

Executive Summary
Radio Spectrum Issues in Hong Kong
plus
What can be done to avoid another cable blackout?

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Background

Hong Kong's spectrum policy review has been undertaken by the CITB policy bureau, not by OFTA, the regulator, and in small but significant ways departs from the philosophy of past policy and regulation by dropping technology neutrality with respect to spectrum to be reserved for China's TD-SCDMA standard for 3G mobile. The CITB has also separately proposed to provide public assets (locations and some funding) to create WiFi access points across Hong Kong, a policy that has rather inevitably brought a reaction from PCCW who fear public funding for a service that could become competitive to their own WiFi or 3G services. During 2006, most of the operators joined forces to oppose OFTA from an early issuing of BWA licences, ostensibly on the grounds that an overall spectrum policy review was required before a licensing exercise that could, among other things – such as creating areas of radio interference with, for example, satellite transmissions – introduce further competition into the market. With this background, TIF debates the spectrum policy review with sponsorship from *Analysys*, an international research and consulting company with considerable expertise in this area.

But one other event was taken into account. On 26th December 2006 an earthquake off the coast of Taiwan, in an area known as the Luzon Straits, cut international submarine cable connections, closing down access to the Internet for several days and to overseas telephone and fax connections. It took many weeks to get Hong Kong back to normal, and this brought some stinging criticism from users and from legislators only too aware of the impact on business, on personal communications and upon Hong Kong's reputation as a communications hub. Given the seriousness of this event, the first session of TIF is devoted to it and the lessons to be learned.

Session One: The Cable Break

Simon Chan, Chair of the HKTUG, chairs this session. The first speaker is **M.H.Au, DG of OFTA**, who reminds the audience that the earthquake, which was actually a series of quakes, was unprecedented and beyond expectations. He also points out that operators were quick to put their emergency plans into operation and basic services were restored within a reasonable time. But there are lessons to be learned.

First, operators need to think about overland cables as well as submarine cables to achieve diversity. Cables built in a loop architecture were able to function, but all cables passing through the Luzon Straits were damaged. However, in MH's view the need for diversity does not warrant regulatory interference with the market because it was market forces that created the diversity of the present system. Second, there is a need to reconsider the way emergency situations are reported. On this occasion OFTA had to ask each operator separately for updates. In future, automatic reporting should allow OFTA to issue public guidance when the implications are territory-wide. Third, based upon an efficient reporting mechanism, the regulator and government can decide whether to intervene to help the situation, for example, by arranging additional routing from Mainland China. Such intervention should not extend to pricing issues, but such arrangements should be reciprocal.

Fourth, because it is SMEs who suffer the most – larger companies often have their own diverse capacity arrangements – the Government's Office of the CIO will use its portal to provide advice and guidance to SMEs.

Andrew Kwok, Head of International, HGC and Ricky Wong, Chairman of HKBN, bring different perspectives on the cable crisis. Andrew points out that Hong Kong coped quite well given that all six cables landing in Hong Kong were affected plus two others that could provide back-up capacity. Worse affected was Internet traffic because of capacity demand. Voice mostly travels over IPLCs, over ATM Frame Relay, over International Ethernet and is relatively easy to re-route, but up to 50% Internet traffic from Hong Kong still goes East to the USA (down from about 70% a few years ago). As soon as the breaks occurred some traffic was diverted to Singapore and either southwards along the Southern Cross to Australia and then to the USA, or westwards to Europe using SeaMeWe or FLAG, and some took the land route through China and Russia to Europe and a small percentage to China north of Shanghai and then to Japan and on to the USA. HGC used all the above. Given all this, even Internet services were 80% back to normal after 48 hours, but even today 100% normality has only been restored on four of the cables. 'Normality' doesn't mean normal latency rates because re-routing involves some loss of quality, but essentially 99% of corporate customers had restored services within 36 hours.

Because HGC placed an emphasis before the crisis on controlling its own diversified international capacity, the company had been in a position to offer backup to overseas carriers in the Philippines, Taiwan and Korea. Ricky Wong adds PCCW to the list, noting that HGC, HKBN and Wharf all did a good job – 'I never said a good word about Wharf before; I think that was my first.'

Simon Chan added that even today PCCW's Netvigator is not 100% recovered, a point emphasized by journalist **Robert Clark of TelecomAsia** who researched the crisis. While most large corporate customers had their own IPLCs and SLAs, SMEs were far more reliant upon ISPs and ISPs were in turn reliant upon the carriers, especially on PCCW. They are the ones who suffered the most from lost or delayed business and could least afford to do so. **Simon Chan**, representing the position of HKTUG, points out that

Hong Kong was lucky in the sense that the crisis came after the ITU 2007 held in Hong Kong in early December and during the long Xmas-New Year break. Even so, there was a dent in Hong Kong's reputation.

Arising from these comments several ideas followed. One, as **Andrew** points out, the affected cables all passed through the Luzon Straits because the constraint on taking cables around the other side of Taiwan, apart from the uneven ocean floor and the activities of local fishermen, is the political situation between the Mainland and Taiwan. Nevertheless, having greater diversity of connections is important, even if such events are rare. (**Steven Lau from Reuters** reminds us that the seismically active area in Taiwan is the north, and after a quake 3 years ago in the south 'people in the cable sector said "That's a once in a hundred years event and that's not going to happen again, so let's not worry about it."') All the speakers agreed on this point, for example, using overland routes across Mainland China. Two, because investment in new cable is obviously expensive and maybe difficult to justify in terms of demand, at the very least there should be prior agreements in place between carriers to cover such contingencies.

Three, **Andrew** in particular argues that some additional investment in cables is probably justified, if only to extend the control carriers have over routing rather than 'handing over your traffic to other people'. Four, **Robert Clark** and **Steven Lau** both make the point that 'club cables' in particular maintain a ludicrously outdated mode of secrecy about themselves which hinders information and the ability to react quickly to emergency situations. Traditionally, cable consortia appoint an 'Administrator' – a major carrier – to act as 'secretary' for the cable group. As **Steven Lau** put it, his contact at one carrier 'on pain of death, whispered to me the names of the administrators, as they call them, of each club cable.' When an Administrator is approached for information about capacity or pricing their usual response is they have to consult with the lead signatories or perhaps with all signatories of the club, which can mean 10 or 15 or 30 depending on the cable, before they can utter a word. In a global information economy, or for an economy that is so reliant upon global information, this practice is clearly outmoded and information sharing or even information pooling needs to be considered ahead of the next crisis.

Five, sharing international information needs to be supported by domestic sharing of resources during times of crisis. **Ricky Wong** proposes a more interventionist regulator to ensure that ISPs in particular are not disadvantaged as they were this time around. **MH Au** disagrees. 'In a competitive market I have great reservations about the feasibility and desirability of the regulator setting a minimum standard on the reliability or availability of the service.' **Ricky Wong** argues back that OFTA frequently intervenes in the market, for example on spectrum assignments, and if the benefits outweigh the costs why not?

MH Au: 'So you would be happy that if OFTA as the regulator on 27th December realized that you have some spare capacity ... issued a direction to you on 27th December to require you to carry traffic of those operators whose traffic had been disrupted...?'

Ricky Wong: 'Yes. The answer is yes.'

MH Au: 'I will bear this in mind.!'

Ricky's idea is to have a pool of capacity upon which the ISPs, through the good offices of the regulator, can draw in times of emergency. **Andrew**, while not committing to the proposal, re-iterates his agreement with OFTA's proposal for more transparency by the operators so the public is better able to make informed choices. **Ricky's** last word is to make the point that if OFTA isn't prepared to establish minimum standards for the quality of service, then carriers have no standards to use when reporting back to OFTA.

*TIF's last word: **M.H.Au** will be retiring at the end of June 2007. He has always shown TIF great support by his willingness to participate and debate the issues, a service he has shown to the industry at large. We wish to thank him warmly, and wish him a long and healthy retirement.*

Session Two: Radio Spectrum Issues in Hong Kong

This session is chaired by **John Ure, associate professor and director of the Telecommunications Research Project, University of Hong Kong.**

The first speaker is **Peter Falshaw, Head of Asia of Analysys**, the sponsor of this TIF. **Analysys** is a consulting company totally focused on the telecommunications sector, headquartered in the UK with around 140 people worldwide. [Note: NOT to be confused with a Mainland China company that has adopted the name *Analysys International* – a case of imitation being the sincerest form of flattery! Ed.] **Peter Falshaw** has studied the evolution of WiMax and here gives us a sanity check. He points out that WiMax gained widespread interest when Intel forecast that by 2009 over 60% of computers would be shipped with WiMax capability, rather in the same way as WiFi is becoming ubiquitous today, while an article in *The Economist* in 2004 suggested WiMax would be capable of 70 Mbps throughput.

Since then there has been a reality check. In June 2006 Korea launched its own version called Wibro, but so far its success is underwhelming with only 1,300 customers, while Korea's cellular operators have opted for the 3G enhancement HSDPA and Wibro is now being spoken of as a complementary technology that can also support mobile TV. Although WiMax looks like a logical extension of WiFi, he believes the future more likely lies with HSDPA and HSUPA. Peter's prognosis is that WiMax is also unlikely to succeed as an alternative broadband access technology, partly because of the improved performance of xDSL and partly because experience has so far shown that WiMax reception inside buildings on 3.5GHz spectrum is rather poor. The future success of WiMax therefore probably depends upon the mobile version, and that remains maybe 18 months off. 'Mobility is something people value, and why not mobile broadband as well?'

The next speaker, **Andrew Wright, Managing Director of Analysys** focuses on broader policy issues, noting from the outset that digital technology has complicated spectrum policy because now 'you find multiple competing technologies delivering multiple

services.’ Andrew examples 3G which began as 384Kbps voice and email and some video and now approaches 7 Mbps capable of delivering mobile TV. To place in context Andrew refers to a study **Analysys** did in the UK around 2 years back. Useable spectrum comprised anything below 15 GHz of which around 50% or 8GHz is available for commercial use. Even on the most conservative assumptions, future demand outstrips supply ‘over the entire > 0 – 15 GHz region.’ This places growing scarcity value on spectrum, which is estimated to account for between 2%-3.5% of GDP.

The question therefore is: what spectrum management regime is most appropriate in these changing circumstances? Traditionally it has been ‘command and control’ following a three stage model: Stage 1 is international allocation recommendations by the WRC of the ITU; Stage 2 is the national allocations table; Stage 3 is the actual assignment of spectrum within the allocation bands. This was usually done on a ‘first come, first serve’ basis subject to the golden rule of no interference with other users. The system worked well for most purposes in an analogue world, although it was ponderous and bureaucratic.

In a digital environment, the legacy issues such as spectrum that is under-utilized require new approaches. There are three basic areas. First, bands of frequencies which can be used without licence, for example, 2.4 GHz is widely used for Bluetooth, private WiFi, micro-wave ovens, etc. The private part is usually associated with strict limits of the power of emissions, although in cases of WiFi the spillovers are often several tens of metres. This is the ‘spectrum commons’ model. The use of unlicensed spectrum for high-powered long-range applications remains untried and untested. [For a previous TIF discussion of these topics, see <http://www.trp.hku.hk/tif/papers/2000/sept/0009summ.pdf>

Second, for licensed spectrum – spectrum for which there is often excessive demand – the question is how to ensure the most efficient use. The answer increasingly involves a bidding process or auction of some kind. Third, whether or not an auction or a ‘beauty contest’ or a ‘command and control’ method is used to assign frequencies, placing a cost on its use through spectrum pricing – spectrum utilization fees or SUFs – is gaining acceptance. There may be exceptions, such as emergency services or the military use of radio spectrum, but even these should be reviewed and alternatives considered as necessary. The two methods of ‘spectrum pricing’ are (a) cost recovery, which ignores the efficiency of the user issue – although the efficiency of the regulator becomes an issue – and (b) ‘administered incentive pricing’ which can be applied to users who are not assigned through a competitive bidding – again emergency services may be an example – but need an incentive to use frequencies most cost-effectively. The most usual method of AIP is to look at the opportunity cost of the next best alternative use. But this is easier said than done, and regulators tend to err on the side of caution reducing the effects of AIP.

Auctions, pioneered in the US, have a checkered history already, partly because they are a ‘one off event’ and reflect market conditions and forecasts at a particular point in time. [Another reason is that they can either be focused on the efficient allocation issue or upon raising the maximum revenue for the seller, and the design of the auction will serve one purpose or the other, but not necessarily both – Ed]. The answer could lie in ‘spectrum

trading' allowing forecast revisions and forecasts based upon changes in technologies, etc., to be taken into account and offering an exit to those who made wrong forecasts or right forecasts but who no longer want to use the spectrum. Andrew gives examples of mobile operators in Austria and Germany withdrawing from the market and their spectrum being acquired by others. The concomitant to spectrum trading is 'spectrum liberalization', that is allowing for change of use as well as change of user. These two together, in a pure market environment, would ensure the most efficient use of spectrum, subject to regulatory oversight to prevent anti-competitive behaviour. The downside of liberalization would be the threat to harmonization of bands across neighbouring countries for global roaming, something which inter-operable technologies may yet provide the answers. Andrew cites a 2004 study **Analysys** undertook for the European Commission, finding that the EC could benefit from spectrum trading and liberalization by up to euro 8 billion, but most of that arose only if the two went together.

UK

Perhaps the most interesting stepping stone in these directions is the position adopted by OFCOM in the UK who will be assigning all future spectrum on a service as well as a technology neutral way. First up is the 2.6GHz band which 3G operators refer to as the 3G-expansion band, but that remains to be seen in light of OFCOM's policy. OFCOM is also contemplating a 'digital dividend' auction of the broadcasting spectrum released when TV goes digital.

EU

The recent news coming from the EC is a recommendation (not yet a law) that in future all spectrum assignments will be service and technology neutral on a mandatory basis, with national regulators having to argue for exceptional cases. The 2004 **Analysys** report found that half of the then 25 Member States intended to move towards spectrum trading and liberalization.

Hong Kong

Andrew leaves it to MH Au, DG OFTA, to talk about Hong Kong, but concludes by pointing out that making the transition from one regime to another always runs the risk of windfall gains for existing holders of spectrum, and therefore has to be managed with care.

MH Au faces a somewhat difficult task. On the one hand, the long standing position of the HK policy-makers as well as the regulator has been as far as possible to move towards technology-neutral licensing and towards the use of auctions. But the CITB's review suggests reserving some spectrum for 'harmonization' with China's TD-SCDMA 3G technology despite the obvious fact that roaming with China is already widely established and China will also adopt the two other 3G standards. [If there is genuine demand for TD-SCDMA, then why not auction it? – Ed]. OFTA is not responsible for the policy review and, as MH diplomatically puts it, if this line of argument prevails then 'this is something OFTA will have to take regard to in making decisions on spectrum management.' He sees it principally as a strategic issue.

Having finessed that point, MH stresses that OFTA has not yet had time to fully digest and discuss all the submissions to the CITB's Consultation Paper, but they seem to point towards general agreement with spectrum trading and the desirability of OFTA to produce a Spectrum Release Plan rather than the past practice of using various channels to consult and inform the industry and the public. To what extent that Plan should include previously issued spectrum remains to be decided, for example assignments for international uses may not be very informative for domestic applications.

But the key issue is the balance between market mechanisms, such as spectrum pricing and trading, and government intervention. Here MH expresses his long felt frustration with the seemingly interminable debates and consultations on issues he clearly feels need progress. He doesn't say so, but the delay in the issuing of BWA licences is a case in point, and MH adds pointedly that this

'has slowed down the progress of Hong Kong, particularly in mobile services. That's my personal observation. We cannot claim that we are at the forefront of mobile services in the region or in the world now.'

MH also picks up Andrew's point about managing the transition towards spectrum pricing and trading, noting for example the outcome of the 3G auctions. 'So I think we accept all these proposals that we should not vary or withdraw spectrum rights before expiry, except in exceptional circumstances.' But on spectrum liberalization MH urges caution until the experience of other jurisdictions can be judged. In a sense, this has always been OFTA's position, never to risk being the leader, but always ready to pick up on good ideas and to be the first within the region to implement them.

John Ure, TRP HKU is the next speaker. John was an early advocate of a royalty payments auction as against a UK-style debt auction for 3G, on the grounds that it synchronizes the need to pay with the ability to pay, thus not encumbering the operators with a debt-overhang and therefore not privileging the big players. It shares the risk between the spectrum seller and buyer, which is incompatible with an auction designed to raise the maximum revenue for the seller alone. The problem with alternative approaches that try to estimate the value of spectrum and price accordingly is that in a world of convergence, e.g. FMC, the cross elasticities of demand create an insuperable problem of calculation. Who knows what value outcomes for mobile operations of price bundling strategies of 'triple play' or 'quadruple play' operators? A royalty auction commits an operator to share the outcomes, not values based upon unknowable forecasts. Those who are willing to share the most, gain the spectrum. If they find it doesn't work out for them, a secondary market gives them an exit strategy and therefore justifies a higher initial royalty payment. Its all about the difference between static and dynamic efficiency.

John then points to a constraint on the operations of the market. Currently, as Andrew has outlined, spectrum allocations are agreed at ITU level and followed at national levels. This inevitably means supply constraint and the possibility of monopoly rent. This applies to bands where demand outstrips supply, which as Andrew has shown is likely across all bands in the coming years. The alternative is spectrum liberalization, and this

would certainly assist commercial strategies such as FMC, but then it becomes very political as the ‘incidence’ of monopoly rent could be shifted from one line of business to another – a form of transfer pricing between services that do use spectrum and those that do not. As a matter of social policy there are good arguments for the State to reclaim monopoly rents at source rather than rely upon *ex post facto* taxation – as any tax lawyer will advise.

Panel Discussion

Charles Henshaw, CEO, Peoples Telephone, reminds us that Peoples along with New World Mobility (NWM) were both seriously interested in the 3G auction until they did their sums. [In a market where technologies are changing so rapidly, e.g. EDGE, HSDPA, HSUPAS, etc, the business case for 3G was more strategic than financial – Ed]. Now the market and the technologies are becoming more established, Charles (a) welcomes the idea of a Spectrum Release Plan, and (b) urges OFTA to make available to the market whatever spectrum is allocated, and (c) raises the need to enforce the efficient use of guard bands between assigned frequencies. This will be especially important if and when the liberalization of spectrum use is introduced. Charles is naturally cautious about liberalization in light of the importance of global roaming and the need to protect the principle of harmonization.

Ricky Wong, Chairman of HKBN sees no benefit in liberalization. ‘I think it is just another MNVO.’ He is also wary of auctions as a way to advantage the larger companies. He sees nothing wrong in beauty contests and administrative decisions [assuming the criterion is to introduce more competition. – Ed] and at this point refers back to his argument in Session 1 that OFTA should be concerned about QoS issues.

Richard Midgett, Director of International and Wholesale, CSL is a strong advocate of the ‘policy first’ approach and was therefore a proponent last year of delaying the issuing of BWA licences – see MH’s remarks above. Richard argues the need to take this seriously and not as a delaying tactic by established players. He runs through what he would like to see come out of the consultation, especially clarification on the future plans for spectrum utilization fees (SUFs) paid by 2G and 3G operators. He adds that the ‘Government’s proposals to park the liberalization and trading aspects, with no guidelines on future implementation of these issues, we find to be unacceptable.’ The third issue Richard raises is the government’s true commitment to market determined spectrum prices, clearly signaling concerns that the government will be self-interested to set prices for the market.

Per Hovstad, Manager, Spectrum Management Section of AsiaSat praises OFTA for doing a good job in sorting out the threat of radio interference with satellite transmissions in the original BWA proposals. (MH added that BWA would not be compatible with satellite downlinking using 3.7-4.2GHz, and that BWA would be confined to 2.3-2.4GHz and 3.5-2.69GHz.) Hong Kong receives signals from around 117 satellites, only 5 or 6 licensed in Hong Kong. With an ‘Open Skies’ policy, AsiaSat sees no relevance of an auction process in spectrum assignments because no exclusivities are involved. AsiaSat transmissions cover from Cyprus to New Zealand, and such satellite services are not in

any meaningful sense ‘national’. For these reasons AsiaSat sees no reason to abandon current administrative licensing procedures. In response from a comment by **Julie Garcia Welch from Qualcomm**, that some ITU studies were looking at the use of MSS (mobile satellite services) in the Ku 2.5GH band, **Per Hovstad** notes some interest from a Korea-Japan venture and a China venture, but points out that in tropical zones it is really C-Band that is in demand.

Stuart Chiron, Director of Regulatory Affairs, PCCW is the last panelist. Like Richard, Stuart is a strong advocate of the ‘policy first’ position, arguing that concerns about incumbent operators dominating the market, or hoarding spectrum to drive up its value, are fully met by the anti-competition clauses in the Ordinance and the licences. Stuart agrees with Richard also that by setting minimum prices for the 3G auction, government and not the market was setting the price. [This argument is all the stronger because in the event there was no bidding as 4 licences went to 4 bidders at the reserve price – Ed]. At this point Stuart takes a swipe at Ricky who opposes auctions and prefers the beauty context approach (see above) as wanting spectrum ‘on the cheap’. Lastly he admonishes those Legco members who argued for the non-automatic renewal of licences. This is a recipe for an end to investment before the licence expires. (During discussion **Ricky** comes back at Stuart, pointing out that his fixed line licence has no guarantee of renewal, and that licences have high economic value to society.)

Discussion

MH comes back at Stuart by pointing out that in the 3G auction two commercial decisions were taken. First, as in the case of Peoples, the reserve price was above their expected NPV, and second, in the case of the four bidders, the reserve price was below their expected NPV. That was the market speaking. **Richard** disagrees with that because the three largest players had little choice; ‘if they wished to remain in business they had no alternative but to pay this price.’ Only the fourth operator was ‘adventurous’, and then only because the government had relaxed the performance bond requirements to keep them in the picture.

In response to a question from the floor about whether WiFi networks would be offered exclusive rights to use a radio frequency, **MH** replies that ‘it’s rather inconceivable’.

Concluding Remark

There was a frustration running through this TIF, especially Session 2. It revolves around the question of whether Hong Kong has lost the initiative. Given the success of PCCW’s IPTV this may be doubted, but in the mobile space especially there is a sense of Hong Kong treading water. Two views sum it up.

Richard Midgett: ‘If you compare us with other markets in the region, you do not see this level of competition... [the] balance has been lost. ... What is missing is sufficient catalyst, sufficient scale and sufficient ability to either invest or drive this sort of business direction. I think that’s more properly where the focus should be put.’

MH Au: 'I think we should stop arguing too much about this licensing process. .. I think it's time for us to draw conclusions and move ahead, otherwise Hong Kong may risk lagging behind in the competition with regional competitors.'