

Internet Telephony and Voice over Broadband (VoBB)

6th December 2004,

Rooms Mahogany and Oak, Cliftons, 4/F Wheelock House, Hong Kong

Executive Summary

1. Over 150 participants turned up for this TIF, **sponsored by Cisco Systems, PCCW Limited** (PCCW) and **Hong Kong Broadband Network** (HKBN)—the largest turnout so far for any of these forums. Was this due to the threat of legal action by PCCW who argue that either HKBN's new VoBB service should not be regarded as a licensed FTNS (Fixed Telecom Network Service) offering and HKBN should not be granted full FTNS rights, for example to numbering, or if it is treated as a full FTNS service then HKBN should be required to carry obligations to provide emergency call services, pay interconnection charges, provide a power supply, etc. Or was the large turnout due to a wider recognition that VoBB, and VoIP generically, will change the character of telecommunications altogether? Each of the FTNS operators, including Wharf T&T/iCable, NWT (New World Telecom) and HGC (Hutchison Global Communications), have either introduced VoBB or are about to do so, but so far only HKBN marketed the service over the broadband network of other operators as well as over its own network.

2. **York Mok, Chair of the HK ISPA** introduces the Session One. The first speaker is **Grant Lusty, Director of Voice Technology, Cisco Systems Asia Pacific (sponsor)**. Grant provides a very well packaged 'tutorial' on VoIP, beginning with a crucial technological issue for VoIP, digital compression, algorithms and coding that compress over a single link four, six or up to eight voice conversations compared with the standard PSTN TDM (Time Division Multiplexing). But what about the quality? This depends upon the quality of the various network connections that make up the Internet routing. Good connections provide excellent voice quality, and managed network connections guarantee that quality, otherwise it is all 'best effort'. At the call control level that determines where the call is going to there are two architectures to choose. The first is a centralized 'soft switch' where most of the intelligence resides and which controls the gateways at the edge of the network and the connections to the connected devices. H248 and MGCP are widely used protocols. The second is the peer-to-peer (P2P) configuration where the central switch is essentially split in two and the intelligence is located at the network 'in-points'. H323 and the new SIP (Session Initiation Protocol) are typical protocols. [The concept of 4G is built upon the idea of new devices adding transceiver 'in-points' such that the network grows or shrinks as more or less people connect to it – ed].

3. **Grant** further explains that because SIP routes according to IP addresses it is necessary to have telephone number translation into IP numbers. SIP does this as a re-direct or proxy server, and H323 carries out the same function as a gateway or gatekeeper directory. Because IP addresses are associated with devices (PCs, PDAs, 3G, etc) rather than locations, given the right network and access, a device can be plug-n-play anywhere in the world, giving rise to the prospect of "one number for life" that you take with you

wherever you go. [IPv6 will create sufficient IP addresses to accommodate the global growth in devices – ed]. And given that SIP is based upon Web technology (the product of the Internet Engineering Task Force and not the ITU) VoBB systems will work across any media.

4. Having outlined the basic technicalities of VoIP, **Grant** reviews what consumers, businesses and service providers can do with it. Initially, in Phase One, it's all about cost cutting. For example, in the enterprise sector expensive PABX systems are being replaced with IP Telephony or IP PBXs. This means only one or two calling centres to over company offices located across wide regions, and mobile wireless and plug-n-play devices within the office environment. Intelligence within the system can locate staff wherever they happen to be. By 2006 Cisco estimate the market for IP PBXs and IP Telephony systems will overtake the demand for TDM systems. For service providers there are essentially two broad approaches: inside-out and outside-in. The inside-out approach arises when a telecom company encodes voice into IP and by-passes its own long distance network, or that of other interconnecting carriers, allowing it to offer cheap long-distance calls, and related media transmission, for example, by selling IDD calling cards. The outside-in approach is typical of cable TV companies who begin offering high-speed Internet and then IP voice is added as an extra service. In Hong Kong *iCable* is taking this route. Either route leads towards the "triple play" in which the provider offers voice, fast Internet and multimedia/TV services.

5. Supporting services over broadband requires a converged or NGN network and this consists of three layers. First, a single data network that handles all types of IP-encoded traffic. Second, a service convergence layer that can deliver that traffic to all types of access and all types of devices. Third, an applications convergence layer, according to **Grant** 'one of the hardest to understand...it is all about data interaction.' For example, a phone that can tell you how many calls you missed, who they were from, whether they left a voice mail or email, whether the call was urgent or not, etc., or an IM programme that says 'do not disturb' or 'back in 10 minutes', etc. **Grant** sees 3 stages for NGN development. First, phasing out ATMs and phasing in soft switches, and offering PSTN services as lower cost. Second, offering "triple play" services in which voice is just one among many several services. Third, offering a full range of new and innovative NGN services and all voice is over IP. Cisco forecast another 10 years before this is finally realized... but, adds **Grant**, maybe only 5 in Hong Kong?

6. **P.L.Wong, Chief Police Communications Officer, Hong Kong Police and Dr C.K.Law, Chairman, Senior Citizen Home Safety Association** addressed an issue of great social concern, how could and would VoBB service providers offer the ability to call Emergency Services? The so-call 911 issue in the USA. Mr Wong explained the Hong Kong Police have three linked emergency call centres in the New Territories, Kowloon and Hong Kong island. The most vital pieces of information are the location and nature of the emergency so that a conference call can immediately be initiated with the appropriate emergency services, police, fire brigade or ambulance. The HK Police handle 10,000 '999' calls per day, 35% from fixed line phones and 65% from mobile phones. Co-located within the call centres are the telephone operators and the dispatch teams so that in

addition to computer-generated information to the emergency services the dispatch teams are organizing the emergency response. The current arrangement is that no overseas calls are accepted as these lie beyond Hong Kong jurisdiction. [This policy could be revisited with advancements in IP telephony systems, especially where emergencies occur in regions close to HK, for example, at sea, and alerts from HK to neighbouring jurisdictions could assist? – ed]. Soon a third generation system will be deployed using GIS (Geographic Information System) to show on a computer screen the exact location of the call. Telephone number portability is not a problem for fixed because the network operators provide a chart of installation addresses, but with mobile the operator must identify the location. [3G LBS applications should help in the future - ed]. The response time aims to be 9 minutes in urban areas and 15 in rural, but in fact it is currently 5 minutes and 6-7 minutes respectively.

7. **Dr Law** explains how his association provides elderly people living on their own with a device they can wear on their wrist or around their neck and in case of an emergency all they have to do is to press the emergency button. Their location as well as their medical history will appear on a PC screen for immediate attention. But, as with other emergency services, the location issue is the key and VoIP may not provide this. To date there are 22,000 elderly people using this service, but to Dr Law's surprise, over 1,600 of them (7%) already report using a VoIP service. At this rate Grant's prediction of another 10 years should be foreshortened. The reason is simple, the service is cheaper and most of these elderly people are low or very low income and they are unaware of the emergency service problems. To most of them VoIP service looks and sounds just like any other telephone service. They cannot tell the difference. A further potential problem Dr Law identifies is that VoIP service does not come with its own power supply, unlike the PSTN, so this is another source of danger. [Later on Ricky Wong, HKBN, does not miss the chance of pointing out that the electricity supply in HK is even more reliable than the PSTN! – ed]. He pleads to the service providers to come up with solutions to these problems, which are ethical, as his association is already facing the dilemma of not being able to help some of these elderly people in an emergency.

8. **K.S.Wong, Assistant Director, OFTA** summarizes the consultation paper on VoIP. At its core is whether VoIP is offered as a substitute for the PSTN or not. If it is, then there is a strong case that VoIP service providers share the same rights and obligations as PSTN service providers, including the portability of numbers, emergency calling services and an independent power supply, although the entry of VoIP may in turn warrant adjustments to these rights and obligations. Second, can services and network operations be separated, in which case should VoIP be treated like a PNETS service in Hong Kong, paying network usage charges? And should VoIP service providers have access to telephone numbering? Third, how to handle VoIP traffic that is 'external'? [Note, 'bits' of traffic could exit and re-enter Hong Kong over the Internet, so 'internal' and 'external' may lose meaning - ed]. Should VoIP providers pay contributions to the USF and LAC?

9. **K.S.Wong** spends some time on the thorny issue of numbers. If overseas operators want to offer VoIP numbers to Hong Kong residents, and vice-versa, the demand for numbers could increase dramatically. Should HK adopt an enlarged numbering system or

go for a pre-selection solution (a prefix for zones where there is no location information) as in the UK and Singapore? [Currently, HK has not researched the adoption of IPv6 numbering codes - ed]. A further issue is interconnection and network charging, for example for CLI. In the Internet world everything is settled on a peering basis for traffic, and on 'best effort' so if there is no delivery there is no basis for settlement. In the PSTN world everything is calculated on a per minute basis. What emerges clearly from the presentation of K.S. is that VoIP takes us into a different world in which many of the rules and commercial protocols of the PSTN do not fit easily if at all.

10. During discussion, **Grant Lusty** points out that some operators are offering battery power supply as a backup, others provide equipment that can flick over to the PSTN supply in the event of an electricity power failure, and he reminds us that where people have given up a fixed line phone for a cordless phone, this problem arises. Ricky Wong (HKBN) from the audience suggests the electric power supply has an even greater reliability in Hong Kong than the PSTN [although a power outage where, for example, lifts are not working, may be more likely associated with a real emergency than a PSTN outage - ed.] Ricky adds that most of the 250,000 HKBN's lines have UPS battery supply so an electricity outage is not that serious. It is also HKBN's policy to query requests from people over the age of 60 whether they fully understand the risks. **Tong Cheung representing the HK Internet and Telecom Association**, assures us that ITAHK members were very responsible in their marketing, and that most senior citizens in Hong Kong who use an IP telephone are most likely 'on-net' rather than 'off-net' and therefore do have power backup. **Dr Law** was not entirely reassured and saw an ethical issue involved that could grow as a problem unless workable solutions were found.

Session Two

11. Session Two is chaired by **Dr John Ure, Director of the TRP**. The first speaker is **Andrew Lih, Associate Professor, Journalism and Media Studies, University of Hong Kong**. Andrew reminds us that whereas broadband in Hong Kong usually means 1.5Mbps, or even 6-8 or 10Mbps, in the USA it still often means just 100Kbps. He reviews the protocol standards used in VoIP, referring to H323 and SIP and reminds us of the first generation, companies such as Net2Phone that 'gave VoIP a very bad name in the original days' with dropped calls and poor voice quality, and various half-duplex solutions. A big problem was that PCs were sitting behind residential or corporate firewalls and routers. This was solved through the appearance of third parties who provided a rendezvous for the two sides to speak to each other, such as Apple's iChat for video-conferencing, and then Vonage and now Skype. Services like Vonage [very similar to HKBN's offering in Hong Kong - ed.] have substantially undercut PSTN prices and forced companies like AT&T to adopt VoIP as a competitive response.

12. **Andrew** then demonstrated Skype, calling a friend in Shanghai who was perfectly audible. Skype is a software programme freely downloadable from the Web (it fits into a Java applet) that provides PC-PC VoIP fully encrypted and of excellent quality if the networks can support it. It is in fact of MP3 ISDN-B quality (128Kbps used by radio stations) compared with traditional PSTN 8 kHz quality. Skype-Out is available for a subscription over the Internet providing PC-PSTN service, and Skype-In (PSTN-PC) is

due shortly. Viral marketing (word-of-mouth) is making Skype the hottest VoIP application of the day. It turns out that around 20% of the audience had already tried Skype! But Andrew warns of one potential danger for the future, that VoIP could lead to islands of directory addresses of people using different systems and the challenge would be how to bridge these islands, a problem not encountered by the PSTN

13. **Stuart Chiron, Director of Regulatory Affairs, PCCW (sponsor)** spoke next, stating that VoIP, whatever its appeal as a technology, was being used essentially as a means of by-passing PSTN tariffs, using arbitrage to cut costs and prices. Because IDD prices in Hong Kong are already so low there is little advantage to the service in Hong Kong, but it is a means for a service provided to by-pass an obligation to contribute to the USF and to the LAC. If regulation is to be consistent in Hong Kong, and technology neutral, then service providers should carry the same rights and the same obligations according to others within the same tier of services. VoIP over a rival network's facilities should be treated like another PNETS/VAS service in Hong Kong, as a second tier service, without PSTN numbering rights. So HKBN's VoIP over its own network was tier one, but HKBN's service over PCCW's network should be treated as tier two. No other Hong Kong PSTN is offering VoIP over a rival's network, only over their own even though it would be technically feasible to do so.

14. **Stuart** goes on to argue that a range of issues such as security, power supply, emergency services, CLI and so forth should always be technology neutral and each type of service provider should be treated in a similar fashion. And he adds that with regard to emergency services, educating the consumer is not going to be an easy task and the issue is a serious one.

15. **Ricky Wong, Chairman Hong Kong Broadband Network (sponsor)** replies. HKBN already has over 100,000 kilometres of cable covering 1.2 million households, about 53% of the total number in Hong Kong. Services provided over this network are 'on-net', but VoIP 'off-net' services were started in August 2004 and already there have been 20,000 applications, and 16,000 installations. OFTA has tested the 'off-net' quality and found it to be equal to the PSTN. Both 'on-net' and 'off-net' provide the full range of traditional VAS, such as voice mail, etc. and both services offer real numbering and ported numbers, so there is no problem about making emergency calls. The standard location features are there, and HKBN needs them for billing purposes. HKBN also use Skype for international calling, and Nortel VoIP equipment. Cisco is the other main vendor. VoIP service allows full monitoring of calls and it is easy to check from the call log.

16. **Ricky** explains two reasons for launching the service. First, Hutchison were already offering V-Phone since December 2003 [V-Phone can be, but is not, offered over third party networks – ed]. Second, at least five major overseas carriers have approached HKBN to exchange HK telephone numbers with overseas numbers, so HKBN knows these carriers are ready to launch global VoIP services. It is better to offer VoIP from HK than to lose the local market to overseas carriers. For example, both BT and Telstra have announced plans to migrate their PSTN to VoIP by 2008. In discussion it is suggested that

in future the Hong Kong market may be even more vulnerable to VoIP services offered from Mainland China.

17. **Ricky** then turns to the dispute between PCCW and HKBN. He reviews the legal issues at stake, suggesting the conditions of the FTNS licence are open to different legal interpretations [a 'disruptive' technology like VoIP will always have this effect – ed.] and on the substantive issue of interconnection makes the point that Internet arrangements are always peer-to-peer, such as the settlement-free Hong Kong IX. Ricky ends with a reference to the call by PCCW for a Judicial Review of OFTA's decision to allow HKBN to continue offering the VoIP service, arguing that if the JR fails then the question arises was PCCW within the law to suspend his VoIP service for 16 hours on 1st August 2004.

18. During the discussion **Stuart Chiron** responded, saying 'The litigation has nothing to do with VoIP but it has to do with how one free rider wants to arbitrage the system to provide an inexpensive service.' [This raises a general problem for regulators and law makers, how far do they prohibit the *use* of a technology in a way that subverts existing business models? If the business model is a purely commercial model, then why do not regulators and law makers simply acknowledge that markets are always risky. For example, why does HK ban parallel imports just because they subvert a business model that is based upon retail price maintenance, itself something illegal in other jurisdictions? But where the business model has public policy issues attached, such as the USF, emergency call availability, etc., the issue is inevitably more difficult to handle – ed.] **Stuart** adds that the recent FCC decision on VoIP does not really impact Hong Kong because it only establishes VoIP as a Federal rather than a State-level issue, and the issues themselves have yet to be determined. But it is interesting that the FCC also calls VoIP an information rather than a PSTN service. That would make it a tier two or PNETS service in equivalent terms in Hong Kong.

19. **Andrew** makes a more general point about the reliability of service and tight engineering requirements of the PSTN which will always be hard to beat. [In this sense the PSTN remains the 'phone of last resort' – ed.]

20. **K.S. Wong (OFTA)** in response to questions about emergency service explains the fixed line (FTNS) operators are not obliged to provide location information to the police, they do it voluntarily, but 3G operators are obliged to do so because they have the ability to identify location. **Andrew** explains that Vonage have a system where their subscribers are requested to log-on their location when they move. **Stuart** agrees the technology for location-based information using VoIP will likely soon arise, but in the meantime licensing conditions should not be weakened. **Ricky** argues that unless the caller is overseas there is no reason now why they could not identify the location.

21. Where **Stuart and Ricky** do seem to agree is in response to a question about why Hong Kong trails Korea or Japan in broadband. **Stuart** points to Hong Kong's free market approach that is not fixed to a particular technology, which avoids subsidies and tax breaks and implies greater market responsiveness. **Ricky** suggests PC and broadband penetration in Hong Kong is already very high, adding that HKBN has just introduced the

first 100 Mbps service in Hong Kong. Only Japan can do better as they have 1 Gbps. As the market focus of HKBN is in Kowloon and the New Territories and as Hong Kong Island is not served with 100 Mbps 'there is a reverse digital gap' opening up. There then follows a discussion about complementary technologies. SIP can already be downloaded onto a PDA and with Ricky's service a subscriber can use VoIP in any WiFi environment. Andrew argues that WiMax is one of the most promising coming technologies, offering wide bandwidth to support many subscribers, and it has the potential to 'blow the lid'. Mobile operators using CDMA 450 could also offer VoIP to large numbers of subscribers spread over wide areas.

22. The last question was an interesting one. With VoIP who can a consumer complain to if things don't work? The network operator? The service provider? The overseas operator? As Stuart says, 'it makes consumer education in this area very difficult.' Hopefully this TIF has played its part.

Monday, 6th December 2004 (2.03 pm)

JOHN URE: Good afternoon, ladies and gentlemen. For those who do not know me, my name is John Ure and I am the director of the Telecoms Research Project which is based in the University of Hong Kong.

As you can probably hear from my voice I am just recovering from a cold so I am not going to talk very much. I am going to rely entirely upon York Mok to chair the first session. York is the chairman of the Hong Kong Internet Service Providers Association. I am going to ask York to do the introductions to our speakers.

Just a couple of points. One, this is actually the first time we have held the forum in this venue and I would like to thank Cliftons for all the preparation they have done and the help they have given us to make it a success. This is a very popular forum in sheer numbers and there are many more still to come. We have a fairly tight programme so we would like to push ahead as quickly as possible.

If there are any press in the room, the house rule is that if you would like to quote somebody please ask for their permission before quoting them directly. There is usually no problem in that regard but out of courtesy, please respect that rule.

Our first session we are going to have tutorials from Cisco on IP, Andrew Lih from the University of Hong Kong, we are still waiting for him, we just put in a telephone call to find out where he is. We have two speakers, Mr P.L.Wong from Hong Kong police, and Dr CK Law from the social welfare services side to talk about the role of emergency services in VoIP and we have KS Wong from OFTA. As I say, the formal introductions I will leave to York. (Applause). YORK MOK: Thank you, John, for inviting me to be the moderator of this session. The same as John, I will not spend too much time because I am not a speaker here, I am just a moderator, to facilitate the efficiency and the progress of the session.

First of all I would like to introduce Grant Lusty. Grant is the director of voice technologies, he is very experienced in voice technologies and has been working in Asia Pacific for more than 6 years. He is an engineer by profession so if you have any technical questions feel free to ask Grant and has 15 years experience in working in the telecommunications field. I will pass the floor to Grant to introduce the technology to us. Thank you.

GRANT LUSTY: It has been a very long time since I have been an engineer so you might want to hold off on those too technical questions for me.

On behalf of Cisco systems I would like to extend a very warm welcome to everyone to this forum this afternoon. As York said, I have worked in Asia now for about six years. Prior to that, despite my accent, which is actually a New Zealand accent, prior to coming to Asia I was working in Europe, working with service providers across Europe, the Middle East and Africa. The one thing I would say at the beginning of this, I have always found Hong Kong to be probably one of the most exciting and vibrant places, particularly in the telecommunications industry of all of the places I have worked in worldwide so I am particularly pleased Cisco is able to be sponsor of this event today.

My job this afternoon is to give you an introduction to voice over IP technologies. For those of you in the audience sitting back and thinking, "Oh dear, this is going to be a really deep, heavy technical session", it is not. What I really want to be able to do is just to bring

everybody to an equal understanding of voice over IP technologies, what has happened in the past, what is happening today, particularly in the service provider environment and what we, at Cisco Systems, see is going to be happening in voice over IP in the future.

The first thing I would note, looking at the technology, these are the only three technical things I am going to talk about. Two of them I am going to go over very fast. These are three characteristics of voice over IP which are set as a backdrop to understanding all of the reasons why voice over IP is such a popular and successful technology.

The first of these is compression. I am sure everybody is aware that voice over IP provides compression so that you can get a lot more telephone conversations over a single link than you might have using TDM technologies. There are lots of different algorithms and coding systems but the main thing to take away from this is that we can get anywhere between four to six, seven, eight times as many voice conversations across an ordinary link as we might have with using TDM technologies.

You notice that some of them are listed, there is this thing called a MOS score next to them. This is a traditional way of measuring the quality of these CODECs but I want to make sure that people are understanding the MOS is only a score that rates the CODEC or the compression of the technology, it does not give you any indication of the quality of an actual voice over IP call. That call can be affected by many other different factors in an IP environment, such as things like bandwidth, quality of service, how much congestion there might be in the network, how much packet delay, jitter there may be. It is certainly not a direct indication of the quality of call you are going to get. It does mean we can, using voice over IP technologies, get qualities of calls that are indistinguishable to the human ear between that and normal TDM speech.

The reason that that compression is so important is because compression, less bandwidth and particularly in the past, bandwidth equals money. Therefore, if we can get more calls over the same link we get cheaper calls. That was the thing that drove voice over IP, particularly in the service provider environment, in the early days.

One thing I would say you need to be aware of is that voice over IP not only gives you the possibility for compression but actually for expansion as well. Today we still have wideband CODECs that enable us to have CD quality speech. We may find a situation in the future where the old adage of toll quality might actually be considered poor quality.

The second thing is, obviously inherent in its nature, voice over IP provides packetisation. This just means that we are taking voice analogue or digital voice and putting it into IP packets. The thing that is important about this is that it means we can now have one transport infrastructure for both our voice and data communications. That opens up the possibilities for new integrated applications and, as you will see, a new suite of protocols are starting to emerge that are much more web-centric and Internet-centric than we have typically had in the past from the traditional PSTN types of protocols.

The third thing which is probably the most complex to understand -- I think everybody is familiar with the first two concepts -- is in the area of call control. It is how you set up a call, maintain a call, and tear that call down at the end when you hang up. There are a number of different types of call control in voice over IP and they essentially fit into these two categories, of peer to peer and master slave.

Actually, are there any Americans in the audience today? I have been told that in the United States you are not allowed to use the term "master slave", you have to use the term "parent child" or some other thing to describe it to be politically correct. So I apologise if you think it is not politically correct enough.

The easiest way to understand call control is to look at a traditional switch. This looks a very techie slide but I am going to try to explain it in simple English. In a traditional voice switch, this could be a TDM switch from a service provider environment or a PBX, but you basically have the ability to be able to connect in phone systems from one side, you have the ability to be able to connect to other phone switches or other PBXs or telephone switches on the other side. There is some switching technology in the middle which actually switches the calls and there is also this call control layer which is essentially taking the digits that you punch into your telephone, working out where that call needs to be routed. These are the basic elements of a traditional switch.

In voice over IP, because it is a distributed architecture, what we end up doing is splitting this voice switch into various components and distributing them around the networks. Let us have a look at these two methods of doing this.

The first one we mentioned is this master slave distribution. What this means is that we have centralised call control, most people will probably refer to it as a soft switch, which resides somewhere in the network but directly controls the gateways at the edges of the network and the gateways of just the devices that are taking the voice and turning it into IP. In this case most of the intelligence is residing in the call control and the 'in-points' are pretty dumb. The protocols you may have heard of are H248 and MGCP.

The one that most people are probably more familiar with has been around a very long time, that is Peer to Peer distribution. So instead of having this call control centralised in a single box, we have actually just simply split the switch down the middle so that the call control ends up half of it being at either end so you end up with these intelligence in-points. Protocols using this architecture are protocols like H323 and the new SIP protocol that many people will have heard of.

The thing about this is, to route those calls through the network, the network routes on IP, it does not route on telephone numbers. So you need something to be able to translate -- when I punch in a telephone number, I need to be able to translate that to into an IP address because it is the IP address I am trying to get to at the other end.

You can see in this architecture, for every device to know where to send a call they would have to have a complete list of every single telephone number and associated IP address in the entire network and even in the entire world, which is clearly unscaleable. The way in which we scale that is by having these directories. You can just think about them in that term. In H323 we call it a gatekeeper and in SIP it is usually called a redirect server or proxy server. Essentially it acts as a directory system so it translates the numbers that you punch in into IP addresses that can then be routed through the IP network.

That gives you an understanding of those three main characteristics of voice over IP that I really wanted to get people on the same level of understanding. Then it helps you to understand exactly why these characteristics are so important and how these characteristics are being translated into applications and actual services.

I will give you a few examples here. The first one of call control, it means that even with this distributed architecture or the soft switch based architecture we get location independence. What that means is that we no longer have to have the call control in the same place as the calls coming in.

A couple of examples of this, Cisco in the Asia Pacific region, we cover the whole of the APAC region with a number of offices distributed in all the countries here. We used to have about 40 PABXs distributed across the theatre. When we moved to IP PABXs we ended up with six IP PABXs controlling all of the systems for the entire theatre. That gave us enormous savings in terms of equipment, staffing and things like that. So we got big savings immediately.

For a service provider environment though, a good example is Cbeyond in the United States. They are offering services to four markets in the United States but they only have two places where they have employed their call control soft switch. So they can provide an entire telephony service to a city that is hundreds or even thousands of miles away from one centralised site. Clearly that has been a key advantage to Cbeyond in being able to move into these new markets very quickly and cheaply so they can start turning up services to new customers far faster than they ever could with TDM systems.

I mentioned something about SIP before. I am sure most of you have heard of SIP or heard the buzz word. This stands for Session Initiation Protocol, which does not really tell you an awful lot. Essentially there is a lot of hype in the industry around SIP today because SIP is starting to change a few of the paradigms about voice communications, particularly voice over IP. SIP, the main characteristic is that it is built on web technology so it is a definition that comes out of the IETF, the Internet Engineering Task Force, as opposed to most telephony standards being driven by the International Telecommunications Union.

Now what we are doing is bringing web-centric and Internet-centric views of the world, in terms of application development and those sorts of things, into the voice world. Because it was set out to work across any media, any type of device and to enable both voice, data and video communications, we see a lot of industry effort going into developing SIP architectures and we, certainly at Cisco, think it is a very exciting future.

If I was to look at some of the applications or services that have been delivered over a period of time now you might argue about the exact placement of some of these services on the timeline. I have listed them by things a consumer can do themselves, things that businesses would do themselves, and then things a service provider might offer as a service. The main thing here is that the initial application and services were all cost-driven so everything was about doing it cheaper. So I am certain if I was to play name association, if I say a word and you say something back, the first thing that comes into your mind, most of the time when I say "voice over IP", people say "cheap". That is the main thing that got voice over IP off the ground but in the future we see that most things in voice over IP are going to be application and service driven.

A really good example is to look at what happens in the enterprise. In the enterprise we have seen a very large growth in what we call IP telephony or IP PBXs. The reason we had this large growth, the turnover of TCO is total cost of ownership, meaning that in the beginning there was one infrastructure, you just have one wiring system, you did not have a separate data and a voice wiring system, you have this centralised call control that I talked about before. You also have this idea of reduced cost of MACs (moves adds and changes). One of

the characteristics of voice over IP is that the telephone number is associated with the device and not the location of the device.

It means -- I have been in the Singapore office for six years and I think I have moved desks seven times. In the old days with a TDM system every time I moved desk within the building I would have to wait a few days for someone to reconfigure the PBX for the phone on my desk to get my phone number ported across. Each time I move in Singapore now I just pick up my phone, move to a new desk, plug it in and the number follows the phone.

We have even seen this with some service providers, like Vonage in the United States who is now offering what they call "one number for life". It means that you get a device, it has a telephone number on it and you can take it anywhere in the country and actually you can take it anywhere in the world and that number will follow you. So they do not even talk about local number portability, they talk about global number portability.

That has been the past of enterprise telephony but today there is a lot more emphasis on new applications and the productivity gains that enterprises are getting out of these new applications.

This phenomenon has driven a massive change in the way that enterprises view telephony such that by 2006, IP PBXs and IP telephony systems will be a larger market worldwide than traditional TDM systems. So this phenomenon has certainly been very good for Cisco but not only has it enabled Cisco to become the largest supplier of IP telephones in the world but in a very short time it has catapulted the company into being the fourth largest supplier of total enterprise voice systems. So the move, the swing from TDM to voice over IP and IP telephony in the enterprise has been very dramatic.

What about service provider? It is pretty much doing the same sort of thing but obviously the service provider environment is a very much more complex environment and very much larger. Service providers are moving from TDM systems to packet or IP based systems.

We will look at a few strategies there. Most of the way we can view how things get done in the service provider tend to be driven out of cost reduction or new revenue generation. We can basically classify these into two approaches that service providers are making: one we would call an inside-out approach, and the other an outside in. I will see if I can explain what I mean by those approaches.

If we were to start out with the two networks as they might be today, this would be a traditional telephone service provider network on the top with class 4 or class 5 switches and a transmission system and then associated telephones or other telephony to connect to them. On the bottom we have a data network. This might be the service provider's own data network or it could be another service provider's network.

The first thing operators started to do was to be able to bypass that long-distance transmission system by connecting these media gateways that encode the voice into IP packets, connecting those into the network and then using the long-distance IP network to offer cheap calls.

A couple of examples of these are China Unicom who built the largest domestic voice over IP network in the world and they were using mostly calling cards so no direct billing relationship with the customer was required. They roll their network out at a speed that is

something in the order of five to seven times as fast as they could if they were trying to do it with TDM technologies. Another one of these is TOT in Thailand who offer a cheap service they call Y-tel 1234 which is just a very cheap long-distance service.

The next stage of this is not only bypass the network but to replace the network. We have been working with operators like Telecom Italia in Europe to replace their long-distance network. They are in the process of turning off all of their class 4 switches in the country and putting it over a complete IP backbone.

As you can see, these are mostly cost driven. As far as the customer is concerned they see no change, they have absolutely no idea that anything is different in the network. It is purely about an inside-out approach to the transformation of the telephone network.

People who have done things the other way round, a good example is Time Warner Cable in the United States. Time Warner was a cable television operator, they started using their cable television network to offer high-speed Internet services. Once they had that service in place then they started exploiting that capability to offer voice over IP over the top of that high-speed data infrastructure. They have only been launched a matter of months and already they have over 200,000 users in their network and growing very rapidly indeed.

The thing for Time Warner, they do not see voice as the end game, they see it as part of the whole suite of services they intend to deliver to their customer. You can see here they have things like home networking, VPN, voice, entertainment, gaming. Their broadband network and their services that are enabled by that, voice is just treated as just one of those services. So it is a completely different view of things.

When we talk about what Time Warner is doing we say they are building a converged network. We like to look at convergence of networks on three layers. The first is network convergence, that is obvious, one single data network but lots of services, voice data, video over the same ones. That is easily understood. Above that is actually a service convergence layer. This is the idea of getting service continuity across all sorts of either different access or different devices. This would be things like I can receive my email on my mobile phone. I can pick up voicemails through my email system. So unified messaging is a great example of service convergence.

We are starting to see this new layer of what we call application convergence. This is one of the hardest to understand. If I can illustrate by a couple of examples. Has anyone here used an instant messenger like Yahoo! or MSN and understands presence -- the idea is that if I am on my PC and I am using it, my PC understands that I am sitting in front of my PC and it can tell all my friends at the other end, "Grant is logged on and he is using his PC." I can go in there and set things like if I walk away from my PC for ten minutes then my PC says Grant is not using it anymore, I will set his status to being away. I can also go in and manually set those things.

It is purely about a data interaction. What we are starting to see is applications like the telephony application talking to these messenger and presence servers. So that now, when I'm sitting at my desk and pick up my phone to make a call my instant messenger or my presence server automatically tells everybody else, "Grant is on the phone, please do not disturb him." So you are getting this tie in of applications together.

Taking that a step further, how often do people either come home or come back to their desk and on the phone it says you missed six calls and you have one light on that say you have got a voicemail waiting. So there is some level of intelligence given to me about what has happened while I have been away but not a lot of meaning intelligence. So we are seeing applications where, not only when I come back to my phone it will tell me how many calls I missed, but it will tell me who those calls were from, whether that person left a voicemail or not and that person can say, "I want to mark with a urgency" and tied in with the presence application, I can see whether that person is at their desk or away from their computer or they want to be connected on a cell phone because their presence will be loaded onto that system as well. So some exciting applications and just a couple of very early examples.

If anybody is thinking about application convergence it seems that is the way we are going to go with all the hype in the market or the talk about NGN. In service provider this is the hot topic of the moment, this next generation network. The thing I find is when I talk to a lot of people, I ask them "What is NGN?" It is very hard to get two answers that are exactly the same because everybody has a different view.

We think there are probably three stages for NGN, the first being what people tend to be doing right now which is not much more than just PSTN replacement. So we would say this is a PSTN type NGN where what you are doing is replacing those assets with new soft switch technology but essentially providing exactly the same services as you did before.

The second one is more like an approach that Time Warner have taken, where they are starting to treat voice just as another application on top of the network. You think about NGN being much more encompassing.

The third stage, which is when you really get into discussions about what people think as totally new communications models based on voice, video and data, but possibly voice is not necessarily the most important anymore.

The last thing we would say is that we think the future for voice over IP and IP telephony is very bright. These are some of the predictions from various people. You will notice we have a 10 to 20 year scale here for the time the PSTN drops away to almost zero and everything runs voice over IP to voice over IP. My prediction is that, seeing how things move in Hong Kong, Hong Kong will be closer to that 10-year scale than the other scale.

In summary, I hope I have given you a little introduction of voice over IP, the main characteristics that gave it its initial growth in the market, mainly that it was cheaper and faster to deploy services. But the future, we feel, is far more focused on developing new converged applications and services to the market, rather than just about cost reduction.

Thank you for your time.

CISCO SYSTEMS

VoIP Technology – Past, Present, and Future

Grant Lusty
Director, Voice Technologies
Cisco Systems, Asia Pacific

Session Number
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VoIP Basics – Important Characteristics Compression, Packetisation, Call Control

Standard compression algorithm's –

Codec	Encoding	Kbps	MOS (Mean Opinion Score)
G.711	PCM	64	4.1
G.726	ADPCM	32	3.85
G.728	LD-CELP	16	3.61
G.729	CS-ACELP	8	3.92
G.729a	CS-ACELP	8	3.7
G.723.1	MP-MLQ	6.3	3.9
G.723.1	ACELP	5.3	3.65

Note: MOS gives an indication of the quality of the CODEC only. The quality of the CALL depends on many factors, including bandwidth, QoS, network delay, jitter, congestion, etc.

• Compression = Less Bandwidth = Cheaper Calls

However: Wideband Codecs (16KHz – 256Kbps) may become the norm in the future offering CD-quality voice

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VoIP Basics – Important Characteristics Compression, Packetisation, Call Control

And if you're really must know...

PCM	Pulse Code Modulation
ADPCM	Adaptive Differential Pulse Code Modulation
LDCELP	Low-Delay Code Excited Linear Prediction
CS-ACELP	Conjugate-Structure Algebraic-Code-Excited Linear-Prediction
MP-MLQ	Multi-Pulse, Multi-Level Quantization
ACELP	Algebraic Code Excited Linear Prediction

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VoIP Basics – Important Characteristics Compression, Packetisation, Call Control

• Plainly obvious but important as voice now runs the same protocol as your PC / data network

- One infrastructure (or the public Internet)
- New integrated applications
- Web-centric protocols emerge

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VoIP Basics – Important Characteristics Compression, Packetisation, Call Control

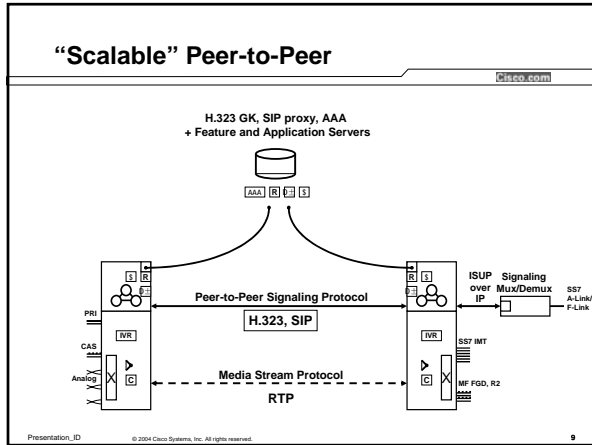
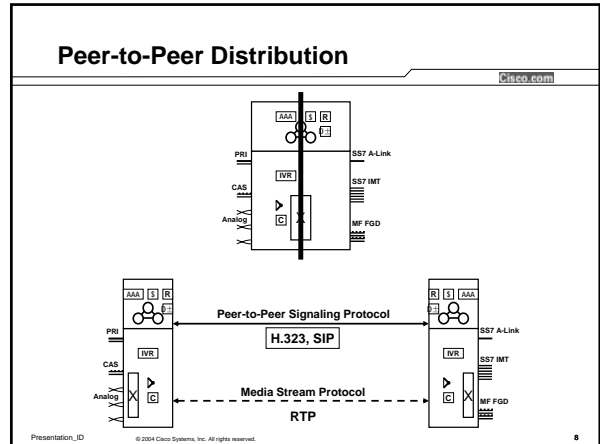
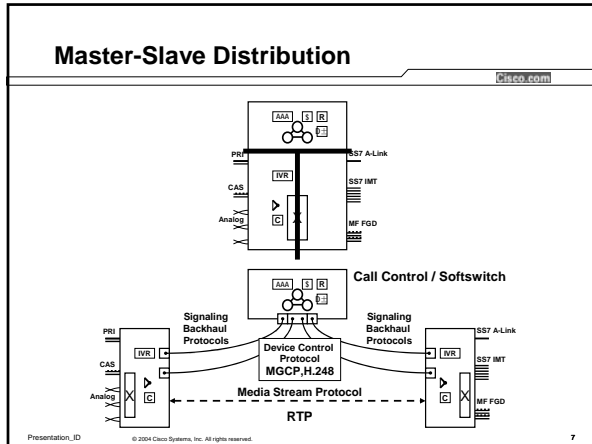
A few different types –

- Peer-to-peer – H.323 & SIP
- Master-Slave – MGCP & H.248 / Megaco

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Call Control (the only techie bit...) "Distribution Models" of a Voice Switch

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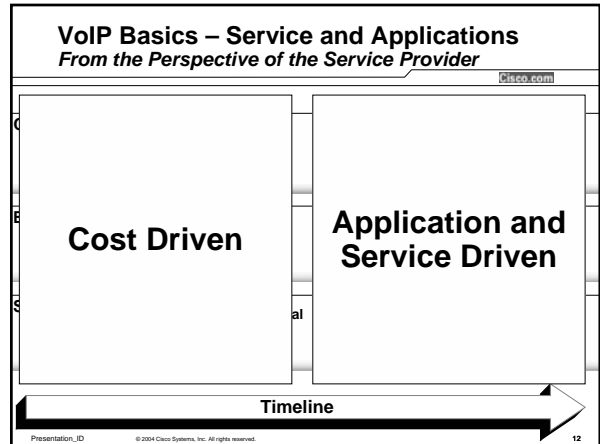


Call Control Common Characteristic - Location Independence

- Cisco APAC ~40 PBX's down to 6 IP-PBX's
- Cbeyond – Cities served by softswitch 100's miles away

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- ### Why The Hype About SIP?
- SIP extends the paradigms of the Internet to multimedia applications
 - Open architecture
 - Intelligent endpoints
 - Flexible applications
 - Vendor interoperability
 - Desktop and web integration
 - Resilient, scalable infrastructure
 - SIP may establish new communication model
 - SIP enables you to communicate independently from CPE, access, network, media, or location
 - No pre-defined call model
 - New Innovative communication services
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VoIP Adoption in the Enterprise Key Technology Drivers

Initially TCO

- Single Infrastructure
- Centralised Call Control
- Reduced cost of MAC's (Moves, Adds, Changes)

The focus on Application Enablement has become much more practical

- Conferencing
- Remote access
- Productivity

Users Pick Convergence Applications

Application	Percentage
Presence	25%
Productivity Tools	38%
Collaboration Tools	39%
Unified Applications	39%
Unified Messaging	42%
Distance Learning	46%
Networked Learning	50%
Unified Voice	52%
Remote Access	52%
User Mobility	58%
Productivity Applications	58%
Conferencing	61%

n = 241

Source: META GROUP

VoIP Adoption in the Enterprise Will Exceed the Legacy PBX Market by 2006

Worldwide PBX Market (\$)

(\$ billions)

Year	IP Telephony (\$ billions)	Legacy PBX (\$ billions)
2002	1	10
2003	2	7
2004	3	7
2005	4	6
2006	5	5
2007	6	3.5

Legend: IP Telephony (light grey), Legacy PBX (dark grey)

- Substitution underway of traditional systems with IP solutions
- IPT market CAGR +31%
- Legacy PBX market to contract at -16% CAGR

Source: Synergy Research, October 2003
IPT includes both "Pure" & "Enabled" IP Telephony solutions

SP Voice: Circuit to Packet The Evolution

BEFORE

AFTER

SP Voice: Circuit to Packet Trigger Points

REVENUE

Outside-In Approach: Services Centric

- Capture market opportunity for:
 - Business voice services
 - Residential triple play
 - VoIP calling cards

Logos: BT, SBC

COST

Inside-Out Approach: Cost Reduction

- Reduce TDM transit network cost
- Save with one network for many services
- Decrease number of network elements

Logos: TELECOM ITALIA, CHINA UNICOM

Circuit to Packet: Inside-Out Approaches The Starting Point—Separate Networks

Circuit to Packet: Inside-Out Approaches Inside-Out Transport Convergence

Circuit to Packet: Inside-Out Approaches Call Control Interworking

Multivendor Call Control Interoperability, Multiprotocol Support

TELECOM ITALIA

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SP Voice: Outside-In Approach Time Warner Cable

- Digital Phone service from Time Warner Cable
- Approx 200,000 users
- Unlimited Calling \$39.95 per month
- Ability to call anyone, anytime, anywhere in Continental US
- Package includes popular calling features
- Call Waiting, Caller ID, Call Waiting ID
- One bill for local and long distance service - combined with cable bill

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Time Warner End Game Intelligent Networks Power the Connected Home

New, Intelligent Devices and Services Demand an Intelligent MSO Infrastructure

End-to-End Intelligent Network

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The Future for VoIP Three Layers of Convergence

APPLICATION CONVERGENCE	Enabling Integration of D/V/V Services	
SERVICE CONVERGENCE	Service Continuity across access; Customer Loyalty	
NETWORK CONVERGENCE	Eliminate Network Layers; Reduce TCO	

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Application Convergence Example Phone State – Presence Integration

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Application Convergence Example Missed Calls List With Presence / Urgency

Presence state is aggregated from all devices belonging to call originator

Caller suggested urgency indicator (! is very urgent, ! is urgent)

Less time wasted playing phone tag
 → Higher percentage of calls completed
 → Increased productivity

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NGN?

Various Schools of Thought / Stages

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- **Preliminary Stage**
PSTN-type NGN (Softswitch)
- **Developing Stage**
Voice Is An Application (VoIP)
- **Advanced Stage**
New Communication Model

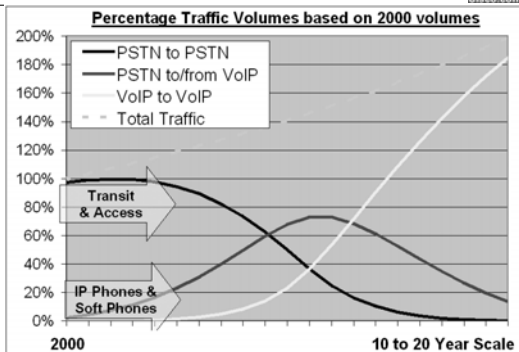
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25

Food For Thought

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6

Summary

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- The rapid growth in VoIP can be attributed in the beginning to the characteristics that made it cheaper and faster to deploy voice services
- The future of VoIP will be much more focussed on new converged applications in both the enterprise and SP markets



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YORK MOK: Thank you, Grant. Do you have any urgent questions at this moment in time? If not, we will leave the questions until later on.

Let us move on to another speaker. We are supposed to have Andrew Lih but he will be late. If case he cannot come in this session, he will join the second session and he will share with us his viewpoint then.

Our next topic will be the emergency services, PL Wong will share his viewpoint on voice over IP with us.

PL WONG: Good afternoon ladies and gentlemen. Today it is my pleasure and honour to come here and share with you some of my experience as one of the 999 operators. Today we will spend some time to tell you about the operation of our centres, how the system works in Hong Kong. Michael Ng, my chief telecoms engineer will later answer a few questions if you have any questions coming later today.

In Hong Kong, as you are aware, the police is run in different regions. We have New Territories North, New Territories South, Kowloon East, Kowloon West and Hong Kong island. Marine is a separate region, basically responsible for incidents occurring in the sea and outlying incidents.

We have three 999 centres, one in the New Territories, now located in Tai Po. The centre will basically pick up all 999 calls originating from New Territories North and New Territories South. The second centre is in Kowloon where they are responsible for answering the 999 calls generated from Kowloon East and Kowloon West residents. The Hong Kong island centre down in Anthony Street will only serve the whole Hong Kong island territory.

When people call 999, what is going to happen next? The 999 call takers will first need to decide which type of service is required, whether the caller needs police assistance or whether the caller needs the fire or ambulance service. This is very important because when the 999 call taker, once they have established whether the caller needs the fire or ambulance service, the call will be immediately conferenced to the other department's hot line.

As you are aware the fire service department is responsible for fire engine and fire cars. The police, the line operator will handle the call directly related to the police force. So when they get the information from the caller the information will be immediately sent to our response unit through the computer system and they will deploy either the big duties or an emergency unit car or a motorcycle to respond to the incident.

There are some interesting figures. Now we handle about 10,000 999 calls a day among the three centres. Some 35 per cent are from fixed lines. You can imagine how the mobile population is increasing. We have 65 per cent calls from mobile phones.

The information that the 999 call takers will need to establish at present, or what sort of information they will receive when they pick up the 999 call, the first information at present is the caller number. On the telephone they know who makes the call, what is their number.

The second arrangement with the service provider is that we want them, we have three line centres, to route the 999 calls based on the regions. Why do they have to do that? At present the three 999 centres are co-located with our dispatch console. When we pick up a

999 call, basically the two teams are working closely together. That is the reason why the police can respond so quickly because once they find the 999 call takers have given the emergency call which require to them to send the police down to the street immediately the information is not only delivered by the computer system, they will take all sorts of actions to work together in order to speed up the process.

The other arrangement is that at present we do not take other calls from other countries, or not made within the Hong Kong area. The reason is very simple. I think that all the public security bureaux will have the same arrangements because they cannot exercise their police powers if the caller is not in Hong Kong. So the present arrangement is that we will not accept or the service provider will only deliver calls made from 852 999.

We are soon going to have the new product coming up, the third generation command and contact system. On the third command and contact system the caller number and the caller locations will be immediately displayed on our GIS map. In other words, when the operator or the call taker picks up the 999 call the caller location will immediately be displayed in front of the call takers on the map and he will know where the call is being made. This is very important to us because it saves a lot of time in identifying the location of the caller.

The other thing of significant interest is the numbering arrangement at present. All our operators know that all the caller numbers beginning with 2 and 3 are fixed line numbers. In other words, the caller is calling from a fixed location. We can track the location of the caller based on that number because that will be the installation address of the caller.

The other number it is a portable number. We know we are not able to identify his location based on the number. Fine, we know that. 2, 3 to us is a good meaning. When they pick up the call they will verify where the caller is making the call and whether there is any discrepancy. Subscriber chart system, we have a system where we can use the fixed line number to find out the installation address. The reason we need that is in such a situation where the caller cannot give us the location or and he does not have the opportunity to tell us where he is and puts down the phone. Once we know that he needs help we can use the system to find out where he is. We can check from this number the installation address of the calling number.

The prime objective to us, in order to provide a good 999 emergency service, in fact basically the 999 call takers are trying to cut short the conversations, we finish the call normally in not more than two minutes, a minute or two will be the longest. Of course, in some situations we need to spend longer because the caller may have difficulty in giving us the exact location. Location is the prime information to us. When he can give us the information quickly we can cut short the conversation.

The other important issue is that we will try to deploy our resources as quickly as possible. Nowadays, we are talking about the police will arrive within five minutes in urban areas and around six to seven minutes in non-urban areas. That is how quick we are. Why can we do it so quickly? 999 can receive the information quickly and then we can pass on to them very quickly.

Lastly, we say that we need to locate the subject persons and render assistance. We will ask that in disaster situations -- I can still remember some ten years ago in a building fire in Yau Ma Tei where the 999 operator received a tremendous number calls, calls coming in non-stop. Some people were making calls from opposite flats, some inside the building. I

remember we received a number of recommendations on the why the police and the fire department cannot do more to locate the subject persons.

Based on that incident we know that if we can identify who made the call, where they made the call then of course we can make attempts to locate the persons. But in the old day, in that day, we only knew that this guy had made the call. We did not have the caller number in front of us, we did not have the caller location in front of us. So to do anything, we are not able to find out who is in the vicinity, who made the call. I think that 911 would have the same experience. Who is within the vicinity is something important to the public safety department as a last resort to locate the person.

The standard information will only know about so many people who have been calling, some may relate to another case, some may be inside the building, some may be in the opposite flats. What we are interested in is we want to make every effort to locate all of those inside the building and disregard those not of significant interest to the incident.

Lastly, just to give you some of the information. The police emergency departments strive to respond in nine minutes in urban areas and 15 minutes, despite, I told you earlier, we are doing much better than that.




999 Emergency Centre


Speaker : Michael NG Hoy-kee
WONG Pak-ling



香港警務處 HONG KONG POLICE FORCE

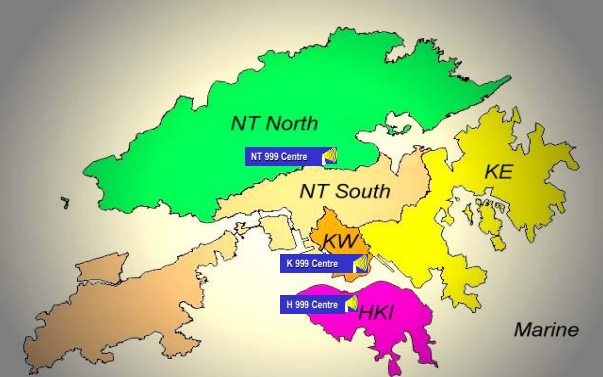


Operation of the 999 Emergency Control Centre



香港警務處 HONG KONG POLICE FORCE

999 Police Control Centre




NT North
NT 999 Centre

KE

NT South
KW
K 999 Centre

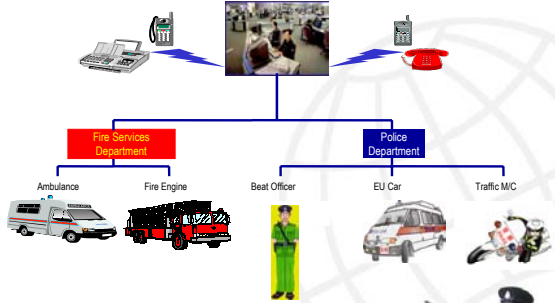
HKI
H 999 Centre

Marine



香港警務處 HONG KONG POLICE FORCE

999 Call Processing



Fire Services Department

Police Department


Ambulance

Fire Engine

Beat Officer

EU Car

Traffic M/C



香港警務處 HONG KONG POLICE FORCE

No. of 999 calls handled per day

Sources	No. of calls	
Fixed Line	3,699	34.5%
Mobile (112 call)	3,077	28.7%
Mobile (999 call)	3,932	36.7%
Daily Total	10,708	



香港警務處 HONG KONG POLICE FORCE

Information delivered and routing of the 999 call by Network Operators

- Caller Number Display
- Regional Distribution of the 999 calls
- Barring incoming 999 calls made from International Gateway



香港警務處 HONG KONG POLICE FORCE

Key information and system support to the call-takers when processing the 999 call

- Caller number and caller location
(automatic display on the GIS map in CC3)
- Significant identification of the caller number
(Prefix '2' and '3')
- Subscriber Check System



Prime objectives of the 999 Emergency Service

- Obtain correct and relevant information from the caller at the shortest time
- Deploy resources to respond the incident as quick as possible
- Locate the subject person and render assistance



Performance Pledge

The Police strives to respond all 999 emergency cases within :-

- 9 minutes in urban area
- 15 minutes in non-urban area



Thank You



YORK MOK: Thank you very much for sharing with us the performance pledge of 999 emergency services. Mr Wong, I think, talked about the general applications of the emergency services for the Hong Kong community.

We will now invite Dr CK Law. Dr CK Law will share with us the viewpoints on senior citizen home safety. He is the chairman of the Senior Citizen Home Safety Association and he is also the Associate Professor of the Department of Social Law and Social Administration of the University of Hong Kong.

Dr Law, please. (Applause). DR CK LAW: Thank you. Ladies and gentlemen, I do not have a PowerPoint. I hope I will speak with sufficient power and enough points.

You may wonder why I am participating in this particular seminar and I definitely have to thank the organisers for giving me this opportunity. What I am going to say today is to try to impress on you the concerns that we have in terms of the emergency services, that the challenges of the voice over IP have given to us.

I am going to have to explain a little bit to you how our service operates, just like a 999 service. Our association provides an emergency call service 20 hours for senior citizens mostly, living alone at home. They wear a device carried either on their neck or on their wrist. All they have to do in case of emergency, such as a heart attack or they fall in the bathroom, they can just press the button and they activate a device which is attached to the traditional telephone and it gives the call centre a call. In the call centre it will immediately pop up on the PC screen, knowing who that person is, plus all the details like medical history and everything. In cases where the person has already fainted we can call the ambulance to send to the elderly person's home. Because of our connection with the hospital authority, we can send immediately to the emergency unit what kind of medicine that person is on, what kind of disease they may have so they know how to treat that person as soon as the person arrives at the emergency room.

Why is that a concern for us? I have to speak frankly. I read about voice over IP for some time. I choose to think that it is a game for young kids playing on computers, talking to their friends and using that technology. But in October when OFTA issued a consultation paper then we looked around to check with our users, it was to our surprise -- our current number of users is 22,000 elderly persons, most of them living alone, some of them are people with disabilities, home bound. Over 1600 have already installed an IP phone. It is to our surprise. It happened within a matter of a few months. The reason is simple. If you look at our user profile most of them are elderly, with limited means, some of them are actually on CSSA. The voice over IP service providers gave them an attractive alternative and there is simply no reason for them to refuse them. The more important thing is they cannot tell the difference between traditional telephone and IP telephony. To them it is just the same, all they have to do is dial and call somebody.

Now we are faced with 7 per cent of users. What is our problem? Mr Wong has told us one very important thing. Voice over IP not necessarily can provide us with the location of that person using that phone, therefore we would not be able to tell which elderly person is calling. It would be fortunate if the elderly person could still talk to us so we can find out where they are and find out where it is from the computer. It has to take some time to communicate with the elderly person, as you know, it definitely takes time. But when the elderly person has already fainted, we have a problem.

We are still looking for solutions to deal with these issues. The reason I come here is to call for whoever is in the business or is going to be in the business, please consider this particular thing and try to offer a solution where we can find the elderly person because the difference in minutes, even one or two minutes will mean life or death for people who are struck by a stroke or heart attack.

Another technical concern is the issue of provision of backup power supply. The traditional telephone line provides the power needed during outage of primary power supply. This is not the case for voice over IP. At least under the present regulatory system the IP telephony services could fall outside the basic telephone line service. So it is not within what OFTA can control. As we know, OFTA is consulting the public regarding the backup power supply requirement for voice over IP and considering that as the basic telephone line service. We definitely agree with that and we hope that can be considered.

No matter what technology will be employed for carrying voice in the future we really hope that, for the reasons that no matter what technology, the importance of safety and the possibility of helping people in emergency, so always bear that in mind.

There are other issues like quality of telephone communication, we have concerns about after sales services because lately we have received a few calls from our users telling us that their phone lines are not working. The reason is simply because a few days ago, someone who installed a voice over IP phone, they put a new jack side by side and ask the elderly to change the plug three days later. Of course, they cannot remember so they say three days later why can I not use the phone?

At present we do not have all the technical solution in order for us to provide secure services for our at risk users. This is a matter of both ethical issue and a challenge to our basic mission which tries to ensure that our elderly living at home are safe.

It is easy to say that we can provide information and tell our users: if you use voice over IP I am sorry, we may not be able to help you in case of emergency. It is easy to say that but their lives are at risk, most of them 70 years old, with some kind of chronic illness. To tell them you are not helping them, it is a terribly difficult job for us but there is no option for us. Although somehow we can say that we can give the customer an informed choice.

My problem is that I have a different view from Grant. We are talking about in 20 years' time. Looking at the user profile I have, in only a few months I have already 7 per cent of our users, and they are what we call the lower-end user, already switching to voice over IP. I think that in less than ten years, I am not a prophet but I think the fixed line will probably be wiped out very soon.

I speak here not for the sake of protecting the service that we are providing, I speak here for the sake of saving the lives of our elderly people.

Imagine if you have an elderly family member or an elderly parent living alone. And maybe you have dreams about how in the future the technology can converge and all the things, various data, everything will come in one single packet of the technology that provides, or if you have a dream that in the future voice over IP will wipe out some other companies. But I hope you share some of our nightmares. Our nightmare is that one night one of our elderly persons suddenly has a heart attack and tries to call for help but no-one knows until seven

days later a neighbour calls the police and says there is an awful odour coming from next door, please help. I think that is already too late.

Thank you.

YORK MOK: Thank you, Dr Law.

I think Dr Law has raised some questions in our mind about how to ensure a safe home environment for the elderly. I have just talked to Grant, he has some technical ideas about how to solve the issue. Maybe operators have some ideas how we can solve the operational issues. I would like to leave that to the Q and A session.

I would now like to pass the floor to KS Wong. He is the associate director of OFTA and he will share with us OFTA's viewpoint on voice over IP and I understand they have just received some response on the consultation paper. Maybe he can share with us some big ideas from operators and from the interested parties.

KS WONG: We have listened to the technical capability of the IP phone and we have listened to the concerns of Dr Law. I want to recap some of the things we raised for consultation. I think the seminar is timely, we are consulting on the subject. The date is timely because due date was last Saturday. I have not studied the submissions so please do not ask me about the submissions.

In the consultation we have grouped the matters into four areas. Let me go through them one by one. I guess the first question we have to ask is "Do we need any distinction between the IP phones?" because there are many IP phones. This reminds me of two cases in the past. There was one case in the 1980s about mobile phones and ordinary telephones. There was another case in the 1990s about callback services and also IDD.

There are common things in both cases. The services were there to satisfy a customer demand and they prospered later on. The second thing was that the regulations were there to facilitate development.

Coming back to this IP phone, I think in this decade it is going to be the IP phone and we will see a lot of development of the IP phone. Our task is to find the right level of regulation.

There are different types of IP phone and quite a number of ideas on how to regulate IP phones. To find the right level, one approach is to look at whether the IP phone is to replace the normal phone. The logic is if it is then maybe the rules for normal phones should be appropriate. If it is not then perhaps we can be more relaxed.

Let us look at what are the current requirements for normal phones. One thing we have to remember is all these requirements were prepared ten years ago when the market was first opened. We have to ask whether these are still appropriate today.

Let me take one example which was mentioned which Dr Law. The backup power supply I think here it is the question of asking whether this requirement is essential for all users, even if it is essential whether we need to specify that in the licence.

There is a second group, if they were not substitutes of the normal phone, the question we raised in the consultation: do we need to set some minimum requirements, for example the ability to call the emergency centres and there may be some minimum requirements we raised in the consultation and we expect to see some response on this. I guess Dr Law must be submitting something I hope.

On the policy and licensing there is another area about whether a network can be separated service. In the past we have done that on the external services where the service is separate from the network. We are asking in the consultation paper whether services can be provided separate from network. If that is the case, whether a PNETS operator can offer the service.

There are some restrictions in the licence provisions to prevent them from offering. In the form of scope in the licence, they are not allowed to supply local telephonic services and they have no entitlement to numbers. I will go on to the numbers in a moment.

This IP phone is a very, very capable service. One special feature is it can be used anywhere, you can just plug in to any broadband connection in Hong Kong or outside Hong Kong, Vancouver for example. This raised a couple of things we have to consider. Mr Wong mentioned the location information. It would be a challenge to the operator to resolve this problem. I saw in the brief there are a number of solutions, either technical or administrative solutions.

The second area is this definition of external telephone traffic. We have used this term for a couple of applications. In the terms of licensing we used it for defining what is meant by external telecommunications services. Also we use this term, especially the definition for the calculation of local access charge for example and also the universal contribution.

Now, a call made in Vancouver over broadband, should we classify that as a local or external call? That will be impacting on this definition and also the application of the term. For the same reason, if the call can be made outside Hong Kong there will be more demand on numbers. We have to look at whether the current 8-digit number is adequate for the application or whether we have to look at some new methods.

An area we have to study is about numbers. This is a second important area. Some economies use 8 digits. Some other economies they use pre-selection, especially for those applications where it is not location specific, for example in the UK they assign a prefix or selection code for those places where there is no location information. In Hong Kong we have to decide which way we should go.

The second thing about numbers is whether we should mandate portability right now the rule for normal telephone is there should be portable numbers. We have to decide whether there will be portable numbers for IP telephones or the other type of IP phone. There are two cases. One is for those that they are going to be a substitute for a normal phone and the second case is for those that are not.

The third area we raised for consultation is about interconnection and access. Talking about interconnection, I guess there are at least two layers. In the first layer we are talking about connection between networks. If PNETS are allowed to offer services we will be talking about networks to services as well.

At present, networks use some of this information for settlement of charges, for example the caller number identification. Whether we should consider insist on this right in the future for IP phones. This comes back to a question. Actually, in the Internet world between services and network most of them are peering. The other idea is whether we should just adopt peering, forget about everything.

Now the access and also interconnection have impacted on the local access arrangement and also the universal service calculations. It is time that we should review the whole thing. In any case, the present system on these things are based on per minute, in the Internet world are we talking about minutes or traffic?

The second layer is about the IP on broadband connections. There are at least three scenarios, maybe more. In the first, both services are offered by the same company so there is no question of settlement. In the second scenario sometimes the IP phone operator has some agreement with the broadband connection provider. In such case there may be some guarantee of quality and some service attributes, a bit like line management network. This is based on commercial negotiations. I guess the question here is would the section 36(a) under the telecommunications law apply if there is a dispute?

The third scenario raised in the paper is the idea that some argue this is just like e-mail. It is on the best effort basis. Email is a data packet, IP phone is also a packet. If that is delivered on a best effort basis so there is no settlement.

The last area we raised in the consultation paper is preferences. You heard about preferences of 999 and also the back up power supply. We are raising this in the paper to ask some questions whether these services are essential or just preferable. If this essential for all or the majority of users or a small group of users? There are solutions to all these questions. Even if it is essential, do we need to specify that in the licence or in practice the market may be able to force them to provide. Those are the questions we asked in the consultation.

We have a timeline for the parts, the consultation part is easy. The decision part may be more difficult. We will make some decision in the first part of next year. With that I would like to conclude my presentation. Thank you.

Regulation on Internet Protocol Telephony

K S WONG
Office of the Telecommunications
Authority

Introduction

- Policy and licensing
- Numbers for VoIP
- Interconnection and access
- Customer issues

2

Key Regulatory Issues

Policy and licensing

- Any need to have a distinction between IP Telephony Services which are intended to be a substitute for conventional telephone service and those which are NOT?
- Whether all current licence conditions for fixed networks are still applicable to IP Telephony Services which are intended to be a substitute for conventional telephone service?

3

Key Regulatory Issues

Current licence conditions for fixed networks

- Conformance to numbering plans
- Number portability
- Any-to-any connectivity
- Interconnection
- Calling line identification
- Directory enquiry service
- Access to emergency services
- Backup power supply
- Quality of service

4

Key Regulatory Issues

Policy and licensing (cont'd)

- Should there be any minimum regulation on IP Telephony Services which are NOT intended to be a substitute for conventional telephone service, e.g. calls to 999 emergency centre?
- Current restrictions for PNETS to offer IP Telephony Services
 - scope of services in the existing PNET licences
 - no entitlement to subscriber telephone numbers
- Should we allow PNETS licensees to offer IP Telephony Services?

5

Key Regulatory Issues

Ability to use the IP Telephony Services anywhere inside/outside of Hong Kong raises:

- Issue on caller location information for assisting emergency services
- Definition of external telephone traffic
- Demand on numbers

6

Key Regulatory Issues

Numbers

- Should conventional telephone and IP Telephony Services use the same 8-digit numbers ? Or should we use a pre-selection code for IP Telephony Services?
- Should we mandate number portability on IP Telephony Services which are:
 - a) intended to be a substitute for conventional telephone service and
 - b) NOT intended to be a substitute for conventional telephone service?

7

Key Regulatory Issues

Interconnection and access

- If PNETS are allowed to offer IP Telephony Services whether any-to-any connectivity principle should be adopted?
- Any obligation/right for IP Telephony Services provider to send/receive calling line identification?
- Any obligation for IP Telephony Services providers to pay interconnection charges, local access charge and universal service contribution? Or should we review the whole arrangement for local access charge and universal service contribution?

8

Key Regulatory Issues

- Interconnection charge between IP Telephony Services and broadband access service providers
 - 1st mode** : IP Telephony Services provider is also offering the broadband access
 - interconnection charge not applicable
 - 2nd mode** : IP Telephony Services provider has an agreement with the broadband network operator e.g. to ensure quality of service
 - interconnection charge based on commercial agreement

9

Key Regulatory Issues

- 3rd mode** : IP Telephony Services provider has no agreement with broadband network operator
 - interconnection charge not applicable because customers have already paid for the broadband connection
 - quality of IP Telephony Services will be same as other Internet services, i.e. on a best effort basis

10

Key Regulatory Issues

- Are any of the following user requirements essential or preferable for all/majority users? Should we mandate the provision of the “essential for all/majority users” and let the market decide the offering of “essential for some users” and “preferable”**
- Calls to 999 emergency centre
 - Directory enquiry service
 - Backup power supply
 - Quality of service

11

Consultation

- Consultation paper issued on 4 October 2004
- Submission of comments by 4 December 2004
- Decision in first part of 2005

- THANK YOU -

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YORK MOK: Thank you for finishing his part early. We have more time for Q and A. Any questions from our audience?

JOHN URE: Can I just ask you to start the ball rolling and ask Grant or anybody else on or off the panel in terms of the technical solution how you can get emergency calls on a voice over IP, what are the answers, what are the solutions?

YORK MOK: Grant, shall we invite you to share with us your technical viewpoint? In terms of to provide a safe environment for our elderly.

GRANT LUSTY: If I speak purely from a technology point of view, certainly I think it is excellent that these social responsibilities are brought of the service provider network are brought into these sort of discussions in the service provider network the telephone system does have a social responsibility as well as a commercial responsibility.

A lot of the issues have already been dealt with, things like, let us just say at least having some of the features of the emergency number service, that if I call the emergency number and then hang up, it does not actually drop the call and the person at the other end is delivered the caller ID. The caller ID can be mapped exactly the same way as it is mapped in a PSTN environment, into a database that has the address and location and pictorial view of where the person is.

Backup power supply, that is an argument that seems to go backwards and forwards all the time. Some operators internationally are providing a battery backup service, they provide something where if the power goes out it can be made to stay up for 4 to 6 hours. And some more advanced ones have technology that can recycle the batteries and make sure the batteries are in good condition.

Some operators are saying they are a second line and they do not provide that backup but you can buy backup equipment that would have a secondary connection to a existing PSTN, that you would not use for phone calls but if the power goes out a relay flicks over and it flicks on to the PSTN line so you can still do those sorts of things.

What is interesting in that is particularly in some of the more developed geographies, Hong Kong is certainly one of those, the prominence of cordless phones in people's houses mean that even when the power goes out the power goes out on their cordless phone and they cannot make a phone call anyway. We are finding less and less people with phones that are physically connected.

I think the biggest one about the mobility issue, being able to pick up your device and move it and therefore effectively fool the system, where the system thinks you are living in this apartment but you have actually moved. There are a couple of different ways -- we did not talk about it in the discussion -- in which broadband, voice over IP is being delivered in some places today.

Some are like the Vonage model where you have a physical device that plugs into a broadband connection and the phone connects to the back of that. That can be moved around broadband connections therefore, depending on the broadband access that you have, you may or may not know whether that broadband connection have been shifted.

For instance, in our enterprise systems, even though I can pick up that phone and move it to another floor and plug it in to an ethernet port on another floor, the ethernet switch does not move. Because the switch understands what device is connected to it the switch knows that phone has been moved and can provide a report to say this phone has been moved to this switch port which we know is at this location. Particularly in the United States that has been a requirement from some large companies, to be able to identify exactly where the phone is.

The other way in which broadband is being delivered to customers is where the customer does not actually get a broadband connection necessarily. They still get a voice connection, but it is connected to a shared device that is then connected to a broadband connection. That shared device may have 24 phone lines on it that being dropped into various apartments. Therefore the person, even though they do have a voice over IP system, cannot actually move the phone to another system. So you are actually able to tell exactly where that person is connected.

The interesting one is Vonage in the United States, where they do have this device that you can move around. They do provide emergency service support but they do require that the customer actually tells them that you have moved. As we have suggested there are two ways of handling it, technically and administratively.

With every new technology comes its challenges. I think that the good thing about this is that those of us involved in the technology are aware of these issues and there are great strides being made but we do have some way to go.

YORK MOK: I realise that some technical solutions have to be invested in by the operators. Can I invite Ricky to share with us how we will help the elderly, will it invest in the network?

RICKY WONG: I will be the speaker after the coffee break.

Let me explain first that the implementation of voice over IP in Hong Kong is in two categories. The first is called On-net. We already have 250,000 lines installed in Hong Kong. It is over our own optical fibre network here in Hong Kong so most of them we already have a UPS battery supply so the outage of the electricity will not impact the services at all.

DR CK LAW: Most, not all.

RICKY WONG: If the areas do not have any battery supply -- I hope there will not be any equal opportunity commissioner here -- we will not accept any application whose age is over 60 years old. That is our current practice. That is why I say I hope reporters will not report this to newspapers otherwise I will get a letter from the ECO tomorrow.

I think one very important thing is the reliability of electricity supply in Hong Kong is extremely reliable. If you look at the figure in 2002 and 2003 the reliability of our electricity supply is better than the telecom network. That means that if the elderly really has a heart attack, the chance that he cannot make a call due to the telecom network is higher than due to the failure of the power supply. So if we really require 100 per cent reliability I think there needs to be something done in Hong Kong before they can assure that. We all know that we cannot assure 100 per cent guarantee.

Most importantly, do not be misled. Look at their web page, the reliability of Hong Kong Electric is 99.95 per cent. That means on average every year they will have an average of five hours of failure. So do not worry about that.

In fact we understand the concern from the elderly citizens.

The second category of voice over IP is offnet. We wish the broadband provider can provide UPS because if the broadband provider provides a UPS port then there will not be any interruptions on broadband and the phone will work. The thing is again, we also believe that the most important thing is the current guideline for Hong Kong operators. The current guideline, if we know that the applicant is over 60 years old we will ask whether they fully understand that if there is power failure there will be disconnection of the service. I think the customer well informed is one of the very factors to making this work.

Right now we have already 20,000 lines installed for the offnet. I think most of the age is between 18 and 35. I do not think we need to worry about heart attacks for those aged below 35.

YORK MOK: Thank you. The telecommunications network of course cannot be guaranteed but after Mr Wong has spoken his opinions it will be 100 per cent. We will have Tony to express his opinions after. Tony, do you want to say something?

TONY: I am not trying to stay something against Ricky Wong. I am representing the Internet and Telecom Association of Hong Kong today and Mr Wong is one of our members so, I have to say something on behalf of the members today. I want to argue what Grant just told Dr Law. I am sure Dr Law has been doing a lot for seniors which is very important. We have to protect their well-being, their lives, this is important.

I tend to agree that some of the concerns that the elderly have on VOIPs. As we know the telephone is a lifeline for the elderly. But for the youngsters, they probably have several mobile telephones, have broadband, fixed line, a safety net. If anything goes wrong on the broadband or the power they have their mobile phones to use. But not for the elderly.

I understand from the members of the ITAHK, they are pretty restrained when selling to the elderly. I know that some members will ask whether the elderly is using a "gau meng jung", it is a device that Dr Law described. I know some operators in Hong Kong would not be selling to the elderly in case these people are using these life critical devices. The technology may have to get more mature before we get a guarantee on the service.

Ricky explained the On-net and offnet kind of services. I do not believe think these senior citizens will be using this kind of offnet services because they do not use broadband network at all. The possibility would be very small. Most likely the 1,600 VoIP lines that Dr Law said the seniors had already installed would be on the On-net kind of stuff, they have backup power, if not externally for those equipments inside the building have been the power.

I understand from some of the member operators that in the future they could be introducing a CPE, maybe a telephone set, a device, a cable modem or other kinds of modems with backup power. I understand it is not cost effective at this moment. Given time the technology will mature, the cost will come down.

I am sure that in the future operators will be able to provide a better service through VoIP to anybody in Hong Kong, so that should ease the concerns of Dr Law on all these senior citizens. I hope one day very soon they will be able to do it.

DR CK LAW: I do not want to take too much time on this topic. I just want to say do not rely on the assumption that the fixed line, the traditional telephone line will remain in existence for the next decade or so. That solution of saying I am not going to give you a service because you are 60 or above, which means that some time in the future they will have no telephone service. So that is a remote or possible possibility. No matter what regulatory system we have, please take that consideration in mind.

The second thing, I am not quite sure of the marketing strategies that you send out to the people. But the factor in just a few months of time we have 1,600 elderly persons who are using our device, who have switched over to voice over IP, that is not within our control now. We are running into that ethical dilemma to stop some of the services because in some testing the results are not that positive, meaning that we are not actually providing to them the service they need. That is a very painful decision that we have to make.

PL WONG: I mentioned the emergency service. During my presentation I tried to cut too many corners. In fact I mentioned the call numbers, call locations. This is extremely critical. Nowadays, we say when people are making calls, who want to kill themselves, make the last moment to call his friend, we may know his caller number, we will go to the system to find the location. Fine, no problem, we know we can check it. We do not know the implication in the future. If the information is confusing or misleading then that will be critical. I think that the emergency we are talking about here the line is open to us. If case it is not that is a different story. Caller location, unless we can identify, we should disregard it. Mobile numbers we know that we are not going to do anything but if it is going to be the same numbering it will be a great concern to us.

Some will say, "You know my number already why are you asking my number?" We spend a lot of time to explain to them that number may not be the same because when you call from a PBX that number is a PBX number, it is not the number that I can establish contact with you.

The second issue is that the caller number -- I mentioned the investment to say that we will have a automated display of caller location or address. The beauty is we can cut short our conversations. Very often people in crisis situations will mix up important information. We spend a lot of time to exchange information, to confirm the address, to establish locations. Most of the time is spent on establishing the locations.

The investment we put is if people call from a fixed line in the future we can establish information within 10 seconds, if the information is correct. We do not have to ask them which block, which phase, which building. This can be cut short. This is my prime concern. If we are going to have the caller number we want to have the exact caller number and address and not give us any misleading or confusing information. When you design a system I hope this will be an important element. Thank you.

YORK MOK: Thank you, Mr Wong. I am sure Dr Law's speech is very powerful because in most of the Q and A session were talking about how to provide safe environments for seniors. I am sure in voice over IP, this new software, a lot of discussion will be going on. Now, in talking about how to support seniors, there is also some other regulatory issues --

economy of voice over IP, impact to the FTNS providers. If you would like to express your opinions to OFTA you have to follow up, otherwise maybe you can get hold of Mr Wong to express your opinions. Mr Wong, do you want to say something to follow up?

RICKY WONG: Mr Wong, for the On-net customer you have no problem because we provide all the accurate caller display and address information. For offnet, when our technicians install the offnet voice over IP we correct the address and put it into the database. So whenever you give us the phone number we will be able to give you the correct address information unless the user has moved the voice over IP box to another location without informing us. That is the issue.

YORK MOK: Also I recall that Dr Law has some statistics, 16,000 clients have had some testing issues. Perhaps Mr Wong can follow up with Dr Law.

RICKY WONG: Our information is not much. Checking the number we have only 1,000 lines installed.

YORK MOK: I know you may have more conversation with Dr Law. Dr Law, you may want to follow up with some voice over IP providers, not necessarily Mr Wong.

Let us have a tea. The second session is coming soon. Thank you.

(A short break) (4.05 pm)

JOHN URE: I am not going to do much talking. I am glad to say that Andrew Lih from the Journalism and Media Studies Department of the Hong Kong University, who was going to be in the first session, is going to open up this session. Then we will go on to hearing from PCCW and Hong Kong Broadband Network. Andrew is going to start with a demonstration for you.

Without much further ado, Andrew, the floor is yours.

ANDREW LIH: Good afternoon. John invited me here today to give you a quick overview of where we are today in voice over IP. One of the things I will show you is Skype. But I just want to talk very quickly about the whole concept of voice over IP. Oftentimes when I am talking about this, it is lumped in together as just voice over IP but it is lots of different concepts and lots of different models, when you talk about voice over IP.

One thing I would like to point out is that is interesting is in the United States they consider broadband anything faster than 100 kilobits per second. That is kind crazy for us in Asia where we are used to 1.5 Mb to start with. That is what you are working with in terms of broadband and voice over IP in the States.

Just a quick rundown. Some of the vocabulary you will see when talking about voice over IP. Anything from H.323 which is the regional standard for session management of things like audio and video streams, SIP, session initiation protocol which is the newcomer, RTP, realtime transport protocol which sends your packets from a place to place and something that is quite new which is a standard based on SIP for doing instant message voice applications.

This is what I was talking about before in terms of with VoIP not being just one thing, you can have VoIP in any part of the transaction between the caller and receiver. Whether you are talking about just using VoIP for the long haul, what you see in China and other places with IP phone cards, they are using the net to receive calls or send calls or things like Skype with VoIP going from end to end, from PC or PC, or from CPE to CPE at the customer end.

VoIP, talking about it as one large thing, it is not necessarily a very accurate thing, there are many different models you can imagine with VoIP in the transaction loop.

Again, the private IP Internet being used to transport the phone calls from PSTN to PSTN is what you see a lot of in terms of IP phone cards. We will talk a little bit about other services like Vonage, Skype and Freeworld dial up.

The first generation of IP, if you remember the original companies like Net2Phone, gave VoIP a very bad name in the original days. It was long delays, dropped calls, bad quality and the addition of voice chat features and instant messaging did not help things either. A lot of half duplex calling solutions, choppy quality, not much in terms of ensuring any type of decent quality of service by these different folks.

Even worse, in terms of installing the adoption of VoIP instant messaging, a lot of third party clients did not support voice calling or voice chatting over the Internet.

One of the problems you will see that held back VoIP was the NAT problem. As more and more people had broadband connections at home these PCs were not just sitting on the Internet, with addressable Internet protocol addresses. They were behind routers and

firewalls and although PCs could initiate a session, in the early days you could not receive a connection because you were sitting behind your residential firewall or residential router.

These days this problem of leaving many clients uncontactable or being hidden behind firewalls has been solved by having third parties be the intermediary to rendezvous those two sides. This is what you see with solutions like Apple's iChat, a video conferencing solution and also with folks like Vonage and Skype.

The original VoIP network that was created in both a hardware and software solution was called Freeworld dialup. It still exists today but not very popular. It was an important step in terms of adopting SIP as a major protocol on the Internet for connecting individuals on the Internet. There was no PSTN gateway through this network, it was all peer to peer on the Internet. It used some basic off-the-shelf hardware like the Cisco ATA boxes that you see on a lot of VoIP applications, or software running on your personal computer and you can still sign up for accounts and run it and it is completely free on the Internet.

As I said before, PSTN connections to PSTN connections are the majority of what you see VoIP being used for right now because the quality of service can be controlled by these long haul operators. One great example of this in the US, showing that it has reached mainstream is AT&T has a programme called CallVantage and they just lowered their prices this last month so you have unlimited local and long-distance calling through a VoIP over broadband for \$29.99 a month. In the US it is a good price. Then you have unlimited calling plans for about \$19.99 a month. Vonage is one of the pioneers in this area. They are the ones who pushed the larger telcos to go with this type of VoIP residential broadband model.

We come to Skype, one of the reasons Skype has a lot of interest now is because it is not only made by one of the most notorious peer to peer companies on the Internet, but it is fully encrypted, not only its instant messaging but its end to end voice conversation. Pretty strong. One of the best-kept secrets of Skype that very few people talk about is the fact that the voice quality is much better than what you are used to in terms of 8 bit, 8 kHz voice.

Some people have said it is like the quality you get 128 kilobits MP3 off ISDN, which is the standard way that radio stations do remote studio interviews. For this reason there are people on the Internet doing Internet radio shows that are using Skype to remotely interview people over the Internet and it sounds like they are in a radio studio right next to the host.

Skype claims that all PC to PC calling will be free using their system. They have an option to connect your PC call to the PSTN using a service called SkypeOut. It exists today. They charge on the order of 2-5 eurocents per minute, which is pretty inexpensive. By the middle next year they are promising a SkypeIn programme which allows PSTN calls to be received at your computer or whatever device you are using. They have a beta programme which you can run on a pocket PC. It means you can have the VoIP application on your pocket PC. If you have wifi you have a wireless Skype device which you can use to send and receive calls.

Let me show you Skype very quickly since John said it would be interesting for folks to have a listen to this. This is the Skype application. You can see it looks like most other instant messaging programmes. How many people here have tried Skype before? About maybe a fifth.

Just let me hook up the audio connection. This is a friend in Shanghai just to show you this is not just next door in Hong Kong. (Dialling tone) Can we hear the audio? We cannot hear.

FONS TUINSTRAS: Hello?

ANDREW LIH: Fons, are you there?

FONS TUINSTRAS: Hello?

ANDREW LIH: He is.

FONS TUINSTRAS: Hello?

ANDREW LIH: That is him on the other side if you can believe it, it sounds like someone here. Let me type messages and he will say something.

FONS TUINSTRAS: Hello? Yes, very beautiful. Can you hear me? Okay, that is okay. It is beautiful weather here. It is a little bit cold for Shanghai standards.

ANDREW LIH: That is the voice quality you can hear. It is not your typical phone call connection. Fons, can you hear?

FONS TUINSTRAS: Okay, that is fine. I hear you now and then. The Internet connection in the office is not very well. No problems in my home. No problems in Starbucks as we have seen a few weeks ago. Chinaherald.net. It is a very easy way, people can click on Skype and talk to me directly.

ANDREW LIH: I just wanted to show you the voice quality. As you can hear it is not terribly different than what you are hearing from me now in terms of the quality. Skype has a good reputation on the Internet, not only because of this voice quality and the licence to CODEC from California company that makes extremely good CODECs at this bit rate. But also because it is pretty much click and run, you do not have to configure your router or firewall to open up any ports. In that sense it is fire and forget in terms of working its way through the firewall and NAT to work.

It does support multi-party conferencing, not on the Mac version yet but it is an interesting application and it will provide an interesting alternative to consumers.

Just to sum up, the question I always ask folks about VoIP is what is the value of a VoIP operator you can imagine that the entire VoIP application can fit inside a Java applet so you can download onto your pocket PC. So the value is not in the software or the CODEC or in any of those types of things.

What is the value of a VoIP operator? Ease of use, that is one reason why VoIP was not successful until recently, price competitiveness, for Skype it is low cost or for outbound calling, quality of services and directory of services which is the most important thing. As more VoIP operators start up the real value is in what kind of user base do you have and is it easy to contact folks and find them on the net? That is going to be an interesting challenge as we go forward with multiple VoIP operators. You are going to have islands of calling and how are you going to connect those people in a cost effective way?

JOHN URE: Thank you very much. Remember folks, you heard it here first.

Our next speaker is going to be Stuart Chiron who is the Director of Regulatory Affairs at PCCW.

STUART CHIRON: In telecoms when you see an issue you know other markets have looked at it in the last 20 years, whether it was liberalisation, privatisation, interconnection so there are reference points you can use when you are a policy maker. VoIP is a little different because everybody seems to be looking at it now at the same time. That is true in Australia, the EU, US, UK, Germany, Singapore, Canada et cetera.

There is not a lot of history yet on the regulations of VoIP, a lot of countries doing it all at once, which is unique. It seems that in the proceedings that have been initiated, this is true in the countries that I identified above. We heard this morning that one of the key issues is consumer protection and social welfare. The concept that when new technology or new applications come to the market, we ought to see an enhancement of social welfare and nothing should happen that will undermine it. It may be that in some cases the first generation of a technology we should pass on or maybe we need to adopt it a bit before we just grab it and run with it.

Certainly, VoIP has gone from a specialist PC to PC almost, the early stages of Skype that Andrew showed you and Vonage, and the market where you see it being used for local calling and not just long distance or national calling.

VoIP has a lot of appeal, at least it seems that way today, but I would argue that the advantages that the consumer sees are basically cost advantages. In most markets including here perhaps but certainly in other markets, it is cheap because it is an arbitrage opportunity at least for now until new services and applications come online.

The attractiveness of VoIP seems to be its ability to bypass charges that other carriers are paying. USC, LSC or Hong Kong Language for example, network charges, access charges, but it is real arbitrage cost advantages that will be short term. The question for Hong Kong since we already have cheap IDD and cheap local calls, what is the advantage of an arbitrage service here? The answer is relatively clear that the advantages are close to zero.

What Hong Kong really needs and is waiting for is the next generation of VoIP, the new services, the new applications, integrated platforms or where we are going to the future. Cheap we do not need.

Then the question for the regulator becomes what is it, how do you regulate it? Regulators have a tendency to regulate anything that moves. If it does not move they kick it and then they regulate it. In our view licence rights and obligations go hand in hand and you do not regulate a market by giving one set of service providers all the rights but then none of the obligations, including the obligations to pay for a network.

If you are going to be technology neutral, that is a phrase we hear a lot, then you need to have regulatory parity. If you are going to be an FTNS licensee with the rights then you are and FTNS licensee with all the obligations. That brings us to a proposal that we saw in other markets. I mentioned that we are seeing a lot of regulatory proceedings in a lot of countries and they seem to be heading towards a two-tier proposal solution. To translate that for Hong Kong licensing, tier one would be FTNS service and tier service is PNETS/VAS. This

generally is what we are seeing in other markets so if you are going to be an FTNS licensee then you get all those rights with the obligations. There is always a matching of rights with obligations. You do not split rights from obligations.

This presents a clear choice to the markets in terms of providers. They can look at the market, do their math and business plans and decide whether they want to be tier one or tier two, FTNS or VAS. That maintains network investment because there will be no free riders and consumer education, we heard about this this morning. No matter what we do, because we are going to be introducing something new, consumer education is going to be a very uphill battle. It is a battle that is not going to be won in the short term, it is about how bad are we going to do in educating the public? There is no way we are going to educate 7 million consumers. Even 20,000 ingrowing elderly that have special phones is going to be difficult to do.

Going back to tier one and tier two, this is how I see the world. You have the FTNS license and then you have the PNETS/VAS licence. Tier one requires owns or acquires its own networks which is a phrase from the FTNS licence. You have put together your network, you own it, you lease it or you have made arrangements with somebody else to use their network. You have the existing numbering plan, 2-something or 3-something. You have number portability within tier one. Obviously any to any connectivity, full interconnection rights.

These are what the FTNS licences do today. If you have that functionality then you have all those rights and all those obligations.

The more interesting side of the table is tier two because these entities have no rights and have to obligations. Everything they have it is something they can do on their own and they can commercially negotiate to get anything else. They can negotiate to get database services, they can commercially negotiate interconnection arrangements to achieve any to any. They will want that and it will be easy enough to negotiate that. It is not unlike peering arrangements. They will have special numbering and their licence is just a PNETS licence. If KS wants to earn some more money for OFTA he can raise the license fee.

When you divide the world this way it is consistent with global best practices. It can use the existing regulatory regime and it works for consumers which is what we heard about earlier.

I take no credit for this slide. I am not this artistic. The consumer welfare issues, the issues we have heard earlier this afternoon, these are the same issues you are seeing in other countries, whether it is the EU with their requirements for PATS, the US. It is all about national security, public safety, CLI, CLI when you move phones, continuous service, all these things. If you are going to be technology neutral you just move these same requirements into VoIP. To an extent the VoIP provider can provide more than this and in time they will. That is a plus and they can use that to sell and to market. Absolutely no bar on that.

Coming back again to consumer protection and social welfare. This goes back to the concept of what are we doing here? We have new technology, how are we going to use it? The point here is that you should never simply adopt a new technology for the sake of new technology but to promote the consumer welfare and public good. If you cannot do that then it is fair to ask whether you should be allowed to come into the market or you come into the market with a lot of consumer education and under a tier two VAS licence. The thing we had two slides ago, these are coming from the FTNS licence, the ordinance, TA statements.

Those are well-known obligations and these are some of the cross reference to where you would find them.

I will save the rest of the time for questions. Thank you

VoIP: FTNS or PNETS ?

Stuart Chiron
Director of Regulatory Affairs

Telecoms InfoTechnology Forum
 6 December 2004

Lots of regulatory activity re VoIP ...

- ACA & ACCC, EU, EU member states (e.g. Ofcom), FCC, IDA, CRTC, etc. all now looking at this
- Consumer protection and social welfare are the **key issues**
- Principles of being technology neutral, promoting investment and innovation, and primary reliance on market forces also relevant
- IP and VoIP moving from "specialist" PC-based services to mass market telephony services



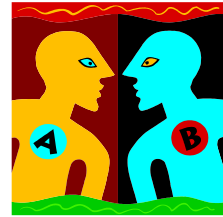
VoIP is an appealing service ... but



- Cost advantages built on arbitrage opportunities (i.e. bypass of USC, LAC, LIC, network/ ULL charges, accounting rates, access charges, etc.) This arbitrage cost advantage will, however, be transient
- HK has cheap IDD and cheap local call rates already (and better quality compared to first generation VoIP)
- Arbitrage VoIP has minimal utility here
- HK needs new services and applications, not "cheap" IDD and local services
- HK must not undermine existing FTNS regime while it awaits real VoIP benefits

VoIP: Telephony or Internet Application ?

- Licence rights and obligations must go hand-in-hand
- Cannot give VoIP service providers all of the rights but none of the obligations (including payment of charges)
- Technology neutral and non-discriminatory regulation required (regulatory parity)



How to regulate VoIP services ?

A 2-Tier proposal would work ...



- Tier 1 (FTNS service) v. Tier 2 (PNETS/ VAS service)
- In line with global best practices
- Clear rights and obligations per Telecommunications Ordinance, FTNS licence, codes of practice, TA statements, industry practice
- Matches rights with obligations (maintain regulatory balance)
- Can be provided within the existing FTNS/ PNETS licensing regime
- Presents a clear choice to VoIP providers (commerciality)
- Maintains network investment incentives and is technology neutral
- Still requires a large (and uphill) consumer educational effort

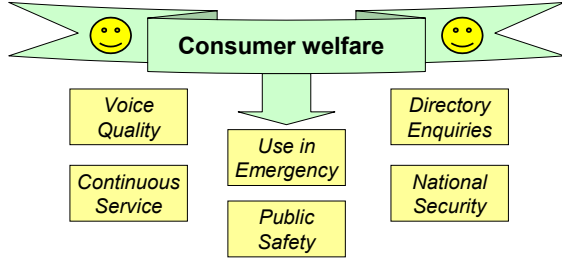
Each Tier has different rights & obligations ...

	Tier 1	Tier 2
Licence	FTNS	PNETS
Own Network	✓	X
Numbering	FTNS (2-,3-)	Special *
Number Portability	✓	X
Any-to-Any	✓	X
Interconnection	✓	X
CLI	✓	✓
DQ	✓	X
"999"	✓	X
Power Backup	✓	X

* To be determined by OFTA Numbering Advisory Committee forum

Consumer protection & social welfare requirements are satisfied by Tier 1 services

Consumer welfare is a prime consideration ...



Technology should advance consumer welfare, not endanger it

Consumer protection & social welfare are obviously important ...

- Should never de-grade or undermine consumer protection or social welfare simply to introduce a new technology
- New technologies and services should promote the consumer welfare and social benefits ... otherwise what is the point?
- If services are offered as substitutes for traditional voice services then they must provide same consumer safeguards
- Safeguards are already embodied in the FTNS licence, Telecommunications Ordinance, etc:
 - **GC 10** - "good, efficient and continuous" service implies power backup required
 - **GC 25** - requirement to provide directory enquiry service and printed directories
 - **GC 26** - provision of access to emergency services (not only ability to dial "999" but also to transmit correct caller's location)
 - **Section 33** - facilitate call interception and wire-tapping

Thank You



JOHN URE: Stuart has kept himself dry for later.

RICKY WONG: I am no lawyer so I am not going to have a legal debate today so please do not ask me questions about the judicial review. I will pass all the questions to KS.

Let me clarify what is going on today. As I explained earlier Hong Kong Broadband I believe in terms of numbers of subscribers we are the largest VoIP operator here in Hong Kong. However, let me again and again clarify we provide two types of VoIP services On-net. We already have 250,000 lines installed over our optical fibre network.

For a lot of people who do not know us, let me tell you we already have 100,000 kilometre cable laying in Hong Kong, covering about 1.2 million households. That represents about 53 per cent of the total number of households in Hong Kong. That is also exactly the same as when OFTA did the type 2 interconnections consultations, it is exactly the number that OFTA stated Hong Kong should have an alternative network.

The other, more interesting, or more exciting because the hot topic today is offnet VoIP, VoIP provided on other ISP network. The customer is using operator A for broadband and operator B for voice over IP. We launched that in August this year. Up to now, we have received over 20,000 applications. This slide was prepared a few weeks ago. Both the On-net and offnet voice over IP have value-added services like call waiting, voicemail, it is exactly like a traditional voice service.

I do not want to go through all the technical details. You can go to the Cisco or Nortel website to find all these details.

I want to compare a little bit PC to PC and traditional PSTN and Hong Kong Broadband offnet VoIP service. First we provide real numbering so you can port your number to us. Like my home, unfortunately the area I live in today is not in my own network cover so I have to ask for 6 megabit provision ADSL service. That is the only I use from them. I installed two SIP phone IDs over that ADSL modem. I installed pay television settop box so every night I am watching MTV and using my own voice service.

That number I ported that number into my own network using voice over IP. My ma she is already 65 years old. She does not realise we have change the configuration. To her we are still using a Siemens phone provided by a PCCW shop so it is still working fine. The sound quality is the same. The nice thing is that I forward my voicemail to my email. Whenever there is no-one at home or the maid does not pick up, anyone who leaves a voicemail to my home that voicemail will directly go to my email in the office. Even this Chinese New Year when we are overseas we can still receive a local voicemail through email systems.

As I have already said, we have 20,000 applications received and 16,000 installed. We have a very positive feedback from market response. The only reason we cannot fulfil all the requirements is because the response is better than what we forecast and expected. My original plan was only to install 10,000 boxes. Unfortunately, or fortunately that helped to save us some advertising money. OFTA also did some testing and the report said the quality of the call was also not different for either outgoing or incoming call.

Unfortunately, the police centre, I think Michael and Mr Wong have left, the customer can still make -- in fact I made a 999 call because I needed to go to the hospital because of my stomach. You can still make the 999 call and the ambulance will still come.

So number porting, as mentioned earlier it supports all the standard features.

We do have some complaints, I admit that. When we install the voice over IP box in the customer site the customer likes to change the configuration and some people like to look into what is inside that box. That caused a lot of configurations.

We do use Skype. We have been using another operator network. As you know we only have two branded products, one is Cisco, and we use Nortel VoIP service in our network. It provides all kinds of standard features.

One nice thing is I can monitor my maid's phone calls. You get an incoming and outgoing call log. Even if I am in my office I can monitor whether someone is using my phone.

The installation is very simple. The first installation is a software version. If you install that software on your notebook when you are travelling around in the world you can still receive a local call from Hong Kong no matter where you are. It is very simple. The second is to connect an adaptor between the PC and the ADSL modem and also they have a jack for your normal analogue telephone set. If you install wifi you can still connect the wifi to your PC and the wifi to your adaptor. The adaptor is still connected no matter if it is cordless or your standard handline set.

My staff ask me why we are rushing to launch the service in August 1st. There are two reasons. The first is Hutchison has already been running its voice over IP service since December 2003, what they call the V phone. The other reason is that we were approached by a lot of overseas carriers asking us to exchange our Hong Kong phone number with their overseas number. So we know there are five major carriers in the world wanting to launch voice over IP services in Hong Kong. Think about if there are any major US carrier, if they come to Hong Kong and provide you a very cheap New York number, Toronto or Vancouver number, VAT free, no IDD call that would make a very big impact into the Hong Kong market. That is why we thought we better launch the service. Today I think Wharf, New World is also launching a very similar service. I am glad to see the industry responding and I think we are pushing the industry.

Telstra and BT, BT have announced they are going to migrate all your traditional telephone lines to VoIP by 2008. They have announced the plan. I wish we had a similar plan here in Hong Kong. I think the consumer would be the beneficiary.

What is the dispute between the two companies? I will not answer any questions about these two slides. I will tell you the fact is the current FTNS licence in our appendix we have this scope of service, which is interpreted as:

"All the internal and external telecommunications services between two fixed points."

Of course we have no clear definition of what the fixed point is.

The second is dispute in schedule 2 all the FTNS licence conditions state that the network should be owned by the licensee:

"Leased or otherwise acquired by the licensee for the purpose of providing telecommunications services."

The third dispute is about the free rider, the settlement fee. Obviously it is clear the role of ISP is to supply a pre-defined bandwidth. If I subscribe 6 megabits then please provide 6 megabits to me. VoIP, normal IP applications, especially now we are running on the public IP network but not on a managed IP platform.

Look at the guidelines of Hong Kong IX, it is a settlement-free interconnection point. In other words, no settlement is to be paid by the peering participant for the incoming and outgoing traffic. This is clear in the guidelines and policy of the IX.

They mentioned five points there. The first is they sent out a letter to the customer, in fact most of your customers are DIY because it is basically it is a plug and play system. So it is just like it similar to Xbox live.

If the service is good enough? As I mentioned earlier, why the underlying technology is different from the fixed line service, the usability of the broadband phone once installed is the same. I copied that from the OFTA test report published in September or October.

The third point is the voice over IP may directly result in the reduction of broadband bandwidth for Internet uploading and downloading the VoIP occupies around 64 kilobit to 100 kilobit per second. I do not see why that would be a big impact on the connection. Again, OFTA confirmed that:

"Any effect that a broadband phone may have on a concurrent broadband Internet application is likely to be negligible."

Again the customer is obliged to inform us whenever they relocate. At least for invoice purposed we need to know where to send our bill to. We have a database, with all customer information. Whenever the police call use we can relay the information to them. Even though the customer moves the SIP box in fact we can give the IP information to the police. If the police ask the broadband provider where that broadband customer is, I think the broadband network has the capability to locate that particular IP address. It is a physical broadband connection.

The last point is emergency calls. As I mentioned earlier, before the break, the reliability of Hong Kong Electricity supply is higher than our telecom network. As we know most of us have a mobile phone with us.

I think the most important is whether we keep the customer well informed. I can assure you that we let them know when there is a power failure, there will be outage

Why a dispute? I have been thinking about this problem for a long time. I do not understand. We are not the first one to launch the service in Hong Kong. We are following on eight months after Hutchison launched a similar service in Hong Kong. We do not understand why on October 30th, the injunction was suddenly withdrawn. I also do not understand why on August 1st we did not receive the IP signal from PCCW Netvigator customers for hours when we can receive from all other ISPs including Hong Kong Net or Pacific Supernet. They are the other reseller.

The only reason I can relate is to two things is the Telecoms Ordinance chapters 24 and 27. It is basically saying that if anybody which wilfully blocks transmission, this is a criminal offence.

I do not know whether there is any relationship between the two things. If the JR succeeds, the voice over IP launched on August 1st that is not legal, that means what happened on August first is not in breach of TO24 or 27. If the JR fails then I think, I wish TA will continue to investigate the case why on August 1st we did not receive the signal for 16 hours.

Thank you.

VoIP : Competition and Choice

by
Hong Kong Broadband Network Ltd



6 December 2004

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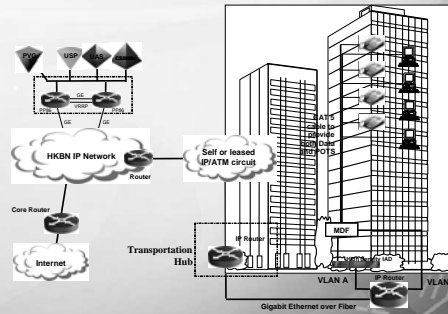
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Voice: Multiple VOIP Service Offerings

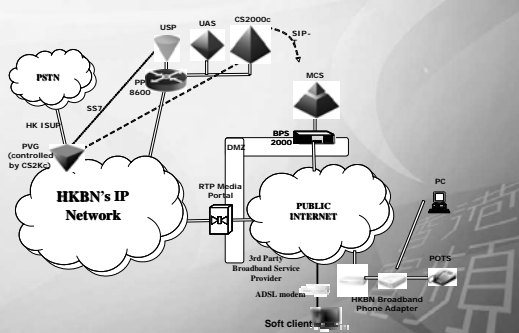
City Telecom's On-Net VoIP services are provided through its own network and represent the vast majority of its voice subscriber base. Off-Net VoIP service are provided through other operators' networks.

On-Net VoIP	Off-Net VoIP	
HomeTel Voice Services	Broadband Phone	Broadband Talk
<ul style="list-style-type: none"> Over 250,000 lines installed. On-net VOIP service launched in 2002 Voice quality of VOIP is indistinguishable from PSTN service for subscriber Both residential and commercial sectors Full suite of VAS – call waiting, call line display, call conferencing, voicemail etc HK\$48 – HK\$128 (US\$6 – US\$16) per months service offerings for unlimited local telephony services Successfully introduced free-appliance promotion with 12 to 36 months long-term subscription contracts 	<ul style="list-style-type: none"> Over 15,000 lines installed Physical IAD Off-net service provide using SIP standard over other ISP networks. Both residential and commercial sectors. Full suite of VAS – call waiting, call conferencing, voicemail etc 	<ul style="list-style-type: none"> Software based service provide using SIP standard any broadband access point Virtual marketing will be deployed similar to Skype.com but enhanced by local Hong Kong number Customers download Nortel Networks SIP software Full suite of VAS

HKBN On-net VOIP Platform



HKBN Off-net VOIP Platform



HKBN Broadband Phone Vs The Rest

	HKBN Broadband Phone	Traditional PSTN Phone	PC-based VOIP
Access Device.	Standard Phone	Standard Phone	PC or Laptop
Real Hong Kong Telephone Number.	Yes	Yes	No
Port over existing Telephone Number.	Yes	Yes	No
Phone-to-Phone.	Yes	Yes	PC to PC only
Sound Quality.	High	High	Low
Access to hotlines, info calls, ETS access etc	Yes	Yes	No
PSTN features – Caller ID, Call Waiting, Call Forward, Voicemail etc.	Yes	Yes	No
Web-based enhanced services – active account management, collaboration tools, etc.	Feature Rich	Limited	Limited

Updates

- Service launched in August 2004, received over 20,000 registrations with completed installation of over 16,000 lines
- Positive market response on installation and voice quality
- Quality comparable to traditional fixed line services
 - Report published by OFTA on promotional material relating to HKBN's broadband phone service, "The quality of the call was also not appreciably different, for either outgoing and incoming calls"
- Usability similar to traditional fixed line service :
 - Connecting to emergency numbers such as 999
 - Supports number porting arrangements
 - Standard value-added services : caller display, call waiting, conference call, call forward and voice mailbox
- Up to now, majority complaints comes from configuration problems of user computers

Enhanced Features*

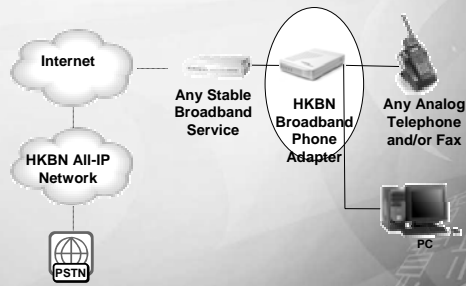
- Voice Features:**
 - Calling Line ID (w/ Name, Number & Subject)
 - Call Waiting
 - Call Forward
 - Call Transfer
 - Call Hold
 - Call Mute
- Web-Based Call Management:**
 - Click to Call
 - Microsoft Outlook Integration
 - Voice Mail Interface
 - Personal and Group Directories
 - Dynamic Call Handling
 - Picture ID
 - Dynamic Presence
 - Incoming Call Logs
 - Outgoing Call Logs
 - Ad-hoc and Meet-me Audio Conferencing
- Collaboration Tools**
 - Instant Messaging
 - Secure Instant Messaging
 - Buddies List w/ Presence
 - White Boarding
 - Instant File Transfer
 - Web Push
 - Co-Browsing

Note * Available and pending at service launch.

Simple Installation - I



Simple Installation - II



Simple Installation - III



Robust Platform

- Over 5.0 million users in Japan
- Telstra Corporation in Australia confirmed to begin offering residential VoIP services in 2005 : "if you can't beat the VoIP service providers, join them."
- BT announced to transform the entire network into IP-based by 2008
- Mass-Market Momentum is gaining in the US
 - AT&T's CallVantage, Verizon's VoiceWing, Vonage etc are offering VOIP-to-PSTN mass deployments
 - US users can chose their own "virtual" area code
- HKBN's Blue-Chip Vendor Support
 - HKBN service is supported by Nortel for its Integrated Access Device (IAD) and Cisco for all-IP network

Disputes

- ☑ Scope of Service?
 - According to that stated in our FTNS license, "Scope of the Service" can be interpreted as "all internal and external telecommunications services between fixed points...", whereas the "fixed point" means a network termination point
- ☑ The Network?
 - Schedule 2 of the license condition as the "network" is not "owned by the licensee, leased, or otherwise acquired by the licensee for the purpose of providing fixed telecommunication network services specified in Schedule."

Disputes

- ☑ Interconnection Fees?
 - Role of an ISP : to provide a pre-defined bandwidth to customers on receipt of payments -> Customers have already paid for the bandwidth usage
 - On VoIP service, customers are using a public IP, not managed-IP
 - No precedent, or similar ruling around the World
 - If we charge interconnection fees on VoIP service, should we impose same treatment on other applications, such as Internet banking, web-shopping, ICQ, xBox Live, that are riding on "your network" for a business?
 - Guidelines & policies of HKIX, "HKIX is a settlement-free interconnection point. In other words, no settlement is to be paid by the peering participants for the incoming and outgoing traffic."

The Reaction...



The Censure

1. The installation of the VoIP services involve complex network settings...
 - ☑ The installation involves simple plugging procedures and computer configurations, that customers can actually DIY
2. VoIP services have not undergone compatibility testing and certification
 - ☑ OFTA has gone through tests to confirm that, "While the underlying technology is different from traditional fixed-line services, the usability of the Broadband Phone – once installed – is the same."

The Censure

3. The VoIP service may directly result in a reduction of broadband Internet upload and download speeds
 - ☑ The voice packets of VoIP service will only take up 64-110kbps of your bandwidth available, which is mainly a 6Mbps connection
 - ☑ OFTA confirmed that, "...any effect that a Broadband Phone may have on a concurrent broadband Internet application is likely to be negligible."
4. The Hong Kong Police and other emergency services providers will not be able to trace and locate the caller if the installation addresses is changed without notification
 - ☑ Customers are obliged to inform your service provider for address relocation for administration and billing purposes

The Censure

5. You will not be able to make emergency calls by the VoIP Services during a power outage
 - ☑ This is correct, but in HK where penetration rate of mobile service exceeds 100%, mobile phone would likely be available for substitution during power outage
 - ☑ HKBN keeps customers well-informed :



Why?

- ☑ Timing Issue
 - Legal proceedings commenced in October 2004, after HKBN's service launch
 - However, HGC launched similar service in Dec 03
 - Why discriminated treatment?
- ☑ Legal Issues
 - Vigorous reactions from PCCW against the new service
 - Judicial review and temporary injunction to suspend service
 - Announced to withdraw injunction on 30 Nov (Tuesday) --> Why?

Why?

- ☑ Blockage Issue
 - HKBN launched service on 1 Aug 2004
 - Unable to receive signals from users of PCCW's Netvigator on the same night for 16 hours
 - Signals from other ISPs, including its reseller such as HKNet and Pacific Supernet remained normal

Note to the audience --

Telecommunications Ordinance Section 24 :

- A telecommunications officer, or any person who, though not a telecommunications officer, has official duties in connection with a telecommunications service, who- (Amended 36 of 2000 s. 28)
 - (a) wilfully destroys, secretes or alters any message that he has received for transmission or delivery;
 - (b) forges any message or utters any message that he knows to be forged or altered;
 - (c) wilfully abstains from transmitting any message or wilfully intercepts or detains or delays any message;
 - (d) otherwise than in pursuance of his duty or as directed by a court, copies any message or discloses any message or the purport of any message to any person other than the person to whom the message is addressed,shall be guilty of an offence and shall be liable on summary conviction to a fine of \$20000 and to imprisonment for 2 years.

Telecommunications Ordinance Section 27 :

Any person who damages, removes or interferes in any way whatsoever with a telecommunications installation with intent to- (Amended 36 of 2000 s. 28)

- (a) prevent or obstruct the transmission or delivery of a message; or
- (b) intercept or discover the contents of a message,

shall be guilty of an offence and shall be liable on summary conviction to a fine of \$20000 and to imprisonment for 2 years.

Relationship Between Judicial Review & Telecommunication Ordinance 24/27

- ☑ The logic...
 - Scenario 1 : Judicial Review Succeeded
 - VoIP service is illegal
 - "Suspect" blockage is not in breach of TO 24/27
 - Scenario 2 : Judicial Review Failed
 - VoIP service is legal
 - "Suspect" blockage....?

Thank You

JOHN URE: Thank you very much, Ricky. The case for the prosecution has just been heard. Or was that the defence?

Before I open up to the audience would either of you like to come back on anything at this stage or would you like to wait until you have heard comments?

STUART CHIRON: At least Andrew did not blame me for Skype not working.

I would like to come back to what Ricky was talking about on litigation. It is technical and legal which does not tell you anything. It is running off specific situations in Hong Kong that we have under our ordinance and under the FTNS licences and whether HKBN's service fits within the ordinance that is unique to Hong Kong. It is not an attack on VoIP globally or generally or even most of the ways VoIP can be used as discussed by Andrew and Grant. You can show how you can use VoIP on the network outside of the last mile et cetera. The litigation has nothing to do with VoIP but it has to do with how one free rider wants to arbitrage the system to provide an inexpensive service.

I certainly would note that on one line where there is megabits and kilobits but there is a lot of difference between upstream and downstream capabilities so you should not think the voice aspect is only 1 per cent of something, it is a significant percentage of one of the directions. Is it up or down? Up?

The rest I must leave to the courts. It is not an issue to be debated publicly because none of us know what the courts do or what they look. This is a mass market offering, The Hutch V phone is certainly not. TO section 24 and 27 but there is also section 23 which makes it actually unlawful for us transmit a call if we think it is unlawful. There are a lot of ways to look at this. I will leave it to the courts and to the lawyers.

JOHN URE: Thank you. Let us open it up to the floor. Are there direct comments or questions people would like to put to our speakers?

You are all stunned into silence. While you are thinking of a question let me just ask Andrew if he can briefly make a comment on the FCC ruling in the States. How far do you think the regulations, as they emerge in the States are going to be relevant to places like Hong Kong?

ANDREW LIH: As Stu said, a lot of this is particular to the Hong Kong situation and regulation. I could not help thinking that my previous career was working for AT&T in the United States, going through a similar situation as you have in Hong Kong in terms of having an incumbent that had a lot to protect in terms of the phone network, customer base and technology. Lots of things providing challenges in the future in terms of technologies that duplicated a lot of what the company was doing.

I think I am a fairly early adopter of technologies. I have four ways in my home of making phone calls, including still my old PCCW landline. That shows you that this whole idea of telephony could stand to benefit from real competition. It is not just competition on price. I have a PCCW landline because it is the most reliable thing I can depend on. When Skype fails like it did today, I am not sure my PCCW broadband line works all the time, I cannot even depend on my Vonage box so I have a Cisco box that I brought over from the United States so anyone ringing a Manhattan New York number will ring me in Hong Kong. That is a nice little benefit but I would not depend my life on it.

I have four different channels. Depending on what situation I have I can use Skype, Vonage, another VoIP application I use like Freeworld dialup or the good old PCCW landline as my line of last resort. I think that customer value will still be here ten years from now. As an engineer for AT&T I know all the engineering that goes into making an 8 bit 8 kHz phone call make it from your house around the world. The tolerances are very tight, the resource allocation, signalling, the software, the hardware, everything in between, that is going to have a lot of value even going forward.

Regardless of litigation I think in terms of just the technology and market for this it is going to add value for a PCCW landline that you are paying x dollars for, it is going to have value for Skype calling and all shades in between. But I think that too much of trying to hold the situation we have here is somewhat dangerous in terms of holding back the technology that could provide a lot of the features Ricky was talking about unified messaging, an illusive goal, which is not the voicemail stranded on the tape in your home but you can access it from anywhere.

It should also be in a way that respects the existing laws. I think some of these can be loosened up so there is a wider interpretation for how these technologies can be rolled out.

JOHN URE: Stu, FCC.

STUART CHIRON: On the most recent FCC decision which was on Vonage, that is a very US issue, it was a battle between who gets to regulate, at the federal level the FCC or the state level the public service commissions. All the most recent decision said that this is going to be done at the federal level, not at the state level so it does not have a great deal of relevancy to Hong Kong or anywhere else. It is just a battle between the states and the federal jurisdictions.

The more interesting decision was the earlier one where the FCC said that VoIP looks like an information service and an information service, when you look at the definitions is not a telecoms service, so it is outside of those general rights and obligations that we would here say that it relates to an FTNS licence.

The US is looking at tier one and tier two but just calling it common carrier services versus enhanced or information services.

JOHN URE: Ricky, the last time you spoke at one of our events you said two things. The first was that your stock price was up 10 per cent. The second thing was that I think MH was on the platform and you had just come back from Korea and you said you had seen 3G in operation. You changed your mind and wanted a licence. 3G provides a broadband connection to your mobile phone, are you going to offer this service through 3G's network?

RICKY WONG: I cannot.

JOHN URE: You cannot.

RICKY WONG: I think 3G have arrangements proposed by OFTA earlier. I already put 100 per cent into the fixed network, that is all I had 1.4 billion Hong Kong dollars. I think I better continue to focus my network and get more market share from my good friends. 3G, we all know that OFTA gave an announcement last week, that they are not going to review

until 2008. It is good for me and then I do not need to borrow more money from the bank.
JOHN URE: Any more questions from the floor? One over there, Tony, and then Simon.

Q. I just want to focus the audience to another issue on VoIP. One observation is the pace of development of VoIP in Hong Kong is not as fast as some of the other developing countries especially in Europe, North America or Japan. As consumers or business customers in Hong Kong we are very spoiled by the local competition. They are enjoying almost the lowest telecoms services in the world, it could be \$40 to \$50 at home for unlimited fixed line service. The one that Mr Lih, you said that you trust the fixed line service. There are a number other than PCCW.

On the business side it is the same, if you look at the bill size that companies are paying in Hong Kong, they are very low. The point Mr Lih just raised that by paying in the US you could be enjoying a US domestic long distance, compared to what you are paying in Hong Kong, I guess we are very lucky. That is really an impediment to the VoIP service.

Consumers, except those early adopters, those who want to try out new technologies, any consumers would just jump into because it gives you something new, most of the time they would consider price as the key consideration of switching over to a new service platform. I guess a lot of the operators in Hong Kong would have to develop new services which is unseen in a TDM based network. Many of the operators have been working round the clock over the last year trying to develop these kinds of services in order to differentiate their services from traditional ones.

This is not a question but just to add to the discussion here that I am sure consumers in Hong Kong will be able to see a lot of new services being introduced on top of the voice services. I think that will be coming very soon.

JOHN URE: Simon from Hong Kong Telecom Users Group.

Q. After listening to all these good presentations if you look at the pace of technology changes, now we are entering a paradigm shift. The advantage of having VoIP is that you can port from location to location but at the same time this poses a security risk. If I look at all the comparison tables that Stuart and Ricky pointed out it does not mention location because that is something they cannot track in the VoIP world.

For all the operators and even the OFTA here is whether we should retain this location attribute as we go forward in the regulatory regime. If we put location as one imaginary feature then there would be very clear direction. Ricky may say there will be those confirming to this standard and offnet may not be. I would like to hear opinions from the speakers about this and the effect on the security.

KS WONG: Can I cover the location part. In the fixed network licence it is not a requirement to provide location information to the emergency centre. It is only a co-operation between the police department fire department and the licensee. So it is not a requirement. But in the case of 3G it is a requirement because 3G is capable of providing the location information.

ANDREW LIH: I can tell you a little bit about the US market. They had that big issue. In terms of emergency service because "security" means a different thing in the US today. In terms of E911, like Vonage when they first started they did not have a way to specify where

you are but now they do. If you log into your Vonage account on their web site you can tell them what address they should relate to a 911 or emergency call from that phone line. So what was implicit before you can make explicit. By going to the website and specifying that. In that case you can do no worse than what you have with a fixed line which is telling them exactly where your box is. Obviously, if you take it like I did to Hong Kong, and make a 911 it is not going to do you much good. If you are in the US you can register that box as a physical location.

STUART CHIRON: Couple of points, first, I would rather read the licence based on the purpose on the section of the licence and the technology that exists today and the practice in the industry which when you put them together requires that the location be automatically disclosed. That is what we do today and that is what is important to the emergency services that you heard earlier. If the equipment does not exist today I am confident that it will exist soon. The fact that first generation VoIP equipment does not do it, fine, those are tier two providers. I would not weaken the licensing requirements of put in danger of public safety or consumer welfare for the sake of earlier introduction of a particular type of technology.

RICKY WONG: For the offnet I think if we can provide the phone number, we can tell them the IP address and then followed by the IP address I think they can trace the location provided by the broadband provider. I do not see any reason you cannot unless the caller was overseas then I do not think there is a issue at all.

I want to draw your attention, I am not sure if today is the same but a few years ago but when I bought a mobile prepaid card in Singapore they need to register the ID number for security or emergency issues. I do not think you do that in Hong Kong today. What I am trying to say is there is an imbalance between the regulations. If we are really concerned about security or the criminal issue we should also ask the mobile prepaid card buyers to register. If anybody does any bad things I think it is much easier to us use a prepaid card rather than using voice over IP services.

Q. My name is Jen from Intel. I totally agree that the Hong Kong market is the most competitive from the telecoms point of view. Competitive does not come to the most advanced or needing even in the Asia Pacific region. For example, when the broadband ADSL comes out Korea takes a lead. Even now the penetration rate of Korea is more than Hong Kong. When wifi the digital industry in Taiwan, Malaysia, they are all in front of us. My question is trying to raise to the board here, we talk about other regulations, Hong Kong is competitive but not advanced, what is the reason? Is there a regulation reason, is the market not mature enough? What is happening? Why are the other cities, the other countries leading Hong Kong?

STUART CHIRON: I think part of the answer -- I will let Ricky give the difficult part of the answer, I will take the easy one. Generally Hong Kong operates as a free market. Therefore tax advantages and other advantages can artificially push a technology that do not exist here and I think they likely exist in some of the markets you were mentioning. It may also be some economics of scales as well.

RICKY WONG: I do not agree with you. I think the first is if you divide the number of broadband subscribers over the PC users Hong Kong has a very high penetration rate. Next up is Intel should reduce the CPU price and make the PC cheaper! Look at the PC market, the PC penetration now in Hong Kong is only around 65-67 per cent only but broadband

penetration is more than 60 per cent so this is a very high percentage of penetration. That means 95 per cent of PC users have broadband.

The second point with which I do not agree with you is -- I do not want to use this as advertising. We just launched a 100 megabit service, the first in Asia. Around 800,000 households can enjoy this service from January at \$268. I think this is very competitive. I cannot see this, not in Korea, not in Taiwan or in Singapore either. I think the only place they can do better is Japan. They have 1 gigabyte per second, it is limited and very expensive. We are going to launch a 1 gigabyte service in the second quarter of 2005.

I think a lot of operators, New World, Hutch, who has a very extensive fibre network here today. We cover about 55 per cent. Give us two or three years more, we are going to increase from 1.2 to 1.6 in the next two years. There is a reverse digital gap, whether you are in the south of the island or the Peak, you cannot enjoy 100 meg, unless you are living in public estates or those highly dense areas. That is an interesting phenomenon in Hong Kong.

JOHN URE: Just remember also, one of the three major networks in Korea went bust whereas I do not think any of the Hong Kong companies have gone bust yet. The serious point there, I remember when looking at comparative usage of Internet between Singapore and Hong Kong. People were trumpeting Singapore as being pushing out broadband and so on but the level of usage was higher in Hong Kong because it is market driven. It is not kind of top down. Some of these comparisons need to be looked at very carefully.

Other questions?

Ricky, you said something earlier, BT, AT&T and Telstra and so on had been approaching you about numbers and the possibility of them offering numbers to people in Hong Kong. Presumably, that could work the other way? For example you could offer telephone numbers in other jurisdictions. What is stopping that development?

RICKY WONG: (Indicates KS Wong)

JOHN URE: KS Wong, how realistic is it that tradeability in telecom services will reach the point in the very near future using VoIP where my service provider could be AT&T, Telstra or anybody, I could have a number issued in New York or wherever?

RICKY WONG: I think the threat is not from the West, the threat is from North.

KS WONG: This is a quite complex subject. When we talk about numbers, if we use number elsewhere the first matter is the demand on the 8-digit numbers. It depends on which way we are going to use it. If we keep on using the 8-digit numbers then there would be some probably 4 or 5 million numbers left around in the 8 prefix and also probably in the 7 prefix.

If we go the other way, like the UK who use a prefix, then the capacity is much more, about 100 million. That is the first point.

The second point is we have to make a parallel with the callback services. I mention this because we are talking a kind of reciprocal. If we accept numbers from elsewhere an obvious approach for us is we have to make sure they accept our numbers. In a way it is

similar to callback services. These are all the issues we raised in the consultation paper and we have to make decisions on those.

JOHN URE: Thank you. Actually, in regard to that, one thing which is missing in the consultation paper is the whole thing of IPv6. It may not in the first instance be related to this issue but down the road it clearly is. I believe that Japan is already pushing ahead with IPV6 numbering system. What is the timeframe in Hong Kong?

KS WONG: The reason why IPV6 was not mentioned in the paper is because if we keep on changing from IPv2 to IPv4 eventually it will change. In the case of IPv4 there is more concern on electronic numbers which is being discussed in the case of ITU and being tested in quite a number of countries. In this regards, Singapore is more advanced because they have the numbering prefix already. But from the regulations point of view, it is transparent, it will not effect the rules for IP phones in a way in the short term. It will probably only effect the capacity of having numbers for terminals, because in a way the electronic numbers are for Internet terminals so it is not a immediate concern now.

JOHN URE: Any questions following from that?

Q. I am Griffith Jones from IBM. The second mention of BT has prompted me to ask what is the potential, what is the future for voice over wifi, in other words a wireless voice over IP offering?

RICKY WONG: Today you can download SIP software and pay me \$68 a month, we will give you a number and you can make a local phone call when you have a coffee in Starbucks or Pacific Coffee with your PDA. You download the software on the PDA. I do not want to promote that because I do not want to be caught by KS. We do not have the mobile licence. This is a grey area we did not touch on or have a detailed discussion before. If the customer wants, without a PDA he can also use a notebook and download the software but a PDA is more handy. WiMax(?) is coming -- voice over IP, PDA, WiMax competing with 3G and again no roaming charge because if everywhere has WiMax you can port your local number anywhere in the world. The impact is not only on the dominant player but probably also on the 3G operators.

ANDREW LIH: I definitely agree WiMax seems to be one of the most interesting things coming along in a while. The range, bandwidth, number of subscribers it allows will completely open the top on what can happen. If you think things are bad now in terms of what there is WiMax could blow the lid. It will be really interesting to see when that that happens.

Q. With all the IP devices, voice over IP, mobile phones, PDAs, 3G phones and so forth, are there any plans for service providers in Hong Kong to support IP version 6. It is already supported in the USA and Japan.

JOHN URE: We are being referred back to KS. It is a circular loop. The answer is not yet.

RICKY WONG: I do not want to put too much pressure on OFTA, they have too much pressure from all sides, everybody is going to squeeze them. I do not want to be named as not following the games. Even though we started the service in August before the consultation, Stuart is not happy -- we need the government to frame the regulatory framework before we can roll out the business plan.

JOHN URE: That is the first time you will hear Ricky say he will wait for regulations before a business plan.

Q. I am SG Lim from E-con. Stuart, I noticed your tier one, tier two proposals and suggestions. where do you think the mobile operators fit?

STUART CHIRON: Tier one and tier two is particular for FTNS licensees so anybody coming off a fixed network, somebody's broadband network so it would be their own or somebody else's so I do not think it directly applies to the mobile carriers or 3G. It is just tier one and tier two, FTNS or PNETS/VAS.

If you satisfy those requirements which are existing requirements then you are tier one, full rights and obligations. If you fall outside of that either you tried or did not, then you are tier 2 and you have no rights but no obligations. That is obviously where HKBN's offnet service fits today. That reflects what is in the licence. But their licence need not look exactly like an FTNS licence, it does not, but there is going to be certain parallels for sure.

RICKY WONG: I am not sure about your question. Why the mobile operator does not carrier fixed line services. A lot of operators overseas, those mobile operators use the spectrum to provide CDMA450, they can also the fixed line service. This is feasible, especially a lot of mobile operators have too many spectrums and let the consumer have more choice.

Q. I am Sam Chui from Reach. I would like to ask a question from a user point of view. With VoIP, now if I am sitting now in the US, make a call to a Manhattan number and I cannot get through, so I ask my supplier I tried to call this number, I cannot get through. In terms of troubleshooting they may tell me this number they have sold to a service provider in Hong Kong, they are selling it as a voice over IP service in Hong Kong, perhaps you should contact this provider in Hong Kong. So I call up the service provider in Hong Kong, they say the number is installed in my device but this is one of my offnet customer, perhaps you can talk to the broadband provider. There are a lot of issues like that. I would just like to hear your comments about this problem I have as a user.

JOHN URE: A user complaint.

RICKY WONG: Normally, if you are calling -- first thing, let me clarify, we do not do that sort of business here today. If I was asked this question, it is very normal. If the customer does not put in the box, does not turn on the PC, there is no answer, it is a busy ring tone, it will probably forward to another number or voicemail. The complaint procedure -- just like any Internet applications, if I cannot log into a bank website then I will call the bank. The bank will say we have no problem, why do you not refer to your broadband provider, the broadband provider says there are no problems, why do you not refer to Intel, maybe the CPU has problems. It has happened for any Internet applications. Voice over IP is no different to other Internet application.

STUART CHIRON: This may actually highlight the issue discussed earlier about consumer education. I am going to make a leap of faith that we have an educated consumer sitting close to the back there. He came up with a usage that there was no satisfaction remit. It is like he calls one party, call somebody else, call somebody else, call somebody else. It makes consumer education in this area very difficult because you have IADs that are moving

globally and you have potential for geographic or non-geographic numbers moving as well. Consumer education is very important but very difficult to achieve.

JOHN URE: Right, nearly at 5.30 so I am going to have to pull it to a close. It has been a wide ranging discussion. As I say, I am not sure who was in the defence and prosecution on this occasion but it certainly is going to change the whole shape and flavour of telecommunications. It is really a question of timescale. It remains for me to thank Ricky, Stuart and Andrew Lih and all the other speakers and thank you for attending. Thank you.