) BT is also building wide-range WiFi networks, with a radius covering kilometers, and attaching WiFi transmitters to 'lampposts, phone boxes and external walls' in 20 'wireless cities' in the UK.

[12] *Total Telecom*, 28 August 2006. 'The reaction's been a bit lukewarm to be honest - just 30,000 people have signed up. While technically there's nothing wrong with the service - the handover between the networks is fine and so on [*but that should not detract from the challenge of interoperability even in a standards-based world ed.*] - the pricing just doesn't seem to be floating everyone's boat. The whole idea around VoIP for consumers is about saving some pennies, which this service doesn't really do. After all, if you've got a phone that does VoIP calls, wouldn't you be looking for a Skype-style free service?' (*Silicon.com*, 23 June 2006) The market reaction might change once BT starts making GSM-WiFi phones available in autumn 2006. In September 2006 BT introduced BT Corporate Fusion which will stitch together a company's WiFi network, cellular network, corporate directory and PBX functionality.

[13] New sometimes expensive handsets are required, a WiFi-enabled hub must be set up in the home, but according to Current Analysis 'BT Fusion will help operators play out a longer-term strategy to "put hooks" into the DSL customer base and shepherd more voice minutes over lower-cost IP.'

[14] In its home market, FT is being challenged by Iliad which launched a GSM/WiFi fixed mobile convergence (FMC) product in May 2006.

[15] Using a Samsung UMA and WiFi enabled handset that can also send and receive email. UMA is somewhat limited (in terms of subscriber control) by a circuit-switch orientation but will give way to SIP when replaced by an IMS-based solution.

[16] Changes, when they do happen, can happen at a dizzying pace. In September 2006 Telecom Italia decided to put its mobile arm TIM up for sale as it tries to transform itself into a media company that

With regulators lifting retail price controls on incumbents, relying more on market competition and shifting their focus to wholesale pricing, most national operators have received permission for their FMC services. Telecom Italia's Unico remains an exception, with the Italian regulator, Agcom, having placed a 120-day moratorium on the release of the service in order to investigate whether competing operators can reproduce Telecom Italia's offer and to ensure that alternative operators can compete when it comes to offering bundled services from a single provider.[17]

TeliaSonera (Sweden) is trialing UMA services in Denmark, and is going after the enterprise market with a converged offer, trialing an IP PBX call manager from Cisco and Nokia that provides mobile and WLAN access to traditional PBX functions. In the UK, France Telecom, under the Orange banner, is offering 'free' broadband services for customers who sign up to high-end post-paid mobile contracts.[18] These moves attest to the development of different markets, different strategies. While an incumbent with a large fixed-line base to protect in its domestic market may choose to bundle mobile and fixed services, it is likely to take a very different tack in countries where it wants to protect its mobile assets or enter new markets. Thus, Orange's unified *brand* does not translate into a unified strategy on convergence: 'Our approach is quite country specific... It is both FMC and FMS.'[19] The Orange strategy is reflective not only of national differences in competition and pricing levels, but also Orange's relative market positions and assets. And while T-Mobile has launched an FMC service in Germany, and has plans to launch in both the US and in the UK, it views convergence as a *distraction* for mobile operators, with 'the risk of confusing consumers because convergence is a complex area. Companies need to be clear about what benefits convergence brings. We'd rather invest in delivering a mobile broadband service. We have got to ask ourselves whether convergence could be a distraction rather than a benefit. We're never going to say never but at the moment we're saying the way forward is mobile and focusing on simplicity.'[20]

For a mobile operator, the FMC outlook has often been described in bleak terms, with voice no longer a future earner, and new revenue streams from mobile TV or mobile wallets failing to materialize. In some respects, 3G operators mis-marketed the technology by stressing its superiority, and consumers were turned off by poor handsets, poor coverage, and poor 2G-3G handoff.[21] Whereas just a few years ago, pundits thought fixed network operators were finished, the rush now appears in the opposite direction. Will mobile operators end up as acquisition targets (beat the threat

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distributes music, films and TV over its broadband Internet service. In 2005 Telecom Italia acquired the 44 per cent it did not own in TIM to bet the group future on providing converged services, the triple offering of mobile, fixed line and broadband services.

[17] In Italy there has been concern over an operator dominant in one market who might seek to gain undue advantage in another market, and that has translated into compulsory 'margin squeeze' test for bundles.

[18] Free is a word abused by marketers the world over and can be a misnomer. In the UK broadband provider Carphone Warehouse was told by the Advertising Standards Authority to withdraw its advertisement offering a service billed as 'free forever'.

[19] Robert Swift, head of voice, Orange Business Services. Cited in *Total Telecom*, 1 July 2006.

[20] *Marketing Week*, 27 July 2006.

[21] Japan remains an exception where 3G has succeeded because KDDI, in part, unlearned the 2G lessons for 3G by adopting a mass market, consumer-oriented approach instead of one focused on early adopters and corporate users.

by joining in) or do they have certain competitive advantages left to leverage off as they seek to reposition themselves in a converged world? Responses differ.

On the one hand, Vodafone, the word's largest mobile operator, has renounced 3G and the pure mobile play in May 2006 in favor of gaining 10 per cent of annual revenues over the next 3-4 years from new 'Mobile Zone' businesses, including converged fixed-mobile Internet services targeting small business customers. Vodafone announced a deal in September 2006 to lease wholesale capacity from BT via BT's IP Stream product and enter the UK fixed-line broadband market, rather than install its own kit at BT exchanges through LLU as Orange, O2, BSkyB and Carphone Warehouse have chosen to do. On the other hand, *3* sticks to its guns and continues labeling FMC technology a niche product.[22]

Theoretically, seamless mobility and handover between GSM and WiFi networks could allow cellular operators to unload networks that are at near capacity by moving customers over to (unlicensed) WiFi when inside buildings[23] or within range of a hot spot ('to offload minutes from overtaxed voice networks'), release radio access network capacity and improve indoor coverage. This could be coupled with the use of WiMax for backhaul to address operational inefficiencies associated with traditional approaches to wireless network backhaul that relied on multiple circuit-switched T1 or E1 connections. But overcoming the reluctance to cannibalize revenues from normal cellular calls which are typically 3-10 times higher than fixed line prices for many services and account for 80 per cent of most mobile operators' revenue has been difficult. In Germany Vodafone, O2 and T-Mobile have struck back with some success with FMS services offering homezone pricing services that enable subscribers to make cheap mobile calls at home.[24]

But price pressure looms from WiFi VoIP, MVNOs (encouraged by MNP) and regulatory intervention on mobile voice termination, roaming and SMS charges. In July 2006 Skype-enabled WiFi-only (single mode) handsets were launched by manufacturers Belkin, Edge-Core, Netgear and SMC. Skype expects to see (dual mode) handsets with GSM, WiFi and the Skype software client for free Internet calls on the market by the end of 2006. In Taipei the city's Wifly service (a part of the government's M-City project) has now introduced a Skype-like application in a bid to attract more users. In May 2006 Nokia added Google Talk to its Internet Tablet device. And with the possibility of Apple adding WiFi VoIP capabilities to its iPods,

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[22] 'Speaking at the Mobility Summit in London, 3 strategy director Bruno Duarte expressed his doubts that consumers are really crying out for a single mobile and landline device. He said: "From a UK mobile perspective we are much more skeptical about what is called fixed-mobile convergence. Beyond bundling and cost saving, we don't see much happening."' (*Silicon.com*, 4 July 2006)

[23] The percentage of mobile phone calls made in-building is debatable but Merrill Lynch estimates that 'with 70% of mobile voice calls made within a building, convergence will mean that calls within range of WiFi networks in buildings will fall from mobile prices (European average of EUR 0.15) towards fixed line prices (EUR 0.03 per minute)'. Swisscom says 50% of mobile calls on its network are made at home.

[24] In August 2006 when the German regulator agreed with the European Commission to force Deutsche Telekom to allow rivals to buy bit stream access to its VDSL network at regulated prices access, Vodafone decided to reintegrate fixed-line operator Arcor to develop a more comprehensive FMC offering that will include broadband Internet, IPTV, fixed-line services in addition to its Zuhause homezone service.

ON World predicts that there will be 100 million consumer mobile VOIP users by 2011.

Local loop unbundling (LLU) and naked DSL, which allows consumers to take a broadband service without having to subscribe to a monthly fixed-line voice rental from the same provider, are also having an impact in terms of new service bundles. For example, the unbundling of BT exchanges has enabled mobile operators in the UK – such as O2 and Orange and even satellite operator British Sky Broadcasting (BSkyB) – to offer DSL services as well. In May 2006 Telekom Austria said it would offer naked DSL connections to householders prepared to sign up to or stay with its Mobilkom mobile network.[25] In the US, cellular provider Sprint Nextel has begun striking up partnerships with cable operators Comcast and Time Warner that allow customers to remotely program their home DVRs with their handsets.[26] Sprint Nextel is also building the first nationwide WiMax network in the US, in tandem with Intel, Motorola and Samsung.

Regulation

Convergence between broadband fixed and broadband mobile, not so much in technology terms, but in business terms, could herald a major restructuring of the industry.

In the UK, O2 has purchased broadband provider Be for 50 million pounds and cable operator NTL has acquired Virgin Mobile. Many are speculating that small European altnets like Jazztel, Iliad, Fastweb and Tiscali are also now ripe for acquisition. What will be the regulatory reactions to such moves, if they do happen, and how will regulators contend with the new owners of spectrum when it comes to issues such as spectrum trading and content regulation?[27] Fixed and mobile operators have traditionally been regulated in different ways when it comes to interconnection, pricing, numbering, etc and this has, in some instances, caused regulatory asymmetries. Are these asymmetries now a barrier to further FMC?

National regulators in the EU, influenced by competition concerns and regulatory pressures from fixed operators, are now reviewing markets such as mobile termination, mobile roaming and SMS.[28] Not only is the level of charges a concern,

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[25] According to Boris Nemsic, chief executive of Telekom Austria, ‘mobile voice is so cheap that VoIP is no longer an advantage to the broadband consumer’. (*Total Telecom*, 26 May 2006)

[26] They can also receive pre-recorded DVR programs ‘on the road’. Time Warner, itself, has more than 1.1 million cable telephony customers. Users who subscribe to cable voice services will eventually be able to extend that service to their cell phones, giving users a single phone number and single voice mail service. After divestiture, Sprint’s former local division Embarq, a new ILEC, launched its own wireless service through an MVNO with its former parent which already offers an integrated voice mail function, combining mailboxes of wireless and home phone lines.

[27] In 2004 Ofcom authorized spectrum trading with no obligation on the way in which the spectrum was to be used. Providers of competing technologies are encouraged to share bandwidth. Spectrum trading would facilitate exit strategies and give investors a means of transferring spectrum to alternative users. In June EC telecom commissioner Viviane Reding announced the intent to create a European spectrum trading agency.

[28] French regulator ARCEP can now regulate SMS termination, with the most likely effect being a lowering of wholesale SMS revenues, rather than a fall in SMS retail prices due to the dominance of the three leading mobile operators (SMS accounts for 8.5% of each operator’s total revenue). In February 2006 EC telecom commissioner Viviane Reding proposed lowering roaming charges by up to 70% within the EU via regulation. ‘Originally, Mrs. Reding had wanted to abolish all charges on the

but the current charging principles based on Calling Party Pays (CPP) may weaken cross platform facilities based competition (and the incentives to invest in converged networks), thereby making FMC interconnection difficult and expensive to implement.[29] Some convergence (or 'harmonization') of termination rates has come into force across the EU since the adoption of a regulatory framework for mobile communications in 2003. However, the spread amongst the EU 25 markets – from $0.07 to $0.19 – is still quite wide, as is also the case even between operators within some national markets.[30]

UK regulator Ofcom set the benchmark in 2004 at around 8 Euro cents.[31] The Dutch regulator has proposed 5.5 Euro cents for mid-2008 for 2G only, while Ofcom is aiming to set a price for a fully integrated 2G-3G operator by April 2007. The Polish regulator UKE plans to proceed with a 30 per cent cut in mobile interconnection fees while demanding that the incumbent TP cut its wholesale broadband Internet and line rental tariffs. (No. 3 mobile operator Polkomtel has announced plans to enter the fixed-line market.)

This whole process could be rendered superfluous by a move to BAK (Bill and Keep), which European regulators have been reluctant to impose.[32] Bill and Keep is what IP network operators do, exchanging IP traffic through peering and transit arrangements, where neither network operator charges the other network operator for call origination or for call termination.[33] FMC, and the association or merger of fixed and mobile operators, could also be facilitated by treating fixed and mobile operators as having equal status in terms of their (licensing) rights and obligations. In the future this might be abetted through the introduction of unified carrier licensing (UCL).

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subscriber receiving a call on his or her mobile phone whilst traveling abroad, especially with mobile phone companies now hauling in scandalous profits approaching the 500% mark. But since there are fixed costs for mobile phone operators that cannot be reduced, the Commission would like to cap charges to users at 30% of real costs.' (*Europolitics Information Society*, 1 September 2006) Many complain about high price of making international calls to mobiles in Europe but in Hong Kong the rate for incoming IDD calls is often cheaper than for fixed.

[29] In evaluating the best model forward for Hong Kong, a consultant had this to say about CPP, 'we can also reject the EU model (in which the calling party's network pays) on three main grounds. It generates very high transactions costs; there is strong empirical evidence that it results in lower calling rates and reduced economic welfare when compared with other models; and again it does not provide a graceful evolution towards future developments'. *Review of the Regulatory Framework for Fixed-Mobile Convergence in Hong Kong*, Ovum, 28 April 2006, downloadable at http://www.ofta.gov.hk/en/fmc/main.html

[30] Mobile operators in Europe charge mobile termination rates well above cost and then use the supra normal profits to subsidize handsets and offer discounts (this is called the waterbed effect or distortion).

[31] Setting this benchmark, and price controls, has come at a very high transaction cost as Ovum states that UK regulator and operators have between them spent HK$1000 million on setting a mobile termination rate (MTR) over the past 8 years.

[32] The US market has a reciprocal compensation interconnection which, for some, is a stronger enabler of FMC than CPP.

[33] It is argued by some economists (most noticeably S.C. Littlechild in an article in *Telecommunications Policy*, June-July 2006) that BAK would allow competition and customer choice, instead of regulation, to determine how to pay for incoming calls. Others argue that BAK would also create more appropriate incentives for investment in new technology by both fixed and mobile operators (Ovum consultancy for OFTA).

Russia has recently implemented a CPP system and the immediate effect appears to be messy, perhaps strengthening the argument for BAK. Mobile users are no longer charged for receiving calls so many mobile operators are threatening to introduce connection fees for outgoing calls, claiming CPP will cost them US$1 billion per year in lost revenue. The three largest mobile players[34], with 88 per cent of the total subscriber base, are lowering interconnection fees between their networks while raising them for smaller operators. Russia's Federal Tariff Service has set the price of fixed-mobile calls at 1.5 roubles (US$0.06) per minute, with 0.95 roubles going to the mobile operator (to compensate for the move) and a percentage of the remaining 0.55 roubles going to the fixed-line operator.[35] If VimpelCom, MegaFon and MTS have reasonably good coverage, CPP might accelerate FMS in Russia. In Mexico, which implemented CPP in 1998 for local fixed-to-mobile calls, the regulator Cofetel has tried to extend CPP to cover domestic long distance calls to mobile phones. But fixed line operators Avantel, Alestra and Axtel have refused to go along with the scheme, fearing that they would only be subsidizing the migration of fixed line to mobile phones, and are demanding instead that their interconnection fees with mobile operators be reduced.

Hong Kong has a Mobile Party's Network Pays (MPNP) mechanism, where the mobile subscriber bears the full cost of not only a fixed to mobile call but also a mobile to fixed call.[36] MPNP was introduced in the 1980s at a time when a mobile phone was considered a luxury product and a Value Added Service to a fixed-line phone and when the tariff for local fixed telephony service was capped at a flat rate below operating cost and cross-subsidized by IDD revenues.[37] So MPNP is the result of regulatory intervention and not a market outcome. With a dual-mode handset that can switch a call from a WiFi network to a GSM network mid-call, MPNP becomes an anachronism. In Hong Kong the regulator OFTA has published a consultation document that includes the suggestion from the consultant for a move to a BAK mechanism, and proposing to give operators two years to transit to the new system.[38]

Future Strategies

The introduction of FMNP would be another accelerator of FMC. But most countries, if they have not already, are preparing for Mobile Number Portability (MNP) first. FMNP for mobile operators would then be introduced at a later date.[39] Despite being one of the first places to introduce MNP, Hong Kong still only allows fixed operators

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[34] VimpelCom, MegaFon and MTS (Mobile TeleSystems)

[35] Prior to CPP, fixed-line users were not charged for making fixed-to-mobile calls which meant that fixed-line operators did not gain revenue for those calls, instead fixed-line users paid a monthly flat fee regardless of how many local calls were made. CPP is intended to help fixed-line operators increase their earnings and reinvest them in their networks.

[36] One of the less savory aspects of the current Hong Kong model is that it 'positively encourages voice SPAM on fixed to mobile calls', with one in twenty calls received by mobile users spam. *Review of the Regulatory Framework for Fixed-Mobile Convergence in Hong Kong*

[37] Mobile penetration rate in Hong Kong surpassed fixed in November 1999 and fixed rebalancing to recover costs took place in 2001.

[38] PCCW has about a 50 per cent share of fixed-line connections in Hong Kong and about 70 per cent share of traffic on them, and with a move to BAK it would be set to lose a lucrative stream of income of around HK$400 million a year. Even with an operator with more than 50 per cent market share it is believed that market forces will preserve any-to-any interconnection that was previously mandated.

[39] If introduced it would be an accelerator to some degree but that does not mean that the lack of FMNP is in itself a significant barrier to the development of FMC. But it would help mobile operators make more informed rent/build decisions.

to establish a database of both fixed and mobile numbers ported. Mobile operators have to pay the four fixed operators to include updated information on ported numbers in their databases.[40] EU member states retain the right to set the price phone customers pay to change mobile operators. So while MNP is practically free in Spain it costs EUR20 in Germany to port a number, but this too is not seen as a significant barrier for an operator to acquire customers from its rivals. Japan is set to introduce MNP in the fall of 2006 having issued new 3G licenses to Softbank[41], NTT Com and eAccess in November 2005.[42]

In preparing for future FMC services and applications, operators are interested in pursuing deals with media companies, some even in becoming media companies themselves. But after years of investment most are not willing to relinquish control of the access infrastructure, fixed or mobile. The fear is that 'you built that roadway and others took advantage of it', but it may not be easy to 'bring in partners and not allow them to steal the show'. In Hong Kong, PCCW has had success with IPTV but who knows how sustainable that success may be when 'the top 10 most popular movies globally on fileshare platforms are downloaded 52 million times a month. Consumers, whether it's legal or not, are running their own PVR, their own IPTV, and there's a conflict there that has to be resolved' (*Daiwa Securities*).

In terms of regulation, carriage and content have often been the purview of different regulatory authorities. How to devise effective regulatory structures to deal with content transmitted via super-fast satellite, mobile *and* fixed networks – or content that hops *between* the different networks – will be a challenge, with numerous political and business interests involved, often competing against one another.[43]

Numbering for FMC services which seek to juggle two numbers, a mobile and a fixed, and route calls to the appropriate device, or to simplify matters issue a new single number, also has to be addressed. In TeliaSonera's FMC offering, the service will have both a normal fixed-network number and a mobile phone number, which makes it possible to call the user with the fixed-network number regardless of the user's location. Japan is considering assigning a special set of numbers for next-gen FMC services (see below).

Asia

There have been developments in leading Asian broadband markets, pointing the way perhaps to a different evolutionary path for FMC, one marked by stronger public-private cooperation. Japan has come out with a national FTTH plan that requires NTT to open its fibre network to competitors at a wholesale rental figure of Yen5074 per month. NTT has argued, in vain, that its deployment costs are much higher. The government also wants the domestic fixed-line network replaced with a fully

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[40] This in a market where there are 300,000 successful ports per year for FNP and 1,300,000 successful ports per year for MNP.

[41] Softbank owns fixed line operator Japan Telecom and acquired Vodafone K.K. in early 2006.

[42] In what can be seen as another twist on FMC, NTT DoCoMo is turning itself into a financial services company with the acquisition of stakes in Japan's two largest credit card companies, and extending lines of credit to its mobile users.

[43] In Korea a long-running battle over provenance was finally settled when the Korean Broadcasting Commission and the Ministry of Information & Communication (MIC) in July 2006 set up a joint steering committee to regulate IPTV. In the UK the formation of OFCOM was less contentious and is proving a rather successful example of a converged regulator.

integrated IP system by 2010, and KDDI has said it would undergo complete IP conversion by the end of March 2008.

KDDI and DoCoMo have both targeted corporate FMC services. KDDI is teaming up with NEC to unveil an FMC solution in December. DoCoMo has been providing corporate customers with 'one-phone' service, LAN compatible FOMA handsets that double as workplace extensions free of charge since September 2005.[44]

A panel of Japan's Internal Affairs and Communications Ministry has proposed that an 11-digit number beginning with '060' be solely used for next-generation FMC services, with cellphones allowed to use the future FMC numbers thereby alleviating a current problem of changing mobile prefixes '090' and '080' to '050' when the terminal is used as a fixed-line 'phone.

Korea, with an emphasis on pushing ever faster connectivity be it fixed or mobile, has unveiled the BcN (Broadband Convergence Network) concept. It is one that envisions the interconnection of super high-speed fixed networks with WiBro networks, an advanced version of wireless local area network technology that can transmit signals accessible by moving client mobile devices.

In the end there might not be a graceful path to FMC, either for the operator or the regulator, but a pragmatic process of feeling one's way into a new market.[45]

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[44] The service has faced its share of teething problems, with the line going dead when a user goes in or out of a building while on the phone.

[45] Akin to Deng Xiaoping's phrase which famously likened the process of reform in China to crossing a rapid river in the dark, feeling with your foot for the next stone.