

Telecoms InfoTechnology Forum

Digital Entertainment, home networking and ‘digital hubs’: driving the demand for broadband?

Venue: Bloomberg Auditorium, 27/F Cheung Kong Centre
2 Queen’s Road Central, Central
Time and Date: 2 – 5.30pm Tuesday 19 March 2002

2 – 3.30pm - Panel One:

- Alan Siu, Deputy Secretary, ITBB – Government Initiatives to Promote the Digital Entertainment Industry in Hong Kong
- Thomas Tang, Executive Director, HK Productivity Council – Nurturing Creativity
- Panel from the software digital entertainment industry in Hong Kong including
Prof. Mark Green, School of Creative Media, CityU;
Tony Sin, Dept of Communication Studies, Hong Kong Baptist University;
Harry Miller, CEO, En-tranz Entertainment and Digital Entertainment Association;
Terry Tse, Executive Director, Boto;
Rob Deans, Bird & Bird on IPRs and the digital media industry,
Prof. Roland Chin, HKUST, ASTRI

3:30 – 4:00 pm – Coffee Break

4 – 5.30pm - Panel Two:

- Christian Morales, Vice President, Sales and Marketing Group and General Manager, Asia-Pacific Operations;
- Dr. Peter Lovelock, madeforchina.com and Deputy Director, TRP – Home networking in China: regulating the spectrum?;
- John Mak, Systems Engineer Manager, Cisco Systems (HK) Ltd - Enabling broadband

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QUARTERLY MEETING
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Executive Summary

1. One of the industries the Hong Kong SAR Government has identified as having good potential to develop in Hong Kong based upon the territory's past history in the film and toys sectors and in its current excellence in telecommunications infrastructure, is the digital entertainment industry. The papers that accompany this report, one by the Information Technology and Broadcasting Bureau (ITBB), two by Dr Lily Chiang and the TIF background briefing paper, develop the arguments in more detail and should be consulted. This Forum sponsored by **Intel Corporation**, and supported by **Bloomberg**, is organized as a contribution to this Government initiative, to explore the issues involved in greater detail, and to understand how the fast growing digital entertainment sector is helping drive the demand for broadband to the home, and what network support is available to meet this demand. The discussion ranges over two areas of interest. The first session examines the state of the digital entertainment industry in Hong Kong; the second examines the home networking side and the broadband infrastructure to support it.
2. **Alan Siu, Deputy Secretary of the ITBB**, begins the forum by outlining the grounds for the Government's optimism for the digital entertainment industry in Hong Kong, pointing to recent successes for the industry, notably the international acclaim for the film 'Crouching Tiger, Hidden Dragon' and for the animation and graphics of 'Shaolin Soccer.' [*And a few days later an Oscar for Raymond Hoi's animation in the film 'Shrek'!* – ed.] He identifies infrastructure, human skills, IPRs and market promotion as four key issues. Perhaps only in the first is Hong Kong truly a world leader, for although IPR laws in Hong Kong are among the most stringent, too often enforcement proves a problem. (See below). Major strides have already been made in improving education and training facilities in Hong Kong (again, see below) and Alan's most important stress is really on the fourth issue – promoting Hong Kong's achievements and potential.
3. The Government's efforts to promote the industry are transmitted through numerous bodies, including the work of the Trade Development Council (TDC) and the Film Development Fund. **Thomas Tang, Executive Director of the Hong Kong Productivity Council** explains the leading role of the HKPC which grew out of its previous involvement with assistance to the toys and electronics sectors. HKPC has worked very closely with the **Hong Kong Digital Entertainment Association (HKDEA)** which is also a supporting organization of this forum. Thomas identifies a number of important trends, especially towards outsourcing by Hollywood which, added to the growing awareness and interest in Asian films and other media material, bodes well for the industry in Asia, including Hong Kong. Bundling media content with toys, advertising and sponsored events also plays to local strengths, and in the area of distribution, especially across mainland China, the opportunities are especially promising. HKPC provides facilitation services to find partners in China, as do 701 other associated Productivity Councils on the mainland.

4. Next follows a panel discussion involving **Prof. Mark Green, School of Creative Media, CityU; Tony Sin, Dept of Communication Studies, Hong Kong Baptist University; Harry Miller, CEO, En-tranz Entertainment and Digital Entertainment Association; Terry Tse, Executive Director of Imagi Production Limited; Rob Deans, Bird & Bird law firm and a specialist on IPRs; and Prof. Roland Chin, Hong Kong University of Science & Technology and the Applied Science & Technology Research Institute (ASTRI)**. The first part of the discussion focuses on the vexed question of IPR. **Rob Deans** expresses a professional lawyer's view that while the law in Hong Kong is very good on paper, the job of enforcement is a nightmare. The task falls to customs officials, not the police who would be more likely to have day-to-day street contact with shops and hawkers stalls where counterfeit goods may be on sale, and the task is just one among many duties of customs officials, just as prosecutions before magistrates are a few among a very wide range of cases to be heard. In **Rob's** view progress could be made not by tightening the law further but by simplifying it and its procedures to make enforcement more workable. He also suggests more technical training for those involved, but it is worth noting **Alan's** point that progress over recent times has been remarkably good in this area.
5. **Harry Miller** expresses the frustrations of a producer of media content such as games, who just needs to walk down the street to find pirated discs on sale for just a few dollars. He would like to target the mass arcade games market where copies are relatively difficult to illegally copy, and **Mark Green** supports the idea that perhaps ASPs can find ways to offer game plays while minimizing the risk of piracy. A participant also supported the view, raised in **Dr Chiang's** paper [*see briefing papers on TRP website – ed*] that bundling of software with other products, such as toys, could reduce the incidence of piracy, while **Mark** points out that Linux software did not get pirated in Hong Kong because it comes with online registration and upgrades, a form of bundling. On the other hand, it is recognized, for example by **Roland, Tony and Terry**, that not only is piracy ubiquitous, especially across the border, but the widespread availability of cheap software has helped drive a more computer-literate population of young people.
6. The panel discussed also in relation to piracy whether digital rights management software and encryption software were areas in which Hong Kong could contribute, but **Roland Chin** was pretty clear that this was an unending race between the code-maker and code-breaker, and Hong Kong was too small a market for this kind of software development. Hong Kong is an innovative user of technology, not a major technology developer.
7. Two other areas came up for discussion: the supply of skilled people for the industry, and how to attract young people into the industry. **Harry and Terry** shared the same problems of finding young people with creative abilities and inclinations. There are now plenty of educated young people in Hong Kong, but far too much learning by rote, far too little individual initiative and imagination. On the education side, **Mark and Tony** outline the types of courses now on offer, and **Thomas** details some of the HKPC's training initiatives, but apart from continuing rigidities in the system – for example, student credits at universities are still not generally transferable across institutions – perhaps the major point

- was that the digital entertainment industry is not yet perceived by young people in Hong Kong as about to take off. They do not yet see it as a career opportunity.
8. The idea of promoting the industry and its achievements in Hong Kong, to “light the fire” as one participant aptly put it, and, as another participant argued, to exploit the infrastructure which puts Hong Kong at such an advantage within the region, these were the themes that closed the first session. The last point is prescient because it raises a wider issue, namely how far should the regulation of the industry now shift its focus from supply-side issues to usage issues as part of the promotion of the information society?
 9. In many ways the best place to start a discussion is where this one ended. By examining how a broadband infrastructure, in which Hong Kong is becoming a world leader, not far behind the front runner S.Korea, and the emergence of home digital devices, especially entertainment devices that can act as ‘home hubs’, we can examine how far is domestic online consumption becoming a driver of the information age. **Christian Morales, Vice President, Sales and Marketing Group and General Manager, Asia-Pacific Operations, Intel Corporation**, in the second session perhaps comes close to summing it up when he identifies two of the key enabling developments: integrated access devices and convergence between the PC and broadband access.
 10. **Christian** makes the point that Asia-Pacific is leading the world in terms of households with broadband access, with cable modems set to grow annually by 25% and DSL by over 40% over the next 2-4 years, but still 80-90% of intra-Asian traffic is routed through the USA, compared with only 40% in the case of Europe. On usage: 76% of broadband users play CDs on their PC, 60% play games, 49% download music, 33% watch movie videos. As if to illustrate the truth of the saying ‘chips with everything’ he notes key areas of advance, from gigabit speeds to improved power consumption performance, to storage capacity, to security and content protection, to content creation. Here he notes that it was chips originally developed by Intel that gave the movie industry its ability to edit digitally without resource to an analogue platform, so advance in chip technology and Moore’s Law continues to drive the technological potential of the industry. *[A parallel development in the film industry appears to be the gathering pace of digital cinema theatres which allow broadband distribution of films together with the showing of other multimedia and revenue-generating events – ed.]*
 11. On the broadband side, **John Mak, Systems Engineer Manager, Cisco Systems (HK) Ltd**, traces the key developments leading up to the convergence of broadband with Ethernet for local access using IP. He sees the advantage of these ‘next generation networks’ over DSL and cable networks in the collapse of the networking technology layers. This does not mean that the ATM-DSL and cable networks will disappear anytime soon – telcos are making them Ethernet compatible - but that for easy and low-cost delivery of broadband business and consumer services the NGN will be the network of choice for the future. For residential customers in particular he sees this as being driven by the development of the digital home hub.
 12. In any discussion these days about opportunities facing Hong Kong, the size and proximity of the mainland China market comes up. In the case of digital

entertainment numerous speakers alluded to it. A true iconoclast, **Dr Peter Lovelock, madeforchina.com and Deputy Director of the TRP**, throws cold water over the idea. If piracy was seen as a problem in Hong Kong, wasn't it a problem in spades on the mainland? And who said Mandarin would be the language of the WWW in seven years time? *[It was Nicolas Negroponte at the Fortune 500 conference in Shanghai, 2000, now repeated in a report by Accenture – ed]* Didn't William Shawcross argue in his account of Rupert Murdoch's foray into China with Star TV that more than ever before Chinese were learning English? For Peter, China continues to do what China does best, keeping foreign competitors at bay while pouring resources into infrastructure – first the backbone network, now the access networks – until Chinese companies have a firm grip over the market. At the same time dangling the carrot of market entry enough to encourage foreign indirect investment. Will WTO change any of this? Yes, in the long term. Watch this space!

Telecoms Infotechnology Forum

Bloomberg Auditorium, 27/F Cheung Kong Centre
2 Queen's Road, Central, Hong Kong
19th March 2002, 2.00 – 5.30pm

Dr John Ure: Good afternoon, ladies and gentlemen. There are obviously still a lot of people to come in. Maybe we should advertise it in future as starting at 1.30pm and then we can get cracking at 2.00pm with a full audience.

For those of you who do not know me, my name is John Ure. I am the director of the telecommunications research project at the University of Hong Kong and we organise these forums on a, roughly, quarterly basis, in order to stimulate debate in Hong Kong in a neutral forum, with the emphasis on “neutral”, so you can, basically, say what you like. Do not be worried about ruffling feathers.

There is one house rule, and that is for members of the media, the press, if you wish to quote somebody or cite something that somebody has said, please check with that person beforehand that they are willing to be cited. That way we get the best balance between anonymity and public interest.

First of all, before introducing the speakers, I would like to thank Intel, who have generously sponsored this forum. I should add that the funds we raise from these forums are the source of funding of the research project for the university. Also Bloomberg who, once again, have provided us with this really wonderful auditorium and Ha Chan, who always does a splendid job in organising these seminars for us.

Today's topic, digital entertainment industry, and to what extent is it a driver for broadband in Hong Kong? The topic is a very current one and the government has, as everyone in this room will know, decided that this is one of the industries where Hong Kong has a real potential advantage and we are very grateful therefore for Alan Siu, who is the deputy secretary of ITBB, to speak to us today. Alan is one of the drivers of this within government and is a member of the working group on digital entertainment industry, which met last week for the first time.

After Alan has spoken, I will invite Thomas Tang, who is the executive director of the Productivity Council. Again, we are very grateful for Thomas to speak; he only got back to Hong Kong, I believe, yesterday, so he is doing it 'on the run'. The Productivity Council has been particularly prominent in trying to promote and facilitate the industry in Hong Kong.

So our first two speakers will set the scene and then I will invite the panel up and ask each member to give a very brief introduction of themselves before we open up for a

general discussion. So, without further ado, if I can invite Alan Siu, deputy secretary of ITBB, to give a government perspective on digital entertainment in Hong Kong. Thank you, Alan.

Alan Siu: Thank you, John. Good afternoon, ladies and gentlemen.

I am very glad to have the opportunity of attending this forum to talk about the subject of digital entertainment. The fact that the forum has chosen this as a subject, means that the topic of digital entertainment is becoming increasingly important in Hong Kong. I guess it is right that the government should start to focus attention on this subject. I am more than happy to give a very brief presentation to kick off this forum, and then later on I will listen to what the experts have to say about this subject.

Digital entertainment is basically entertainment using digital technologies and we consider games played in arcades or game rooms, or wide TV, computer internet, education entertainment, films, TV programmes and animations, all using digital technologies in their production process are all classified as digital entertainment. If you look at the world trends, half of Japanese families, one third of American families and one fifth of UK families have game consoles at home, so this is a very big business in the world. The global game business is estimated at around US\$20 billion a year so that is potentially a very large market which Hong Kong cannot ignore.

As far as Hong Kong is concerned we have seen an increase in the amount of import and export of electronic and video games and related products in the last two years. And we have also seen the growing use of digital special effects in our film and advertising productions, for example the "storm riders" two years ago and, recently, of course, the film "Shaolin Soccer" which has smashed the box office receipt record in Hong Kong and which is going to be shown in more than 100 cinemas in North America within the next few months. Hong Kong does have a very good potential to develop digital entertainment. When you look at people like Raymond Hoi, who is involved in the production of the cartoon film "Shrek", and people in Hong Kong who are working to develop games which are now being used in Harvard and Stanford business schools, you can see that Hong Kong people do have the sort of talents to develop digital entertainment to an international standard.

As far as the government is concerned, we consider that there are certain areas that we should focus on in order to drive digital entertainment in Hong Kong. *The first area* is obviously infrastructure; we must have a very good infrastructure before we can develop all sorts of digital entertainment, applications and for the content to be delivered to the general public.

In Hong Kong we do have a very advanced telecommunications infrastructure. As far as broadband network is concerned, we have full coverage for all our commercial buildings and over 95 per cent of our domestic households. Of course, recently, we have issued third generation mobile services and even, according to the latest reports, we are still sticking to the original timetable of rolling out the services before the end of this year or

early next year. So the mobile networks will provide another very powerful medium for us to deliver digital content to the community.

At Cyberport, which we are now building – the first phase will be launched in April this year – we do provide a lot of multi-media facilities, which the industry, whether they are tenants or not in Cyberport, will be able to make use of to carry out digital content production. At the same time, we are also building a film studio, a first class film studio with state-of-the-art post-production facilities in Cheung Kwan O, which, in future, will provide very good facilities for the production of digital material.

We have recently also introduced an SME funding scheme, which helps SME's to purchase business installations and equipment. We provide the guarantee for their bank loan to purchase this equipment. So SME's in the digital entertainment industry will be able to make use of this funding scheme to help them in acquiring the equipment, which they will require in their production.

The second aspect: human resources development. Different universities and other training institutions in Hong Kong, like the vocational training council, are providing a lot of courses on digital entertainment and digital special effects, which help us to provide the people to support the development of the industry. Of course, we also have the film development fund, which also sponsors various training schemes on an *ad hoc* basis, in order to fill the gaps in the training area. For example, last year we organised a training scheme, which sponsored students in the digital media discipline in the tertiary institutions to go to a New York film school, where they attended a short-term training course on digital animation. When they returned to Hong Kong they shared what they had learned with their counterparts here. This helps us, not only to acquire state-of-the-art technology in the digital entertainment field, but also helps us to establish a network within the international arena in the production of digital entertainment.

We have also introduced an SME training fund, whereby digital entertainment companies, the small and medium sized ones, can make use of these funds to apply for training, not just for the employees, but also for the employers. In terms of research and development, we have a \$5 billion innovation and technology fund and one of the schemes in the future will be to promote research in digital entertainment. We have introduced special themes for soliciting applications. We have done so for e-commerce and logistics, and digital entertainment will be one of our themes in the future. We have also introduced an SME development fund, whereby academic institutions or trade organisations in the digital entertainment field can apply for and get the funding to carry out various sorts of activities which will promote the development of digital entertainment in Hong Kong. *And, of course, the protection of intellectual property rights is very important* and Hong Kong has a comprehensive set of legislation, complying with WTO rules, to provide protection for digital products in Hong Kong.

The fourth aspect: market promotion. We have introduced an SME export market fund whereby SME's in the digital entertainment field can also apply for funding to help them to carry out market promotion activities inside or outside Hong Kong. We will also

organise trade missions to enhance the exposure of our digital entertainment industry to the outside world, and by taking part in international conferences and exhibitions so that we can enhance our exposure and establish networking with our counterparts in other countries. I see our colleagues in the trade development council here; no doubt, we will work together with the trade development council, to help market our digital entertainment companies to the outside world.

As regards the way forward, the government is beginning to focus on this important area and we have established a working group on digital entertainment, under the information infrastructure advisory committee, which is the main committee to advise government on it policy. The main aim of this working group is to see how we can devise measures to further drive the development of digital entertainment in Hong Kong. We hope that we will be able to come up with a series of measures and recommendations within the next few months.

We also intend to establish regular liaison with the industry so that we can listen to the views of the players in the industry and to know what their requirements are, in order to help their development in Hong Kong. So we will work together with the Hong Kong Productivity Council – which Thomas will talk about later on, no doubt – to establish a regular liaison forum with the industry, in order to encourage the exchange of views and cross-fertilization.

So, this ends my short presentation this afternoon and I look forward to listening to the views of the experts later on.

Thank you.






Telecom s InfoTechnology Forum

**G overmm ent' s Initiatives to
Prom ote the D igitalEntertainm ent
Industry
in H ong K ong**


Presentation by Mr Alan Siu
Deputy Secretary for
Information Technology and Broadcasting
The Hong Kong SAR Government

19 March 2002

D igitalEntertainm ent

- Entertainm entusing digital technologies
- G am esplayed in arcades & gam e room s or via TV , com puter or Internet; edu-tainm ent; film s, TV program m es and anim ations using digital technologies in the production process



2






**G lobalD evelpm ent of
D igitalEntertainm ent**

- Half of all Japanese households, 1/3 American ones and 1/5 British ones have gam e console at home
- G lobal gam e business estim ated atU S\$20 billion a year





3






**D igitalEntertainm ent
in H ong K ong**

- A substantial increase in in port/export of electronic and video gam es and related products between 1998 and 2000
- G row ing use of digital special effects in film production, e.g. Storm Riders, Shaolin Soccer
- H ong K ong has a good potential to develop digital entertainm ent





4



**M easures to SupportD evelpm ent
ofD igitalEntertainm ent**

» **Infrastructure**

- An advanced telecom m unications infrastructure
- Third generation m obile services





5

» **Infrastructure (cont'd)**

- M ulti-m edia facilities at Cyberport
- State-of-the-art post-production facilities at film studios in Tseung Kwan O
- SME Business Installations and Equipment Loan Guarantee Scheme



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John Ure: Thank you, Alan.

I will go straight on to Thomas. After Thomas has spoken I will then go straight on to the panel, but I would like both Alan and Thomas to participate in the panel and to field questions at that time.

So, Thomas?

Thomas Tang: Thank you very much, John. Good afternoon, ladies and gentlemen.

It is an honour to speak here and, actually, I have a little bit of stage fright when speaking to so many experts in one field when I am probably the one who is least familiar with a particular topic and I am sure that some of you are wondering what the Productivity Council has to do with this type of entertainment industry. In short, the Council's ambition, as a statutory body, is to help Hong Kong's various industries to upgrade their competitiveness and productivity through the introduction of technology and the latest management methodology and all the related marketing facilitation, etc.

So, let me just speak to you on some of the experiences that we have in working with the industries over the past two years. I think the whole term 'digital technology', or 'digital entertainment industry', actually only came about in the last two or three years, when we started with the convergence of computer content and also the telecommunication aspect, and we named this a new economy. When we are introducing all these technologies to all the different industries with an aim to upgrade their productivity, one technology that keeps cropping up, obviously, is computer, is digital and is animation.

Our first introduction to digital technology was actually through the manufacture and design sector of the Hong Kong industries, in way of improving the product design and engineering, simulation, etc. But, as we progressed along this technology line, we discovered, in fact, that some of this technology used by our engineering counterparts are the same packages and the same technology that is being used, or would be very useful to people in the animation, and therefore in the movie or advertising, industries. So that is how we came to be involved in this very highly technical area of digital animation.

When we started promoting digital animation, of course, we had been working with the government - and I do not have to repeat all the programmes that Alan has just mentioned - because we are one of the implementation arms for many of the government initiatives in technology and we are also the implementation agent for many of the trade associations in Hong Kong, including the digital entertainment association. But what we do have is, through our daily work with the industries, we have come to be in a very comfortable position to be able to witness what different parts of the industries are doing. Starting from the technology supplier - the hardware, the software - and over this side the advertising industries, the movie making industries or people who have been doing production, for example, for Hollywood during all these years, and have started migrating from the old, traditional film-making process into the latest digital technology.

Hong Kong has been involved in the film shooting process for ages and is responsible for some very famous films, starting from “the world of Susie Wong” to “Love is a Many Splendid Thing” to the later “Anna and the King” and “crouching tiger, hidden dragon” and “rush hour 2” and the like. What we have learned from the industry, is that, just as in the film industry in Hollywood, they have already set a target for 2004. They will be producing two thirds of their output in digital format and by 2005 all the films made will be in digital format – in fact, will be in both conventional and digital – of course, with the aim that it will be able to capitalise on these benefits of a particular production. The benefits being that they are able to produce more dramatic scenes through animation and these techniques. And, secondly, from a purely production point of view, that, with digital technology and with the communication infrastructure that is now available, they will be able to outsource their film production, which is one of their prime objectives, in digital format all over the world.

Now that is a good thing; when Hollywood starts to do something, then everybody follows suit, and Hong Kong, of course, is no exception. But, at the same time, there are also these other countries – Ireland, Israel, Australia, Korea – all these countries are going in the same direction. A big opportunity for our film makers, a big opportunity for our communication operators, and also a big opportunity even for people in the data storage, data centre business; how is anyone going to be able to store so much in digital format? And then we imagine all this heavy traffic going backwards and forwards between where the actual animation work, or digitisation work, is being done to the originator of the screenplay, the amount of communication going back and forth. Also, if somebody tried to look into the retroactive market, what would be the size of the market to convert the old, conventional, traditional film into digital format? That is a huge opportunity.

Secondly, we talk about production, and animation is just one small part of this. I am trying to describe the whole chain of what this whole technology can bring, animation is maybe there and digital film will be there. Then, if you talk about digital film, then you have your pre-production, all the planning, screen-playing and all the post-production, and that will make your film. Now, with the whole film, you have the global opportunity. If your films are in digital format, then think about the distribution of these films internationally.

When I start talking about distribution, one country that is going very, very aggressive after this is none other than China. China is a huge land mass, so imagine how many cinemas, how much transportation they need to distribute their films. But all they need now, with digital technology, is a satellite and this is what some Hong Kong companies are doing. You can beam them up, of course video on demand, beam them down and then, instead of a barefoot doctor, you can have a barefoot cinema operator, carrying a case, no bigger than a suitcase, going up the hills, going down the mountains and into the valleys, showing the latest “Rush Hour 2”. So this is something that they are going after in China, and, for example, at the Shanghai film festival last year, actually they were very much more advanced than many of us would imagine that China would go so far down the road.

And now, with film as a background, we talk about digitised advertising and software games and hardware games, one thing that film can bring us is characters. Characters are so important to animation, to games, to toys, and if all these were already produced, if Jackie Chan is already in digital format so we are only one button away from making that a game in Xbox, or by itself. And with the characters and the games, that will also tie in with the toy industry at one end, in which Hong Kong is bigger, and at the other end is the actual showing of the film, for which high definition TV would obviously be the answer. Talking about high definition TV, again one of the leaders in the world that is producing high definition TV, again, is China. China is already producing a 19" HDTV, and they are talking about a street price of US\$300 or thereabouts.

So all these are byproducts of when digital technology started impacting the first animation, then the movie, then entertainment - the hard type and the soft type - and all the rest of it. Of course, they will cascade and go further down into distance learning, distance entertainment, and all the rest of it.

So, with that major change in mind, and this is what the Hong Kong Productivity Council is trying to do, is to help Hong Kong companies to move up this value chain. So that is why we have in the past two years, participated in so many government initiatives, some of the film fund authorities, by bringing people like Richard Williams and other gurus from around the world to help our industries. And not just our industries, but also by helping young people in our industries. The one programme that Alan just mentioned on how we provide training through the holidays, we had 30 openings for young animators and we had over 2,000 applications. We actually screened and interviewed and picked 30 to be trained and you will be able to see some of the work that some of our high school graduates have produced. You will be amazed at how much talent Hong Kong does have in this area of creation and animation.

I just want to end by saying the Productivity Council is a statutory organisation. We help industries by getting involved and knowing exactly what they need and also knowing what the international trends are and then we identify the gap and then we bring in public support, either through government or other bodies, or through international technology vendors. So we are technology providers, but then also we are technology acquirers. In Hong Kong we are working intensively with vendors of technology, with people who are actually in the industry and also with training organizations that are able to produce different kinds of training in this particular field.

So, with that, I want to thank John for inviting me. Of course, not very much detail in the way of preparation. But the Productivity Council is a party where, whether you are a vendor or whether you are a person in the industry or in education, or whether you are international, you will be able to find through us your counterparts and also your opportunities, not just in Hong Kong, but also throughout China, because in China we do have a network of over 701 productivity centres who are doing quite similar things to us. If you are interested, for example, in getting in touch with people in the mainland - of course, you can go direct - then HKPC will probably be the next best thing to doing it yourself. Thank you very much.

John Ure: Thank you very much, Thomas.

I would now like to invite our panelists to come up and let me introduce them in order. Actually, our first panelist on the programme was going to be Dr Gino Yu. Unfortunately, Gino has had to go off to the States, but Harry Miller has agreed to step in. Harry, would you like to come in and introduce yourself in one or two minutes?

Harry Miller: My name is Harry Miller and I am sitting in for Gino Yu. I come from the United States and I have been in the game business for a little while now. I came from the side and the publishing side. I started a new company based here in Hong Kong that has two major publicists. One of them is publishing of mass arcade games for the pan-Asian region. Second is to develop world class content out of Hong Kong and Southern China. We started a couple of months ago and everything is going very well. And that is the nature of our business.

John Ure: Thank you, Harry. And, Harry, you are also involved in the Digital Entertainment Industry Association, is that right?

Harry Miller: Yes, I am.

John Ure: Fine. Secondly, Dr Mark Green from CityU, if you would like to just give a quick intro.

Dr Mark Green: I am from City University of Hong Kong, the School of Creative Media. The school has been in existence for about three and a half years now. We offer associate degree, bachelor's degree, MBA, MPhil and PhD in creative media and digital media. Our programme is relatively broad-based in all forms of media. Our students take film, video, photography, sounds that are on the more traditional side. They also see the digital side in terms of programming, different animation packages, different digital photo editing packages and things of that nature. So we cover the whole range of media and training, both on the creative side, and using the technology, with the idea that people who are going to be producing can function both technically and creatively and then the industry providing both the ideas and the technical skills.

John Ure: Good, thanks, Mark. And, also from the education sector, Tony Sin from Baptist University.

Tony sin: Hi, I am Tony Sin. In terms of my past experience, in 1987 I was the founding curator of the Hong Kong Science Museum. At that time, it was probably the largest installation of a multi-media exhibition. Throughout my career, before joining the Baptist University, I was with a company who furnished the History Museum and also the Heritage Museum.

Presently I am working on a project which is called Discovery Island and probably will be the largest installation of exhibition of multi-media that will probably be open just

before Disneyworld. It is supposed to be a community, interactive, learning laboratory and I hope that all industries and universities can participate and use it as a big laboratory so that people can experiment and use it as a testing ground for this type of distance learning, digital learning, and experiential and real-life touching and feeling type of learning.

Presently at the Baptist University school of communication we have journalism, TV, cinema and also digital media. All of them are related to communication.

John Ure: Our next speaker was to be Darren Olivero from Centro. I got a phone call literally just before we started, apologising because something had come up, and so Darren will not be able to be here today. But we do have our next speaker, Terry Tse, who is executive director of Imagi Productions Ltd. I believe, Terry, you have a short video you would like to show us.

Terry Tse: Hello, my name is Terry Tse. I am from Imagi Productions Ltd that is a 3D computer graphics animation studio. We are currently producing a 26-episode computer graphic TV series entitled “Centro” and we want to show you a trailer of it.

[video shown]

John Ure: Would you like to say who those characters were?

Terry Tse: Well, that is princess Megan, and her friends, a little dinosaur called Mango, and the robot, obviously.

John Ure: That is made for an American TV series, is it?

Terry Tse: Worldwide.

John Ure: Right. Our next speaker was to be Victor Wong. Victor phoned me last night to say that he has to dash off to the mainland but we do have, through Terry and through Harry, two of the companies who are involved in the industry, so we ended up okay. Rob Deans from Bird & Bird. Rob?

Rob Deans: Hi. I am from Bird & Bird, a firm of solicitors, historically specialising in IP laws. Over the past ten years or so we have moved towards the technology sectors. I am in the middle of what we do here in relation to it, media and technology generally. Thank you.

John Ure: Thanks, Rob. And, finally, I am very pleased to introduce professor Roland Chin, from ASTRI (Applied Science & Technology Research Institute)

Prof. Roland Chin: Hello. I represent two places. I am a professor at the Hong Kong university of science and technology. We do not have any media courses. We have basic courses in computer science and computer graphics, which is also related to this industry.

Recently, I have joined ASTRI, which is applied science & technology research institute, which is a government funded research institute of the order of \$3 billion and our objective is to build, not just an infrastructure, but a human infrastructure, basically starting projects, doing technology and with the resources at the institute. We could have 300 engineers and scientists working on various technologies. And one of the technologies we are looking into is game technology. That is one of the reasons I am here.

If I represent ASTRI, I guess I would have to sit on the government side. That is why I am here!

John Ure: Thank you, Roland.

I am going to fire one or two questions just to start the ball rolling. And then I will invite anybody who wants to come in and ask questions of anybody or all of the panel. Please feel free to do so.

I would like to start with one issue that has come up in a number of the papers and one or two of the presentations, that is the issue of piracy. Rob, you are a lawyer representing a company that does a lot of work in intellectual property rights and so on. I would like to start with you, but then ask any other member of the panel to come in on it. The question is this, just how serious is piracy in this industry? Is it particularly a Hong Kong problem? How are the intellectual property rights laws designed in Hong Kong to cope with it? Do they cope with it or do they need some revisions? And, in terms of the opportunities that might offer, in terms of encryption techniques, digital rights management and so on, is that an area that Hong Kong can develop? In other words, change the threat into an opportunity?

Rob deans: That is, potentially, a very long answer. How big is the problem in Hong Kong? It depends on who you are on the commercial side. If you are trying to sell content to end-users here then it is a problem, which directly affects you, and our clients say it is a big problem here. If you are, for example, trying to create digital content for sale overseas, then it is not such a direct problem for you. If you are trying to sell to Hollywood, there is a problem if you want to come back to Hong Kong, if your movie is designed for here. But it depends on your market where you are.

Piracy is, inevitably, going to be a problem. It is a problem for Hong Kong. The quality of laws here are very, very good. I saw on a newsflash the other day that a couple of treaties are just coming into place worldwide dealing with issues including anti-copying devices and putting into place minimum standards applying to anti-copying devices that cannot be circumvented. One treaty came in a couple of weeks ago and another is coming in in a couple of months' time. We had appropriate laws in Hong Kong in place almost five years ago in 1997. Our laws are very, very good here. There are problems in enforcing those laws, partly because they are highly technical and have become more so with the recent revisions to copyright legislation,

The issue perhaps for us in Hong Kong is our neighbours. We have got very good copyright laws here, but some of our neighbours do not have laws that are as good.

That is the first two parts of your question. I have lost my thread as to what the third part was.

John Ure: Well, maybe the third part might be more in Roland's area, which is, are digital management rights and encryption software opportunities where Hong Kong can make strides?

Roland Chin: I do not think I am an expert in that, but I can comment on that. If the market is Hong Kong, the market is too small to do anything. If the market is United States and Europe, I do not think there is much of a problem. If the market is China, good luck!

Any encryption, DVD area code encryption, watermarks, etc. Are good research areas, but it could be defeated very quickly by smarter people outside. All you have to do is to look at the DVD area code. Look aticable in Hong Kong, our own Hong Kong cable channel, I walked around Mong Kok - for those who have never been there, you should go - yesterday and for HK\$49 you can buy a decoder in a little circuit board to decodeicable movie channels. No matter what kind of encryption or what kind of thing you keep changing, there are always smarter people out there and it is really inexpensive to change it. So it depends on the market. I do not think it will be an area of investment to go into high-tech encryption, into contents for a small market in Hong Kong or for a big market in China. I do not think it helps.

John Ure: The point you raised about how quickly cable codes can be broken, you have probably been reading the story that Vivendi in France has accused Newscorp of using Israeli code-breakers to break Canal Plus code and then putting it on the web. And there is a lawsuit on that. But Terry and Harry, from a business point of view, how big an issue is this and does it keep you out of particular sectors of the market?

Harry Miller: I came here six months ago and I went to Mong Kok - which a lot of you are familiar with - half the games that I saw over the last two years are there and they only cost US\$1 apiece, which hurt, but I guess it does not affect me now! There may be laws here, but they are not enforced, so it is a moot point. I guess there are benefits to it, maybe for Hong Kong people, because they get access to cheap software and then they can learn that software and become experts. But, as far as enticing people to come to Hong Kong and to China, it is a tough road because people do not want to come here because there is no market for them here. And as for copy protection, there is no such thing, unless it is on the server side. I mean, it exists, but it can be broken. No matter how smart you are, there is someone smarter.

So, whether you are an IAP, offering games which require server side protection, and which are theoretically it is impossible to break... give it a couple more months and we

will find out if that is true or not. But, as I said, Hong Kong is a small market; it could be much bigger because there are a lot of interesting games here, if piracy was not so prevalent. So the market is here, and for us, making games we have to focus on a worldwide market. And that is true for anything you do, the larger the market, the better chance you have of breaking it. So, even if China was a great market and had no piracy and Hong Kong had no piracy, we would still focus as a worldwide market.

Terry Tse: Well, I think he answered most of our problems. We know Hong Kong is a problem and China is a bigger problem. So, for us, our strategy is to look at the worldwide market and that is why we sell our properties to Europe first or the USA, if we can, and then Japan. So Asia/Pacific, Hong Kong/China will be our last stop. That is the way we do it.

Mr Alan Siu: As far as Hong Kong is concerned, I think we have the legislation there. The question is very much enforcement. Of course, there are areas where we can do more, in particular, for our colleagues in the customs department. We have been making some good progress there, certainly in terms of the film industry. The film industry has been criticising us for not doing enough in the past few years, now they are beginning to compliment us, and these days it is not easy for the government to receive compliments.

So, I guess we have been doing the right thing and I guess we need to do more in terms of digital entertainment. Certainly, the next item on my agenda for the next meeting of the working group is to call upon my colleagues from customs to come here and listen to the views of the industry and see what more we can do in terms of enforcement. In respect of China, of course, there is a limit to what we can do but, certainly, I guess the technology can help and the mode of delivery will be able to help. Some people are now talking about the use of delivery of on-line games, which can get away from the piracy problem. That is something that I think the industry can explore further.

Rob Deans: Just to pick up a couple of points there. First, on the enforcement side, we agree the laws are good but perhaps a bit overcomplicated which means that either you take civil remedies, which means employing someone like me, at significant cost, to try and enforce rights for you, or criminal remedies using customs. The problems with customs are essentially that they are doing a multitude of different jobs and they are trying to bring a case before a magistrate who has got a multitude of different criminal cases before him, and trying to pick your way through complicated legislation is not that easy when you get down to that level and, although we have the laws in place, if they were simplified that would go a long way I think.

Harry Miller: I understand it is difficult to stop piracy, but when you have stores whose only business is to sell pirated software, why is that hard to stop? You just walk up there and you shut them down. You post someone there and every day if they try to open up again, you shut them down again. And the customs issue, they can replicate stuff here in Hong Kong. So I do not understand why it is that difficult in that sense.

Rob Deans: The issues are, with customs and with the Intellectual Property Bureau, the problem is that you are stuck in customs' hands, customs are the enforcement agents and if a policeman goes past the guys who look after hawkers, they see some hawkers, they will not arrest them. So it is the customs that deal with this and they have limited manpower. And, if you go to Golden Arcade, a customs officer will walk up, he'll be spotted on a camera and, by the time he has got inside the facility, most of the shops will have shut down. If he does find someone, he will find some 14 year old with no previous record who will be arrested, convicted and replaced by someone else the following week. That is the problem, you are chasing and you are fighting for resources. That is the essential problem with the enforcement on that side.

One other thing regarding on-line delivery, I think there are interesting ways of doing that. If you looked at the Napster model a few years ago, everything there for free, wonderful. Napster were not making much money, if any, and they were eventually shut down. If you have on-line delivery where there is a licence fee paying you money, if it is a content provider, they could use some kind of security that creates problems in itself. But, I think there is a long way to go in thinking of novel licensing methods to try and work your way around a number of problems.

John Ure: Let me ask one more question before I ask people from the floor to come in on that or other issues. Let me link my next question with that issue. I will put it first to Terry and then to Harry, and then to mark and to Tony.

One way, perhaps, rather than the enforcement, which seems to be a rather difficult problem, is a commercial answer - and that is one of the proposals that I think was in Lily Chiang's paper - and that is if you bundle, if you move up the value chain and you start bundling your products then that makes piracy more difficult. So one question to Terry and to Harry would be, moving up that value chain through bundling, how far is that a commercial opportunity, here in Hong Kong?

The second question I want to ask is about the supply of skilled labour that is involved in that and, from your points of view, what are your greatest needs, in terms of human resources, and are they forthcoming in Hong Kong? And, from mark's point of view, and from Tony's point of view, do you see the students that you are producing matching the demands of Terry and Harry?

Terry Tse: Well I really do not have any answer to those first questions. That belongs to government so I cannot comment on that.

On the second question, in terms of human resources, we do find it difficult to recruit qualified trainees, etc., from local universities and high schools. I think the education system here does not encourage our younger generation to think creatively. To think creatively is more important than knowledge. So it is very difficult to find a creative person. Again, I am not able to deal with this problem by myself so hopefully the government will handle that.

Harry Miller: Bundling is not really an option because it is really a (last-ditch?) Option for selling our products. Once the life cycle has basically ended, we look towards bundling. So, if our option is to bundle hardware or software just to sell them to these regions, this is not anything. So, again, it is not a market force.

It also seems a shame that distance has defined unique, creative ways to get the product sold when we should find other ways that are teaching the community why piracy is bad. One, taking a stronger stand on enforcing piracy, or anti-piracy.

As far as local staff goes, it is a challenge finding people who are qualified. One thing that is interesting is seeing resumes here. The resumes are beautiful. There are hundreds of them. But then when we actually interview them, what is on paper and what the skills are is not the same thing. That has been a very interesting experience for us.

What is also interesting is, when I hire people back home, I have never gone to a university to look for employees. When people apply to our school, it is something we do not look at, because they have no experience in the field, they have learned theory in areas of art, or programming, or whatever but, bringing them in is like teaching them all over again. So it is another year before they are talented and have the capability to help us. So, back home, probably 10 per cent to 20 per cent of our staff has a college degree. Whereas here everyone who is applying is applying from university with a masters programme, doctor programme, etc.

Finding people is a lot longer road than I thought it would be. It takes more investment, as far as taking people on. But this is how games work. Take Dallas and Austin, Texas for example, each of those cities is quite big in game developers. Each of those cities started with one game developer who became quite successful. What happened there is that they were very successful and they hired more and more people, and their arts grants were bigger. They started losing and making serious money. All of a sudden these programmers say, "you know what, I am doing all the work here, I am going to grab these two artists that I work with pretty well, and a programmer and we are going to start our own company. And then that breaks off, and pretty soon you have 15 different companies in these cities. Some of them are doing well, some of them are not. But that is how that industry grew. That is going to happen in Hong Kong, I believe. That is one of the reasons why we are here.

John Ure: Does that mean what you (*asking Mark and Tony*) are doing is irrelevant?

Mark Green: I hope not. I am going to go back to the bundling issue and then I am going to come back and talk about the training. I think, to some extent, the bundling is a way out. One of the things I was going to mention on the piracy issue is look at different business models. The model we are looking at is basically the model that the recording industry pioneered 80 or 90 years ago, when they started selling black vinyl. I mean you sell something physical to somebody, and that is how you distribute it. Once we went, in the media industry, to digital we screwed that up because, when you are on vinyl, when you are on cassette tape, you could not make perfect copies. There was always the

benefit of having the original because it was higher quality. Once we went to digital it meant that copying was no longer a problem; you could put it on different media. People started looking at this and saying, "if I bought this on a CD, why can't I put it on my MP3 player and listen to it?" And things of that nature.

So maybe we need to look at how we distribute things. Maybe there is a different way of distributing. Maybe there is a different way of making money off of this. Bundling is one way.

Games; there is a great game industry here, look at building games. I spend a lot of time at the Golden Arcade in Mong Kok, as well, looking at those things. One of the things I have noticed – and I have not done any formal research on this, this is very informal and non-scientific – Linux is not pirated. Other operating systems are, other software is. Even some of the pirate stores sell real, original distributions of Linux. Why? People are willing to buy it because it has the printed documentation; they register and they get online service and updates. They are getting something bundled with the service. They are not buying the CD, they are buying the service and that seems to work here. But that is the only software that I have seen that has not been widely pirated. I think it has something to do with servicing.

Going back to the training, there is an issue with training here; I spent quite a long time in North America before coming here – about 20 some years – teaching people who went into the gaming industry, particularly bioware and electronic arts. There is a difference here. One of the criticisms we are constantly getting from the university is that we turn away the top 10 or 15 per cent of the students that apply to our programme. They say, "why are you turning away all these great students?" Well we interview every student and they are great at memorising textbooks. They can tell you, from cover to cover, the contents of the textbooks that they did their A levels on, but they could not write anything if they had to. One of the tests that we give them when they come in is to give them a picture and they have to write a one or two paragraph story about that picture and then we read it and see if they have any creative ability. Some of those who went flying through with straight-A's will give us a description that tells us what is in the picture; we already know that. We are looking for the ones who will tell us the story behind the picture, that have that creative ability. First of all, it is hard to get those students because, for the 88 positions that we have in first year, we interview 500 to 600 students to get down to that level. So it is difficult.

The other problem with the education system – and I think there are too many people from the universities here, I am going to be careful how I word this – it is hard to get co-operation. One of the things that I have noticed, we have four universities within commuting distance of each other: the City, Baptist, Polytech and Chinese University. You can get to any of them in about 20 minutes on the MTR or KCR. A student cannot take courses at any of those other universities and get credit. So, for example, at City University we are running a media programme – we do not have a music programme, we do not have a drama programme – I would like students to take music and drama courses. I cannot send them to Baptist or Chinese universities because they do not get credit for

any courses that they take there in those programmes. They could easily do it; it is a 20-minute commute. We cannot run it; we cannot do that within the current university system. There is no way of transferring credit between the universities. There is no way of getting universities to co-operate and collaborate on running programmes. This is a problem we have in our system now. I am not sure where it is going. Maybe we need to talk to UGC a little bit about these sorts of issues. But it would be very good if we could actually get some of these universities collaborating, working together. Because if we want to produce well-rounded people, people that these guys can hire right out that understand, both the creative side, and the technical side, they have got to be taking a broader range of courses. We have got to work together on it.

Harry Miller: Well, I do not want to speak ill of the university system. I actually work quite closely with Polyu. It is great that they are teaching the courses they are teaching and it does go a long way to help.

John Ure: Tony, would you like to add to that?

Tony sin: I actually joined the Baptist University only four months' ago. In the past 10 years I have been in the field of creating interactive exhibitions, multi-media, etc. A lot of the work has led me, actually, to China and I find myself, although I have a design team of 50 in Hong Kong, wanting to work more and more in Shanghai, Beijing, Guangzhou, Shenzhen and Zhuhai, and all those areas. The reason is very simple; the designers there are very anxious to work. I remember 15 years ago, when we were doing the Science Museum, I tried all over the place to find where the best place to do a multi-media programme for the people would be? We went to India, we went to the United States, we went to Australia, the Philippines, and eventually we found it right across the border in Zhuhai. There is a group of people there who are very willing to learn – and we were using a Macintosh at that time – and, at the end of the day, when they had finished their work, they would stand up and bow and thank us for giving them the chance to use our equipment.

So, with the ratio of 1-10, if the charge is HK\$10,000 a month here, it will be \$1,000 in China. So, in terms of the creativity, the labour and the attitude, comparatively speaking, I find myself working a lot more in China, but then I have come to recognise that I think that is not the way to go. So, eventually, I decided that, when people first come, they will constantly have to be told what to do and I say, while working in a professional area, I am not here to teach you how to do it, so I decided to teach. I actually find students are very bright but I think they need exposure in Hong Kong. It is actually an advantage in Hong Kong to have the piracy because it is so readily available, they are exposed to all kinds of games and they test them, and make good judgements about the toys here. So we need to curb them, but there are actually students who know not to use piracy, but the fact is that it is happening this way.

In fact, I find that, in terms of the education system, there is actually a lot of revenue where, if people could be exposed, there are many scholarships, including the one – and we will thank HKPC for that one – allowing the students to go to study in New York

City. Since they have been back, I think we need to retrain every one of them. In a class of 20, there are only two people who went there and it actually had quite a big impact on the other students there already. So, as I look, there are actually plenty of ways of doing it, including recently we have been doing, what is called, the first China university video conferencing. That means we can actually bring people from all over the world, and they can gather in their own place, just like in this room, and be able to talk to the best experts around the world on different topics.

I think, in terms of the problem that you might have with the university, because I can always claim that I am a so-called “professional in residence”, so I can get away with murder in the university system. So I just do not ask them what to do, I just do it. I think maybe we should start doing that, as it is a way of getting around the problem. I do not think anybody will tell you not to do it; you should just go ahead and do it. I think that will solve many of the problems.

Alan Siu: Going back to the question of training, I think, as Mark has said, I think there are sufficient people in Hong Kong who are interested in the subject, in trying to attend all sorts of courses in order to gain expertise in the area. I think it is a question of how we add value to them and improve their quality. Bringing people like Roger Williams to Hong Kong certainly helps and sending our youngsters abroad so that they can have increasing exposure to electronic arts or New York film school. I think all this will help to improve their quality.

One thing that we are doing – not for the university graduates, but for the form five school leavers – is the course recently organised by the Hong Kong Productivity Council to provide digital entertainment training for the youngsters who will probably not be interested in a formal education. One important feature of that course is that we do provide internship training for them. They will not just have to attend the courses; they will actually have placements in our games companies, in our digital production companies, where they will have the internship training. I think this is a very important aspect, which ensures that the youngsters that we have trained will be able to cater for the needs of the market. The response for the course is very, very good. The HKPC is trying to have another class, and we said, “ok, if you can manage to find the internship”.

Thomas Tang: There is a little bit more to add to that very successful programme for young animators. I think, from the statistics, you can tell a lot of the people that actually came are young people in their early twenties or in their teens, which shows that young people in Hong Kong are, firstly, interested in new things, interested in computers, and they are also very interested in creating things. But some of the feedback we are getting from some of the youngsters is that really, even though they have signed up to join, they do not know whether it is going to be a huge future for them. I think that says that, apart from the training, obviously we need a lot more well-trained youngsters to really upgrade our industries.

On the other hand, I think the industry itself also has some publicity work to do. The animation industry – or, for that matter, digital entertainment – is still not that widely

advertised as an industry. As an industry, youngsters, whether they are university graduates or people from form five, need to really find a career which they can do for the rest of their lives. So I think there are things for the industry, and also for organisations like ours, for HKPC to really promote this as one of the most new and upcoming employments in industry, as well as an opportunity for our youngsters.

Roland Chin: Let me say a few words about training, since I have been teaching for the past 30 years. I think it is a 'chicken and egg' situation. The jobs are not there. For creative art training, you get certain training, whether it is a sub degree or bachelor degree, the jobs are not there. If you look at the last two year's numbers, Polyu has a programme – not Mark Green's programme, but another associate degree type programme – which has received funding from ITC, the Industrial Technology Commission. The first intake of students was about 80. They came out and they could not find jobs. Of course, there are two reasons why they could not find jobs: there is no job, not enough industry to support that, or they are no good. I am not going to comment on one or the other. It could be either or a combination of the two factors. And then the second year intake trickled down to 50 and they expect that the next intake will be 30. So are there no jobs, or are they no good? The industry is going elsewhere to find people.

But if you look at the comic culture in Hong Kong, 35 and 40 year old 'kids' are reading comic books every day on the subway, and do not tell me they could not do simple creativity, Hong Kong people are very creative. Are there no jobs around or not enough jobs around to support this training? Or are the students no good? I do not have any answer to it.

One thing I criticise now in our own education system – since I am partly guilty, I am an educator – is that Hong Kong does not really have any decent or massive fine art programme like in the United States or other parts of the world. Fine art people know how to write music scores, how to write a script, how to do drama, in terms of training. In Hong Kong, people are still very job-oriented; they go to computer science, they go to finance, they do marketing, and there is very little training in that respect. That may be part of the reason why our students are not creative in that sense.

John Ure: Can I ask how many people here are from the industry? Do any of you have anything to add to the issues that we have been discussing? For example, the supply of school people, or another question would be where do you think you would like to see government coming in to give support to the industry?

Participant: I would just like to make a comment. In Hong Kong, there is a drive to be a technology centre. It is lacking one of the things, which a lot of major technology centres have, and that is that, a lot of the education, and a lot of the industries, are subsidised by the government for military purposes. Israel and the United States, even China, are subsidising research. But Hong Kong really does not have that kind of support system to train programmers, to give funding for research for these activities and I think the reason is that a lot of the Hong Kong research has never been focused or directed toward a mission objective. Maybe, until recently, they have been looking at Hong

Kong's role within China but there has not been a much more focused desire to actually train people and, in the past – and I think it may be a little too late in some degree to actually come up with a mission now, at the last minute – a lot of the technology built around the world, for example on the internet and so forth, actually had military applications in the beginning, and in the second and third generations you find commercial applications, and you already have a bed of trained programmers and developers that can exist on that.

So, that said, what would be the next mission for Hong Kong? What can it do to 'light the fire' in people, to tell them that they have to develop a real technology industry?

John Ure: What, and declare war, you mean?

Participant: No, I am not advocating that Hong Kong should have its' own military!

Participant: Yes, I have two questions. Let me ask the first question to Harry Miller. You are in Hong Kong, obviously. My first question to you would be, why are you here? Is there something that attracted you to come to this place, or were you invited here? I just want to get a sense of that first.

Harry Miller: A lot of reasons. Actually I approached the previous government on that years ago for the same purpose and they thought it was great, except that they wanted me to do everything, like expertise, do training and fund it all. So I was not that interested in that, plus I was running a production company in the States. So, recently, I sold my company and I wanted to try something new and heard about the university's interest in this area, which is positive.

Secondly, Hong Kong, to me is the most attractive country to come to for games, coming from the United States. Part of what I do is bring in experts programming art design. The idea is we see as many people as we can, locally, into these areas, so that after a game has been developed – and this is a lot of hard work, it takes time, it takes two years to make – then those locals from here who were part of the process now have the experience. They may not be able to do it by themselves, but maybe they can do the next one out. Anyway, it is an easy place to recruit. It would be very hard to recruit in Korea. You go to Singapore, but Hong Kong is next to China, so the idea of developing art studios, that sort of thing, in southern China is very attractive. The infrastructure as far as the internet, for pan-Asia is best in Hong Kong.

Our idea is to focus in Asia. Our idea to make money is to supply these mass arcade games for Asia. So we set the server here in Hong Kong that supports all of Asia. We are a small company, I work with partners in Korea, Taiwan, Singapore and Malaysia, etc. But the game resides here in Hong Kong. They deal with distribution, advertising, marketing and such expertise in their own territories, but it resides here in Hong Kong.

Participant: Well, you hit on a point that I think is important. Hong Kong, from my experience too, has probably one of the best infrastructures in the world, in terms of

broadband, and when I talk to people in the States about what we have here they are often a little bit jealous. But what surprises me, at least I sense it when I talk to people in the States, is that they are a little bit surprised about what we have here and are not aware of what Hong Kong is doing. Why isn't Hong Kong promoting its' infrastructure to the rest of the world? And, if it is, how is it doing it? And, specifically, what kind of companies have you – Hong Kong, the government, or whatever (I do not even know if industry has a group that tries to promote the infrastructure here) – brought here to develop things, because to me this seems like the most ideal laboratory to develop something? The penetration here is great. There is interest in the connectivity, in terms of games, in terms of ASP solutions. And, if it works here, I think it will work in China, the next big market adjacent to Hong Kong. This is a great place to prove something, but I do not sense that Hong Kong is marketing, what I see as its' best asset, and that is its' infrastructure.

Harry Miller: When I talk about infrastructure, I do not mean just in Hong Kong, and particularly in my business, what I do, I do not think anyone knows that it exists. I think even the government does not know that it exists. Most ISP's here do not know that it exists at all, until we have any research on it. I mean they are competing for the business. That is how we found out that Hong Kong was the best for this. So this is not just how someone here in Hong Kong connects to someone else in Hong Kong. That is what happened when someone in Korea played with someone in Hong Kong. Before, what would happen is if someone in Korea wanted to play with someone in Hong Kong, they had to travel to the United States and back to make this connection. Now it is okay, now they can go direct, which helps and makes it a viable business.

Participant: So why isn't that being promoted

Alan Siu: I guess I have to answer this question and I must admit that we have not been doing enough on this and we need to do more. That is why, in my presentation, I have emphasised the point of market promotion and that is what the government is going to do. For example, taking the industry to internationally prestigious conferences and exhibitions, to showcase Hong Kong's products. We have people with good talents, we have many good productions which have won awards elsewhere and our productions are of international standards and high quality. These are the things that we should publicise and let the world know about what Hong Kong can produce

One thing on my mind will probably be one of the recommendations of the working group, and that is we should produce a VCD on what Hong Kong has achieved - for example digital entertainment - and then send it out to all digital production companies all over the world, be it in Canada, United States, Europe or the mainland, and tell people what we can achieve and see what we can get back from that. So these are the things we have in mind.

Participant: Is that part of government's abandonment of laissez-faire in favour of intervention?

Alan Siu: I think it is not a matter of intervention; it is a matter of facilitation. As this gentleman has said, we have done a lot to set up our infrastructure and what we try to do is let people know what we have. So it is not a matter of intervention or interference. It is a matter of facilitating our market to get to the other places in the world.

Thomas Tang: I think I would like to add, of course, the Hong Kong SAR government makes policies, they do not get involved really that much, apart from being a very positive, sometimes, facilitator.

But there are other government organisations like the Trade Development Council or the Hong Kong Productivity Council, who actually, as part of their mission as a facilitator, help Hong Kong industries go abroad, for example. I do not know how many thousands of exhibitions TDC hold each year in all parts of the world, obviously under different themes and headings. I know that there are several that they are holding on films and other digital it industries for Hong Kong. For example, the recent it export which is a major, landmark event for Hong Kong it which was held a couple of weeks ago and attracted a lot of people from overseas.

Of course, I think what Hong Kong needs to do, or at least what these particular industries need to do, is to make ourselves more visible. I am not saying that we are not visible, but this is a new industry we are talking about - digital entertainment - and usually when we, TDC and HKPC, take delegations overseas we usually work, not so much with the particular entertainment companies, but we work with trade associations. So, for example, clocks and watches, toys, and other electronics, there are many trade associations that we can go out with each year all over the world. So maybe it is an opportunity for our association to really take part and maybe approach either TDC, in the case of overseas promotion, or HKPC to really get more deeply involved with our counterparts, whether it is overseas or in China, for example.

John Ure: In light of the time, I am going to just ask one question for each member of the panel. If you would maybe just take one minute and then carry on the discussion over coffee.

If you had to come up with one area where you think the government can usefully support the industry, in one way or another, what would be the top priority you would choose?

Where shall I start? Rob, would you mind? You may or may not have a view on this one.

Rob Deans: A difficult question for me to answer. If I look at myself with a lawyer's hat on, what I would see the government could do to help me help my clients in the industry is probably to give more expertise within customs so that they can be more self-reliant in the technical areas of copyright infringement.

Terry Tse: I think the government would be doing Hong Kong a favour if they can somehow establish a training centre and provide our high school and university graduates, for example, with training facilities, like software programmes, which are quite expensive if they buy them themselves. And create a sort of a talent pool so the private sector, like us, can tap that pool.

Mark Green: I guess, in my view, if they provided some help for young people, young companies, small companies to get started, get some infrastructure out there. I was glad to hear that some loans are available, because it is the small companies with young people that will do the innovation and build up the industry. We need to get them going and started on building a structure in the industry.

Harry Miller: I agree 100 per cent.

Mr Tony Sin: I think that the public think that the dot com bubble has burst and that anything digital is a façade and is not successful and, in fact, I think this is not true at all. I think it is still going on. A lot of the companies are systematically building up through e-commerce, etc. And I think, first of all, the government needs to dispel that myth that anything to do with dot com is not good, and, in fact, is very useful. And I hope the government will set up a task force and will actually solicit and systematically study how to be able to put this back together.

I also want to open up the term 'digital entertainment' more, because I think it is narrowly focused on just doing animation film. It could be education, it could be training, it could be training people in 747 simulation, it could be doing surgical operations by all these different techniques and so animation is not narrowed down to just doing films, but it is in flash, in websites, multi-media and all sorts of other programmes.

Roland Chin: I think that this is a human resource intensive area and human resource training is the most important thing. I also urge the government, contrary to some people's opinion, not to have another task force or another consultation. They have done too many, too often, and they are usually sitting there collecting dust and no action taken.

Dr John Ure: All the consultants can leave now!

[laughter]

Thomas Tang: I think anything to do with human capital and improving the financing to this particular area obviously is something that the industry will look for. But, on top of this, I think one thing the government should do – and, actually, I think they are doing – is the cluster effect. Whether it is digital entertainment or others, Hong Kong has to be known, has to be on the map of digital entertainment, so that people can come here to invest, or to procure, or to start companies, and when we cluster we should leverage on some of our existing advantages. For example, Hong Kong is well renowned for our film industry, so digital filming we can obviously add to this. Hong Kong is also

well known for our advertising industry, so digital advertising would be another route for us to form this clustering, put us on the world map of digital entertainment.

John Ure: Alan, the last word. What is the next step?

Alan Siu: Well, I would just like to assure Roland that we have no intention of doing another consultancy. All we will focus on is action!

John Ure: Okay. Well, watch this space.

Before I bring this session to a close and before I thank all the panelists, just to say that after the coffee break we will be picking up really, partly on the point that Jim raised about how to use the infrastructure, what this implies for the infrastructure and we will have Intel, Cisco and Peter, who will be talking a bit about China and what is going on there, Peter is based in Beijing.

So, can I thank all our audience very much indeed for a very stimulating discussion? We have obviously just scratched the surface. Those of you who have not read the TIF or the other papers, I urge you to do so. There is a lot of meat in them. So, thank you very much indeed, all of you.

[Coffee break]

Dr Peter Lovelock: Welcome back to the second session, where I think we have got more of a focus on the infrastructure side. I am going to get this going very quickly.

We thought we had speeches from Intel, Cisco and myself. Then we thought we did not have Cisco, which was great because I have got a plane to catch in a couple of hours, but it looks like Cisco is on the way. So I think Christian and I are going to do a routine between us until Cisco gets here. So, without further ado, Christian Morales, vice president, sales and marketing group and general manager, Asia Pacific operations for Intel.

Christian Morales: Hello, ladies and gentlemen. Good afternoon. It is my pleasure to be here today.

I would like to talk about where we are today in terms of building the spiral of software, building the spiral of hardware and, from there, where we see the market going from an it perspective, from the devices to access the internet, from the broadband which is required behind, and what are the opportunities we can all share going forward.

One of the things that are here today is that the internet is still well alive and keeps on growing. Most of the emerging markets, worldwide, keep on investing, and they have a budget for it investments this year, which is higher than the one they had last year. This is true for our neighbours here in PRC, in the mainland where they have a 13 per cent increase in budget versus last year and where the government has just decided in the 10th

five year plan to invest US\$500 billion in infrastructure, mainly in broadband and content development, which is very, very important. And they want it to become a key contributor to their GDP going forward. Wherever you go in the region of South East Asia – India is a little more conservative on this, I would say – it is very bullish on it and we also see their budgets being increased. This is also the same in a lot of eastern european countries, in Russia and latin American countries.

So what we can see here is that we had a vision four or five years ago that by 2005 there would one billion PCs connected around the world, 100 million servers connected, generating hundreds of billions of business-to-business transactions around the world. If you look at what happened in 2001, we ended up with about 550 million users connected to the internet worldwide, and this number keeps on growing at a rate of 120-150 million per year. So we should be reaching a billion PCs connected around the world by 2005 and we will see the amount of transactions through the internet – whether it is b to c, but mainly b to b – which keeps on growing.

So if we look at what is happening in the digital world today, let us look at some important data we can see here. In the course of one day we will have about 500 million people connected to each other. We are going to have about \$12 million of retail shopping done online. We are going to have, if it comes closer to us, we at Intel are going to receive about \$60 million worth of business through the internet on a daily basis, so it is about 80 or 90 per cent of our business worldwide which is transacted through the internet, so every day we get 60 million and we hope this grows. There are 500 million searches done each day that are conducted through 30 million websites around the world, which means a huge utilisation of connections around the world, utilisation of servers, utilisation of broadband. There are 650 million instant messages exchanged on AOL on a daily basis, there are 1.2 billion pages used at Yahoo only on a daily basis, and we have about 100 billion emails sent each day throughout the network. And this keeps on growing on a daily basis so it proves that the internet and e-business is really alive and doing well.

So, if we look at the situation worldwide in terms of broadband deployment, where we are and where we are going to be about three years from now, let us look at the leading countries here. We can see that countries like Korea have got 30 per cent of homes connected through broadband and we expect they are going to have 75 to 80 per cent connected three years from now. So they are clearly leading the world, and we can see here more mature markets like the United States or Western Europe, which look like emerging markets, in terms of broadband deployment. That is quite interesting.

If we look closer to us here, where Hong Kong is right now, we have about 10 per cent of households connected to broadband and, in three years time, with all the investments planned we see here taking place from the telecommunication companies in Hong Kong, about 60 per cent of households will be connected through broadband.

I just want to tell you an interesting anecdote. Before coming here, I spent one year in the United States, before that I was in latin America and before that I was in Western

Europe, but in the United States I tried to order a DSL connection for broadband and so I placed the order to Pacific Bell in San Francisco and, after six months, they told me they would install this broadband connection three months later, which meant in total from the moment I ordered it it would have taken nine months. But then I was planning to leave to come to Hong Kong, so I told them it was too late, not to install my connection and maybe next time I was in the United States we could talk about it again. When I came to Hong Kong, it took me three days to get a broadband connection, so it just shows how well prepared I think we are in this part of Asia to get a broadband connection, when in the United States it can still take several months to get it and then you are not sure if it works all the time. Our CO was telling me a couple of days ago that he still has engineers from the telecommunication companies coming to his home every other month to fix problems. This does not take place here, so I think this is something we have got to be very proud of in this region because we have been leap-frogging to the latest state-of-the-art technologies which are much more stable and scaleable and give us a much better service. So it is interesting to see this evolution here of the number of houses that are connected and how this is going to evolve over the next three to four years, whereas countries like the United States and Western Europe will still be lagging behind big time.

In terms of revenue of services provided by broadband, we are going to have about \$33 billion of opportunities by the year 2006. The annual gross rate we are expecting in the next two to four years in Asia are in cable modems, of about 25 per cent year on year growth in cable connections, and 42 per cent in ADSL connections, which is a very steep growth taking place, going forward. In Europe we are going to see the access revenues doubling from this year to the year 2006, broadband users will jump from 56 million to 100 million plus, and in Latin America we are going to see the broadband users growing 56 per cent year on year from 2002 to 2006 and ADSL subscribers growing from 400k users this year to 3.7 million in 2006. So a very steep growth around the world of broadband deployment.

An interesting point to mention here, for people who are using broadband at home, 76 per cent are playing audio CDs on their PCs and they use their PCs as the entertainment centre and the digital centre of the contents they use, 60 per cent are playing online games at the same time, 49 per cent are downloading music onto their PCs. We were talking about the IP issues an hour ago, I think this is something to be taken into account by the music industry; shouldn't they think about the different issues and models than just selling support like a CD, shouldn't they work on distributing the content online with a very different scheme than the one they have today? Thirty three per cent use their PCs to watch movie videos, because now you can get very good quality on your PC when watching a film. Interestingly enough, we have been linked to the film industry worldwide for many years already. It was in 1997 that I had the honour to be at the Cannes Film Festival for the first time, and I was there to represent Andy Grove, who was receiving the award for the company that had contributed the most to the film industry that year, which is when we introduced the Pentium with MMX technology that allowed you to receive 28 to 30 frames per second on your PC, and it was possible to digitalise the films on your PC, which was a major breakthrough in terms of technology, because you did not have to cut and paste your films on analogue support, but you could

do it on the digital support, which was a major enhancement. So we have been involved for many years there and I heard that a lot of the special effects that have been done there were done on inter-architecture workstations, so we have been working very closely with Hollywood and a lot of producers around the world. And 23 per cent are downloading films using their PCs. So we see the PC is really becoming the entertainment centre in the home for these kinds of things.

The other night I went to an anniversary celebration – not of a teenager, but of a person in their early fifties – and they had three hours of music that was on a PC, so they had everything going through the PC. I thought I would still see the old disc, as we had 10-15 years ago, but, no, they were digitalised, they had everything on a PC, which was quite interesting.

If we look at an interesting phenomena taking place right now, if we look at the Asia bandwidth here, we see that communicating from Hong Kong to Taipei, or communicating from Hong Kong to Singapore, or Kuala Lumpur, rather than taking the shorter distance, we have to go through the United States each time. So it is quite interesting to see that that much of bandwidth has been deployed throughout the west coast in the United States, rather than intraband so this just suggests that there is a major opportunity. People now are deploying a lot of connections here, using intraband just to support those connections and transactions taking place. Just as a reference, in Europe, for example, 60 per cent of the transactions take place within Europe and only 40 per cent with the outside, so they use the internal infrastructure to support the transaction. Unlike here where 80 or 90 per cent is going through the west coast. And this is going to change over the next couple of years, but for the time being, it is amazing that most of the countries just invested first in communicating through the United States.

So what do we see next? This is what we have seen taking place in the last 15 years or so since the PC industry really took off and moved from a couple of tens of thousand units per year to 150 million units plus per year, which is the current production now on a yearly basis. And we can see here that the applications have moved from a productivity environment where people were using their PC just to write text or send an attachment, to designing web pages, to double-up audio, to downloading MP3s or videos and, going forward, we see this as a spiral of the digital world which will keep on growing.

The interesting next stage is that we will keep on seeing the capacity of technology doubling every 18 months or so for the next 10 to 15 years, or for the foreseeable future, we do not see any limit here. So we are going to be seeing two billion transistor chips. This is 20 times what we have today, just to give an idea of how much more we will have in terms of power. And when I talk about 10 or 20 gig hours, in terms of speed, so when today we talk about 2 gig hours, it is still a pretty slow process.

So where do we see the PC moving? We see it keeping moving as the digital education centre, the digital home centre, as a centre of digital entertainment and a digital office centre. The PC will become the media creation centre. It has become that already for a lot of companies and I was listening to the comments on the film industry in Hong Kong

using a lot of PCs for developing special effects. Twenty years ago these companies may not have been able to develop these kinds of effects, because you just had to invest a couple of hundred million US dollars for being able to develop those effects today. With a couple of tens of thousands of US dollars you can have all this infrastructure to develop those special effects. It is becoming the entertainment hub, the e-commerce engine, the research park and the education resource. And the future PCs we are going to see in a couple of years from now will be based around 10 gig hours kind of processors with 10 gig hours input/output bases. They will be either wired with one gigabit ethernet broadband kind of connection, or five gig hours kind of connection on wireless, and this is some of the hotspots which we will start seeing now in Hong Kong, for example. And they will have handled the gigabits of storage. So, we are going to see PC and broadband available for every person and this is what is going to happen: a major impact on the distribution of content, whatever kind of content it is, whether it is video, whether it is audio, whether it is education, entertainment, or whatever.

So what can we do together and where do we see some opportunities to work with the local industry? The number one opportunity is that the internet keeps on growing, the content keeps on growing. In the mainland they predict that the language that will be used for the largest content in the world is going to be mandarin, so there is still so much to be developed in the mainland and Hong Kong can take advantage of those opportunities.

We are going to have new PC platform capabilities, people who can access the technology, people who can access the internet using a voice command instead of using a keyboard, which is still cumbersome for many people, mainly for oriental languages. Some of the challenges we see here is the internet content, with the broadband deployment, as we have just talked about, PC platforms with the content protection and there are many initiatives about security and IP that are ongoing right now worldwide.

Some of the key actions we have, going forward, is to keep on fuelling the spiral for this digital world, like building internet hubs in Asia, rather than going through other continents. To keep on deploying the broadband infrastructure, whether it is wired or wireless - I think Hong Kong is doing a great job here, and local telecommunication companies are also investing very heavily in this and providing us with a very good infrastructure. Part of the processing power to differentiate, and this is very important, just to invest in the latest state-of-the-art technologies. To just look forward three or five years down the road so that we have enough headroom in the devices we use to keep on integrating and using all the forthcoming applications. To keep on developing local content and shared platform development. And, the other one which is also going to be very important and will have an important impact, is the convergence of computing and communication and which is going to be basically having a PC with broadband connection, fully integrated, and this is going to have a major impact on the way we communicate with each other.

So we, as technology providers, will keep on working on providing the best devices and architecture for accessing the internet. Whatever kind of device it is, whether it is a

notebook, a desktop, a PDA, a cellular phone, we are going to make sure that, in terms of networking, we bring scaleable and modular networking architecture with the IXA, ethernet, optical architecture we are providing the market with. And, in terms of servers, make sure that people do not have to keep on investing tens of millions of dollars in service infrastructures, but our modular architecture we have for servers which allow for millions of servers to be built on a yearly basis, keep on being deployed just to support this incredible internet growth that is taking place around the world.

So we will keep on working with the local industries, the media, the film industry, the content development is very, very important going forward. At the same time, we need to keep on working with the local players to keep on deploying the infrastructure and we will see in parallel the infrastructure and the content that will keep on being deployed. And around this we will keep working on architecture for accessing the internet and powering the internet.

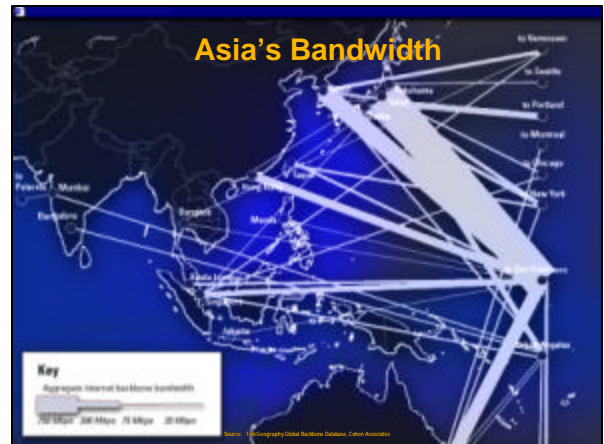
So this is what I wanted to talk to you about this afternoon. Thank you for your attention.

Households with Broadband Internet

- 76% play audio CDs on their PCs
- 60% play online games at the same time
- 49% downloaded music onto their PC
- 33% use their PC to watch streaming video
- 23% download films

PCs become entertainment centers

Sources: Yankee Group



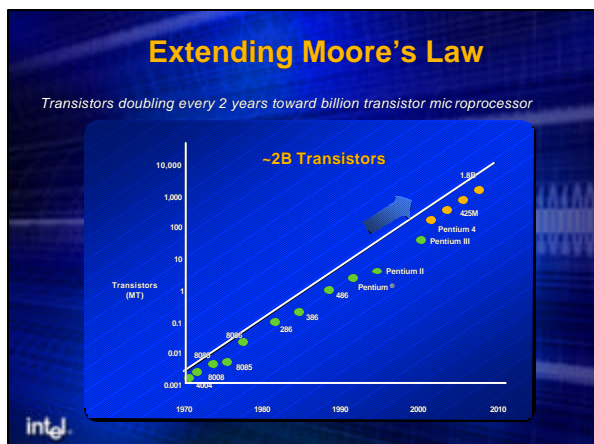
What is next ?

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Spiral of the Digital World

More processing power

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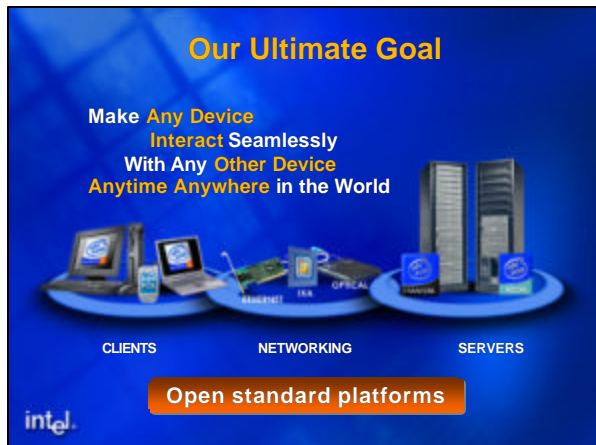
Next

- PC is our....
 - Media Creation Center
 - Entertainment Hub
 - e-Commerce Engine
 - Research Park
 - Education Resource
- Future PC
 - 10 GHz Processors
 - 10 GHz I/O Bus
 - 1 Gb Wired
 - 5 GHz Wireless
 - 100's GB Storage

digital education
digital home
digital entertainment
digital office

PC and Broadband for every person

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Peter Lovelock: Thank you, Christian.

Do you think that China has been the progenitor of more bad statistics than anywhere else in the world? I mean the idea that Chinese mandarin will be the language of the web within seven years is the basis of the Accenture advertisement that is flagged around airports worldwide these days. We started doing work with accenture and I keep trying to find the person who came up with that. They have lost him; they have no idea where this came from. They know the advertising agency, but they have got no justification for mandarin being the language of the web within seven years. And the big challenge to that would, of course, be William Shawcross' biography of Rupert Murdoch which had the indelible characteristic of noting that Murdoch was targeting China, way back when, because there were more people learning English on the mainland in the mid-1990's than there were in the entire rest of the world. And I met Shawcross several years ago and asked him where that statistic came from and he had no idea where that one was from either.

In telecommunications for several years people used to cite that the rising power of the Ministry of Posts and Telecommunications, the old MPT, was due to the fact that they were generating more revenue than any other body within the government and that gave Wu Chichuan his power - with the exception of the state tobacco group/consortium/regime - anyway this came up literally in the middle of my PhD thesis. My supervisor said, "the one way of finding out the power structure would be to look at where the money is. Show me the money", this was years before Tom Cruise, "go and find out who is controlling the money and how much money is being generated". And I said, "well, the MPT is probably generating more money than anyone else, with the amount that is out there". And John said, "well, justify it". But I couldn't. And one day I casually said, "the only people who would be generating more would be the tobacco folk, because of all the folk smoking in the mainland". John wrote it in a paper and cited me, and then we started seeing this getting cited everywhere. And now we wanted to chase it down, because this was quite important, and we would go and ask academics that were citing this where it would come back to, and we followed this path back to us. To this day, I feel guilty of this.

There was one very interesting point in the first session. This idea - and let me get this correct - that Hong Kong's strength for digital entertainment is: point one, its' infrastructure, point two, yet again, being on the doorstep of the mainland and, point three, that the mainland is the up and coming market for all things, let alone digital entertainment, and yet a good chunk of the debate revolved around the problems that piracy is creating. But piracy has got to be a 'blink' here compared to China. So if you are looking at all these people who are targeting China as their forthcoming market and justifying this for the infrastructure, the development and relocating to Hong Kong, please tell me they are not planning on making money out of the mainland market where piracy is approximately 97%, according to the Business Software Alliance. It seems a very strange equation to me.

The reason for invoking China: John and I were brainstorming about topics for TIF and we have a couple of themes we try to run through on a regular basis, one is the media, one is consumer interests, and we had been working through what the up coming topics were, and the two of us seemed to be coming together with access devices and, from access devices – as the economics of the telecommunications industry goes through a phenomenal transition, as both the networking and the access side are getting heavily commoditised, and people are trying to work out whether it is where a lot of investment now comes from, particularly as we move into the broadband era – and we were trying to tie these together and we were looking at access devices and we began heading towards the entertainment side, because the content is obviously what is going to drive this one day. Having settled upon access devices loosely, which became digital entertainment, we got into this rather significant argument about the impact of the internet and the economics of distribution on media conglomerates and peer to peer technologies, like Napster and Morpheus, which are a significant challenge to the big media conglomerates that dominate distribution and therefore keep prices abnormally high, as a way of justifying promotion, marketing and worldwide distribution, be it Hollywood or the music industry. John believed that this was going to phenomenally challenge the strength of the media conglomerates and I actively disagreed, believing that this will, yet again, be something that they manage to encompass. Within this, I made the casual remark, as we were talking about access technologies and the growth of the various markets, that China was seriously considering regulating, or more correctly, licensing, the local area network wireless spectrum, at the same time that it was moving to consolidate the cable and broadcast industry and attempt to create a Chinese AOL/Time Warner style conglomerate. John picked up on that theme and said that obviously, as people begin to focus on access and bringing content down, that this was going to be of quite some interest. And the nice contradiction there is that they are attempting to licence something that worldwide is not licensed, at the same time that they are trying to build great access. It seemed to be something worth bringing up and it seems to have been of particular resonance, given what was said today in the earlier session that danced around China as the lucrative next market.

We have handed out to you two pages that sum up the contradictions inherent in what the Chinese policy attempts. It is a nice summation of how the government promotes access by limiting participation. One of my researchers was writing this in abstract and I just thought I would throw it in because it, sort of, sums some of these issues up.

Anyway, what I am going to do is very briefly talk about China and why this is of such interest, in terms of trying to regulate access, because I am not going to talk too much about the wireless lan issues, or the spectrum, we can come back to it. The key here is the size of those numbers and the restructuring that is going on in the Chinese telecommunications industry. That is the key area. One of the only other countries that regulates the spectrum for wireless local lan spectrum is Thailand and no one really gives two hoots about the fact that Thailand is doing it. It is a small player, it is not actively involved in too many of the standards' bodies, and it is not a large and powerful market. China is considering regulating this in 802.11 spectrum, the wireless lan spectrum [*see*

http://www.trp.hku.hk/infofile/China/2002/chen_runming.pdf – ed] and suddenly everybody is starting to get actively interested. Why? It is a big market.

Why are they interested? Well, China has a long and glorious history of trying to suck in technology and expertise and play off people who are bringing that in – be they foreigners or large state folk – against each other to keep prices low and keep expertise and new technologies rolling in. They go through up and down phases, just like they had economically with technology. Back in the mid-1990's we had the horrible situation in the basic telecommunications network of having eight different switches being manufactured by seven different vendors across the country and the networks did not talk to each other, but we had one of the biggest networks coming on line at remarkably cheap prices and everyone piling into the industry. The government had to get involved to put these networks back together again. It was a horrible time for a short period, but this is where they focused. Now, the focus has become on the local access networks.

So, on the one hand, we have, all through the access areas, a range of technologies which are becoming competitive and the government thinks that access is their next target. They have done backbone roll out brilliantly well. We have three of the biggest, broadest state-of-the-art networks around the country. We have got five or six players out there rolling out big bandwidth. They are well aware that the economics of the industry are not there yet and no one is making broadband work and so they have done something unique. They have called broadband, a basic service which will be administered as a value-added service. Which means, at any point in time, we, the government, the pseudo regulator, can get back involved and say, “while we have allowed anyone who wanted to come in, pay the licence fee and get involved to the end, we will take this back and make it a basic access service which only Chinese state-owned enterprises, or Chinese anointed players can play in”.

So, very quickly, why the interest? Well, of course, the numbers. Five million new mobile subscribers every month through last year – a short blip at the end of last year – we are now up to six million per month. Some 155 million mobile subscribers, some 200 million fixed-line subscribers, the biggest network in the world.

On the cable side, we have some 100 million houses hooked up to cable, increasing at somewhere between 10 and 15 million a year, depending on who's statistics you believe. We have the third, the fourth or the fifth biggest internet market in the world at this point in time. Some 33 million internet subscribers officially. God knows if it is 25 million or 50 million at this point in time, these are guesstimates. But one of the biggest internet markets in the world, and here is the ‘kicker’: the Chinese government is not actively trying to limit internet participation or internet access just as much as the western media would like you to believe that it is. This is one of the fastest, biggest, most successful telecommunications and access rollouts in history and they are promoting it actively. But, the dual nature of the ‘kicker’: they do not want people surfing onto free access, looking for dissidents, Falun Gong messages, pornography, Washington Post style stories, cnn type sensationalism. They would like for Chinese people to be reading Chinese material and they would hope that that Chinese material owes some allegiance to

the government, hence the sponsorship of content because it is all going to come back to what the people are getting over the networks, hence the focus on content, and hence the focusing on the restructuring. The Chinese government recently got involved, we had two players, and we were up to about nine official, basic network service providers. At the end of the year, the government came in and separated China Telecom, the incumbent, into two parts - I am presumably talking to the converted, you all know the basics. Now China Telecom is being split into China North and China South. China North taking 10 provinces, China South, the bottom, 20 or 21 – depending on how many provinces China has got, the government is a bit confused. China North encompasses China Jitong and China Netcom. They ascribe to this the ‘five plus one model’: China North, China south, China Railcom, China Unicom, China Mobile and, the plus one, being China Sat, because beaming down that satellite technology is probably pretty important, we just haven’t quite worked out how we do that in terms of mass, real-time distribution. But if CITIC wants to buy up China Sat to get their proxy licence in play, then we have left the door open for them to participate.

Now, you have got four players. You have got the biggest rollout market in the world; you have got commoditised access coming in. The China mobile market is not generating the kind of value that this market needs if it is to sustain, and when you are adding five or six million new mobile subscribers a month you are flat out trying to keep the networks alive, let alone finding out where you raise capital and get revenue and value into the network, hence you start focusing on the basic structure, you split it up. The problem with doing this when you are China is that people will go after ‘cream-skimming’. So if you split it up into four fully integrated players, the likelihood is that they will all go after the same lucrative markets. How do you encourage them to go into different directions? Well, look at that China North. China North has just sucked up the sexy play in telecommunications in China, China Netcom. It was focused on broadband. Originally a carrier model, they stole their business plan off Level 3. That was not working, they got out before Level 3 did, they moved into broadband access. That was not working because their economics of broadband do not yet work. But it was a good idea, and they had rolled the network out, and they had targeted the right way. They had gone after their tier one cities, they had gone after the top tier buildings in the tier one cities and they hooked them up, but there is no content there yet.

So they have got a great idea, a good plan, a sexy play, and \$325 million worth of foreign investment from the likes of Michael Dell, Rupert Murdoch and Goldman Sachs, but no business to speak of. So you give them 68,000 people. You recognise that broadband economics is a bleeders’ market and you allow them to bleed. You bring China Netcom into the fold of China Telecom so it can bleed on its’ backbone access and you allow Edward Tien to focus on the next new thing. Wireless lan.

Wireless lan networks have been rolled out by Netcom in Beijing, Shanghai, Guangzhou and Tianjin very successfully in trial development, allowed him to go and play there. It brings premium pricing back into the telecommunications networks for wireless broadband access. He can play off on that area and try to bring in high paying consumers, meanwhile China Telecom can bleed on the basic access.

You have the notes in front of you. There are obvious problems with the model they are pursuing. Even if the four do not all go after the same market, we have got a whole range of hoary problems coming up: interconnection, access issues, who owns what? If we integrate all four carriers and we give them licences, do we continue to see stuff happen like in January when \$64 billion gets wiped off the Hong Kong stock exchange because Mobile and Unicom's prices go through the floor?

And then we get to the punch line. For the first time, the attempt to reorganise the cable industry and the media industry into a single large conglomerate looks like it has finally got some teeth, because SARFT, the State Administration of Radio, Film and TV is fighting for its life, it has no other reason for being, it does not control the networks or the access, and that is where the money is. It is a propaganda bureau and that was re-emphasised in the reorganisation in 1998, which brought the MPT into being, the MII and the ministry of radio, film and TV was devalued into a state admin group. They are actively about propaganda. The MII controls and regulates the networks and SARFT does not even own this stuff, it is usually the local guys, probably the province, maybe the municipal government, but probably the banks because they were bankrupt and the bank bought them out – we never know who owns this stuff – but the government is convinced that the content is all important, the broadband access has to be made to work and that there will be two streams. A telecommunication service stream and a media stream. If we are having a media stream, we want to sponsor an AOL/Time Warner organisation, and when you have 100 million cable households connected to the network, it is a great base to work off of.

China & the spectrum: Keeping the Gate

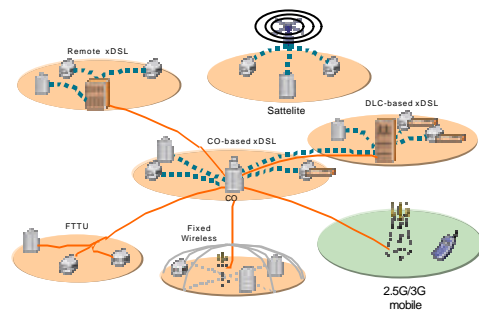
Peter Lovelock

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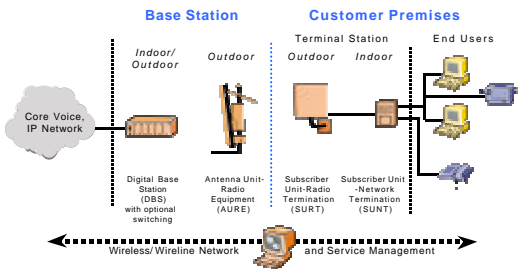
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Pervasive Broadband Access Demands Multiple Technology / Solutions



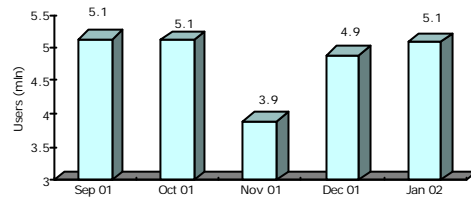
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Wireless IP Key Elements



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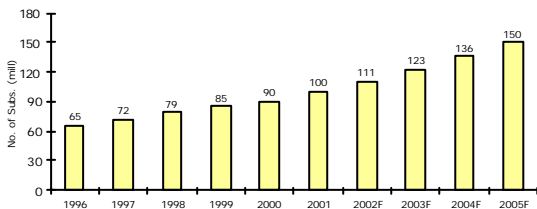
New Mobile Users, 2001 and 2002



- After two consecutive months of new users under the 5 million mark, in January of 2002 new mobile users again rose to 5.1 million new subscribers, and in February new subs hit 6.1 million.
- This represents a 24% increase over the same period from last year.

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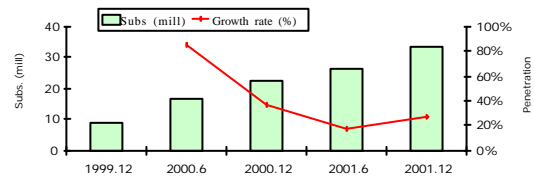
Cable TV Users in China, 1996-2005



- By the end of 2000, China had 90 million cable TV subscribers.
- Under the 10th five year plan released by the government in early 2001, China aims to develop 150 million cable TV subscribers by 2005.
- This means China has to increase its cable TV subscribers by a compound rate of 10.3% from 2001 to 2005.

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Internet Subscribers in China, 1997-2001



- By the end of 2001, China had 33.7 million Internet subscribers, representing a 49.8% growth year-on-year.
- Compared with the 4 million new Internet subscribers during the first half of 2001, China secured an encouraging 7.2 million new subscribers in the second half of 2001.
- The MII stated that China will have 200 million Internet subscribers by 2005. To reach this goal, China would have to maintain an annual growth rate of 56% in the next four years, unless we start to factor in mobile Internet subscribers... in which case 200 million should prove to be extremely conservative.

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"5+1" Solution

Company Name	Advantages	Mobile Experience	Potential
China Telecom (the old China Telecom south)	<ul style="list-style-type: none"> ▣ 70% of nationwide trunk lines ▣ Fixed line services ▣ Largest Internet network ▣ Data comms ▣ Trunk line leasing 	<ul style="list-style-type: none"> ▣ "Little Smart" ▣ Fixed CDMA 	<ul style="list-style-type: none"> ▣ "Little Smart" to 3G ▣ Fixed CDMA ▣ Fixed wireless access
China Net Comm. Group (the old China Telecom north)	<ul style="list-style-type: none"> ▣ 30% of nationwide trunk lines ▣ Fixed line services ▣ Data comms ▣ Trunk line leasing 	<ul style="list-style-type: none"> ▣ "Little Smart" ▣ Fixed CDMA 	<ul style="list-style-type: none"> ▣ "Little Smart" to 3G ▣ Fixed CDMA ▣ Fixed wireless access
Netcom	<ul style="list-style-type: none"> ▣ 12,000 km DWDM backbone ▣ Broadband wholesale 	<ul style="list-style-type: none"> ▣ Fixed wireless access 	<ul style="list-style-type: none"> ▣ Fixed wireless access ▣ Broadband access
Jilong	<ul style="list-style-type: none"> ▣ 2nd largest satellite network ▣ 2nd largest Internet network in China ▣ VSAT business, VoIP business 		<ul style="list-style-type: none"> ▣ Satellite data
China Unicom	<ul style="list-style-type: none"> ▣ Fully licensed carrier 	<ul style="list-style-type: none"> ▣ CDMA, GSM 	<ul style="list-style-type: none"> ▣ 2.5G and 3G CDMA ▣ Ujigindo
China Mobile	<ul style="list-style-type: none"> ▣ Mobile ▣ Mobile data 	<ul style="list-style-type: none"> ▣ GSM, GPRS 	<ul style="list-style-type: none"> ▣ GPRS and W-CDMA ▣ Monternet
China Railcom	<ul style="list-style-type: none"> ▣ Fixed line ▣ Data comms ▣ Line leasing 		<ul style="list-style-type: none"> ▣ Large national service demand
China Telecom Satellite	<ul style="list-style-type: none"> ▣ Largest satellite network providing data, Internet, ISP services 	<ul style="list-style-type: none"> ▣ Satellite mobile 	<ul style="list-style-type: none"> ▣ Satellite data, Internet services

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Potential Problems from the Division

Interconnection	<ul style="list-style-type: none"> • China Telecom's current fixed line network divided into two • Interconnection costs increase
Mobile licenses?	<ul style="list-style-type: none"> • New tariff structures and VoIP services rapidly eroding China Telecom's revenue and profits • Mobile business likely target for new revenue generation
Impact	<ul style="list-style-type: none"> • If newly restructured companies gain mobile licenses, both will compete with China Mobile • China Mobile could also suffer because it cannot function as an integrated service provider
Nationwide services	<ul style="list-style-type: none"> • To operate a fixed line business in the north China Telecom must: <ul style="list-style-type: none"> ▣ invest in the construction of a new network, or ▣ lease China Netcom's network.

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SARFT: Separation Before Convergence

- Up till now, under SARFT reforms, China has created 9 provincial Broadcast and TV groups in Beijing, Shanghai, Shandong Jiangsu, Sichuan, Guangdong Zhejiang, Anhui and Hunan.
- With the exception of Anhui, the other 8 provinces have been selected as test regions for digital TV services.

- SARFT is mimicking China Telecom's earlier reforms, and is trying to separate government bodies by establishing new enterprises to enter the market.
- SARFT is also trying to separate cable content from network transmission by establishing separate network transmission companies.
- These plans indicate SARFT's ambition to apply for a convergence license in order to run telecom services over cable networks once this separation is complete.

Province	Subs (mill)	Household cable TV Penetration (%)
Beijing	2.0	~45%
Shanghai	3.1	~55%
Shandong	6.0	~45%
Jiangsu	5.5	~45%
Sichuan	7.2	~45%
Guangdong	9.0	~45%
Zhejiang	5.6	~15%
Anhui	1.9	~15%
Hunan	3.3	~15%

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Peter Lovelock: With that, can I move on? We are fortunate to have John Mak who is systems engineering manager at Cisco, who will talk about all of the network.

John Mak: Good afternoon everyone. Let me introduce myself. I am John Mak, systems engineering manager for Cisco systems Hong Kong. I have been working in this industry for about 10 years and doing presales, consultancy, giving advice on setting up networks. These days they are broadband networks.

So I will briefly talk about broadband access and technologies. To begin, if we take a look at data access – to be exact, it is not broadband access, it is data access – technology starting from the TDM, the DDN network, frame relay network, and, later on, with the internet rollout, we have got the dial-up network for using phone lines connecting to the internet and, later on, we have DSL networks for higher bandwidth to access the internet. From there we start talking about broadband access, which means a higher band with local access technology for surfing the internet.

As a data guide, we are quite optimistic on the data technology development from this perspective. However, nowadays, the bandwidth and the bandwidth requirements for the internet are increasing more and more and becoming more and more demanding, more than the traditional TDM network or data network that can fulfill. With the advance of ethernet technology, and also the opening up of fibre networks, we can all now have ethernet access technology for broadband, via fibre, via cat.5 cable, via phone wire or wireless lan access. So you see that TDM is not selling, dial-up network is going to die out, but the growth is shifting from the traditional way to the newer, ethernet technology way.

Why ethernet? I think it goes back to the old days, about 10 years ago, of the 10 baseT we were all using in the office. We can still remember using the coaxial cable for wiring up the PCs in the office, having a 10 baseT network and, from there, we started the ethernet technology. The ethernet frame, itself, is also designed and IP friendly, which fits perfectly for internet access, because all the internet traffic is based on IP technology.

Secondly, it is low cost, simple and flexible and has a scaleable bandwidth. With the advance of technologies, the silicon technologies, with the same ethernet frame, with a higher clocking rate, you can have fast ethernet, which is 10 times the rate of the normal 10 base ethernet, and nowadays, with gigabit ethernet, it is 1,000 times faster than the 10 base ethernet technology. So you see the scaleable bandwidth. With this advancement of the bandwidth advantage, we can do more, not just with data, but with video and voice. It has also opened up a service for provider markets, like the deregulators and service providers trying to move on from traditional telecommunication services to value added services and also all the greenfield carriers are finding new ways of making money. And that is why fibre technology is booming, they have opened up the fibre plants and it also helps to promote ethernet technology as the broadband access technology.

As traditionally ethernet is tailored for the local area network - we call it lan network, we are all quite familiar with it - and with the advancement of access technology, now we

can have building area network, a network within a block of buildings or an estate of buildings, and also metro area networks, like fibre wiring up an estate or even wiring up a metropolitan area. So we have a building area network and also a metro area network.

Traditionally, this is the telecommunication and internet infrastructure of a typical service provider. It targets most of the markets already, starting from residential to multi-tenant, SME, commercial, major corporations, and you can see all the red lines matching each other, back and forth from the so-called, CO, central offices. And now, with the advancement, you can see that we can move on to using gigabit ethernet technology, or even 10 gigabit ethernet technology from replacing those red lines in the metro area, in the building perspective, as well as in the lan environment. By doing so, we can still offer the same services like video, voice, as well as data services.

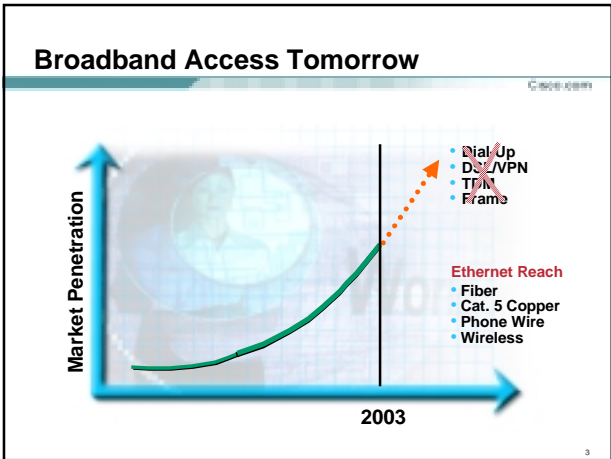
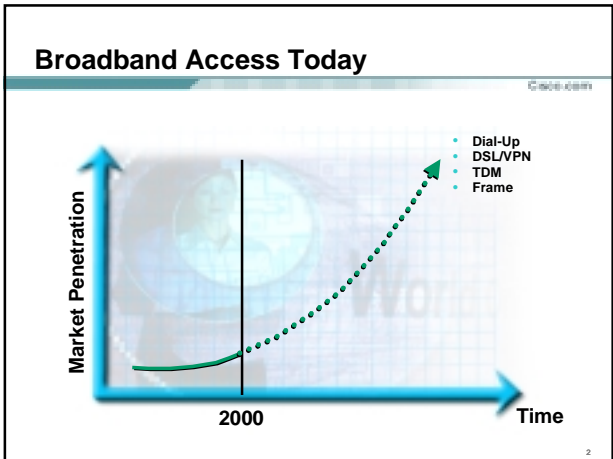
Also, from the technology and business perspective, we can easily see, in terms of the equipment and operation costs, an 80% saving over traditional TDM courses. You can see in the diagram, the upper part is the traditional telecommunication with an overlay of different layers of networks, starting from the fibre networks, SONET networks, ATM networks and the lower part is a one layer network, just an ethernet access network, and on top you are putting services like video, voice, data and internet access. You can see, in terms of the infrastructure layers, as well as operation personnel, and in terms of Capex and Opex, there is a great reduction in that.

So, to summarise, we can easily see the predictions, ethernet and IP will be the next generation broadband access technology that we can focus on. We are not saying that DSL, cable or even broadband wireless access is dead. However, in comparison we can see that most of the service providers or telecommunications are offering DSL or cable access. They are also finding ways to migrate them from the traditional way to ethernet access technology because of the cost, in terms of equipment and operation, and because of the benefits of the bandwidth, because, if we are talking about more content services, or more value added services, content is the key, and how to deliver that content is the bandwidth. So we can also see that service providers will be trying to find ways of making new revenues and money from those value added services. Those value added services, such as VOD, interactive TV, high definition TV, distance learning, e-learning; all these services can all ride on ethernet access technology for delivery. And we can also see in the near future that every home will have their own dedicated broadband ethernet access.

That is all. Thank you.

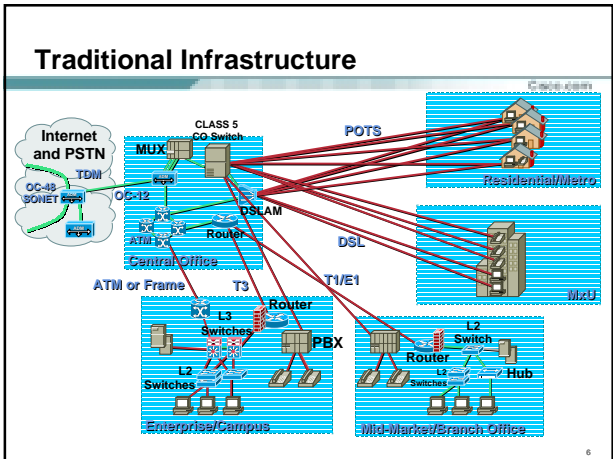
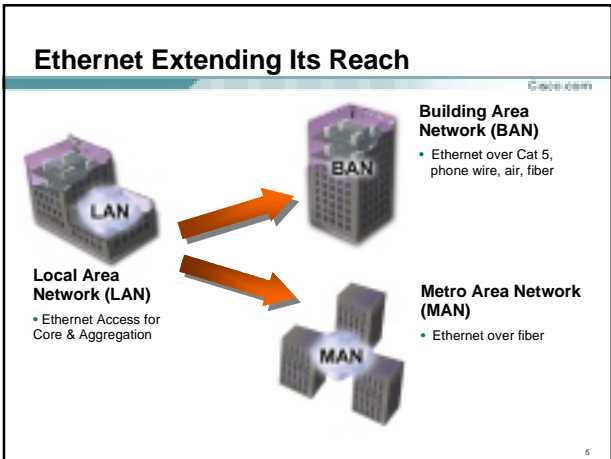
Broadband Access

John Mak
Systems Engineering Manager
Cisco Systems (HK) Ltd.

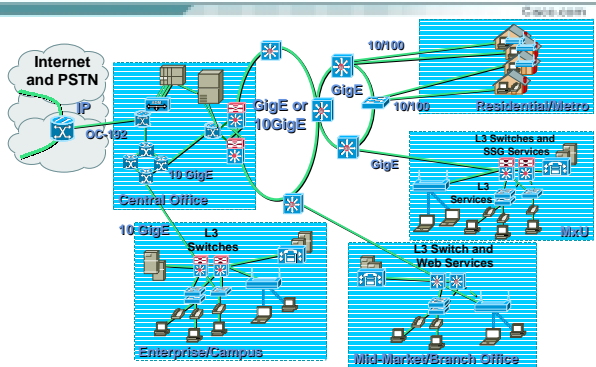


Why Ethernet Access

- IP Friendly
- Low Cost
- Simplified and Flexible
- Scalable Bandwidth
- Voice/Video/Data Convergence
- Availability of MAN Fiber
- Advances in QOS / Traffic Management



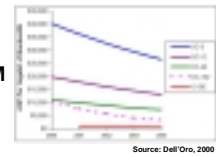
IP/Ethernet Access Revolution



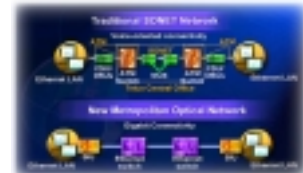
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Radical Economics

- Delivers 80% Savings Over TDM
- Leverages Ethernet Technology to Reduced Cost
- Eliminates Infrastructure Layers/Equipment
- Lowers Operation Costs



Source: Dell'Oro, 2000



8

4 Predictions in Next 4 Years

- Ethernet and IP are universal access technologies
- Service Providers are making money from value-added services
- VoD, interactive TV, HDTV, 3D gaming, distance learning, telemedicine and lots of other services are enabled
- Every home has at least 10Mbps dedicated broadband access



9



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Participant: To bring something like high definition television into the home through broadband, what kind of speeds are going to be required on the last mile, do you think and when might we see those? Because 10 megabits per second is not going to be fast enough obviously. Will we see one gigabit per second in the next five years or in the last mile?

John Mak: well, the question is what kind of bandwidth for delivering high definition TV. Obviously, 10 megabit will not be fitting for that. In the next five years I think gigabit ethernet or one-step backward, fast ethernet will be the key. Because, nowadays, you can see for those service providers who are offering an ethernet type of access technology, the port speed, itself, is actually ethernet or fast ethernet. So it just depends on the service level, the business plan, as well as the business model. So definitely, at this moment in time, fast ethernet access is available now. Also, in the household, in terms of PC, or even set top box for video entertainment or connecting broadband access, fast ethernet is not too pricey compared to ethernet. So I think fast ethernet will be the best choice at this moment, and in the next five years gigabit ethernet is going to be there.

Participant: fast ethernet is about 100 megabits per second?

John Mak: Yes.

John Ure: One of the things that is going on in my mind is that it is like a dog chasing its' tail. In the first session we had content creators and content providers. We are now talking about networks, we have got chips, we have got equipment, we have got the network operators, we have got content, but, in a sense, we are all waiting to see what is going to move it all. I remember several years ago meeting with Andy Grove and he was really tearing into the telecommunication companies - this was about the mid-1990's - saying "you guys, you said you were going to roll this stuff out, and we were planning on our production to service this market. Where are you now? You are just not there". Well, from the figures we have seen, the networks are beginning to get there, certainly in Hong Kong. So now we have got the networks, the next question is who is going to use them, who is going to get access, who is going to actually make use of them? We all agree it is content driven, to a large extent.

So my question is, both to Intel and to Cisco, how are you as companies going to help drive this whole thing? Is it done through alliances, alliances with networks or alliances with the content providers? How do you see Andy Grove's question, kind of 2002? What is going to drive this thing, or is everybody waiting on everybody else?

Christian Morales: well, I think that Moore's Law is still here and keeps on going forward. We have not been waiting for the telecommunication companies or the content providers or whatever to keep on investing and integrating twice as many transistors every 18 months or so. So today we can have PCs, which have on one little notebook like here, more than NASA had back in the early 1960's when they sent the first shuttle to the moon, and you have this for US\$2,000, when at that time you needed to spend \$30 million. So this will keep on going.

One of the things we have done in the meantime has been to really invest in people who deploy infrastructure, people who develop content, people who make the technology easier to deploy, technologies that can deploy content and develop content in much more efficient ways. So we have also done this in parallel. The next step: it is clear that the telecommunication companies will keep on delivering infrastructure as fast as they can, because this is going to be one way for them to get the service revenues to grow. But with 802.11, for example, the deployment that we start seeing taking place in the world, if 2.5G and 3G deployments are not fast enough, we are going to see a major contender coming in from these 802.11 initiatives we see around the world. So I think Andy was impatient in the early 1990's when he was not seeing the telecommunication companies really moving into new technologies and still building upon legacy systems and legacy technologies. We have seen now the telecommunication companies really leap-frogging into the latest technologies because they cannot afford, with revenues and gross profit margins going down, to keep on growing, deploying and investing in new infrastructures if they do not use new technologies.

So this is what we are seeing right now. The combination of new technologies, less available capital for investment in telecommunication companies and, at the same time, this demand from the market for more broadband and higher speed connections.

John Mak: We have been talking to quite a number of telecommunication companies regarding this. How we can help them out during this downturn, in terms of a technology provider, in terms of how to roll out new services or new revenue streams using new technologies.

It comes down to the point that there are two extremes. On the incumbent telecommunication companies, they are still struggling and debating on the traditional legacy services on which they still have quite a profitable margin, as well as the new services, or new investments, or new infrastructures, which seem to be creating new revenues. However, it may take a longer time to return and also the market keeps changing and it also depends on the business model, how they are going to roll out these new services like, a couple of years ago the iTV, interactive TV, or VOD kind of services. So there is still a debate within that and the situation is getting more and more severe, especially at the moment because Capex is going to be very, very low and the profit margin is getting thinner and thinner and so they are struggling to find ways out and they have no choice in adopting new technology, but with a very conservative and moderate investment, a very careful investment in the new infrastructures.

Peter Lovelock: Christian, can I just follow up briefly on your point. Why is there such interest in 802.11? You have got broadband access out there, you have got a market like Korea, which is phenomenal for the access, but all of the carriers are bleeding ink, they have had a really bad time of it in terms of generating good revenues, three out of four are having real problems. So you have got good access there, you have got figures of 40 to 60 per cent penetration, and yet they are not making money. We have got the

2.5G wireless rolling out in various places around the world, we have even got initial 3G, we are not seeing healthy revenues, so why all the excitement about 802.11?

Christian Morales: The deployment of 802.11 is much more efficient than any other deployment of broadband, and you can just get the fibre optics through to the building or whatever, and then you can get the last couple of tens of meters or whatever connected through wireless, and you have all the speed you need and you do not need to go through all this heavy infrastructure.

John Ure: I am just going to follow up with a question about convergence, because a lot of the arguments about the next generation and so on, are all about convergence and, certainly, at the network level, you can see that happening, everything goes down the same pipe. But, at the customer access level it seems that there is quite a proliferation of standards protocols and so forth. And one argument would be that, in fact, different devices will serve different markets, and that there will not necessarily be a convergence there. If there isn't a convergence there, then obviously that rather limits the time when the level of critical mass can be achieved. So, again, the question will be, do you see that the issue of convergence, as it were, stops at the customer access point and is that a big problem?

John Mak: Well, to put it this way, sometimes convergence is not the starting point for the service provider rolling out services. A typical example is cable operators, they invest in their cable plant, they wire up buildings, using coaxial cable and their investment purpose is providing a video, a cable TV service. However, with the advancement of cable modem technologies, they find that their cable plant can offer more services than just cable TV services. So they think that they can do things more efficiently and smarter than just using their cable plant for delivering video or cable services. That is why they put in cable modem technology on the same access plant that offers services. For them, the investment of the cable technology, like cable modem, is a delta investment. They are offering two types of services. One is a broadband cable access service and the other is the traditional video service. So broadband access services can be taken as a bonus for traditional cable operators. So from then on they think of multi-services and convergence using one network offering multiple services.

John Ure: You are describing what I think is a quite realistic view of what is actually happening; incremental development from different service providers. Not in any business sense really converging. Interestingly the FCC has just voted three to one to declare cable broadband in the United States an information service, rather than a telecommunications service, which means that, on a regulatory basis, they will not now have to open up their networks and offer preferential rates to carriers, which might have some implications on the way the regulation goes here, I do not know. If that is the way that things are moving, then clearly – the whole local loop unbundling experiment has been a complete and absolute failure in the United States – that does suggest that, for a long time to come, we are going to see very traditional, vertically integrated companies still dominating different sections of the market.

Participant: The main drive for wider bandwidths seems to be video. I do not know if there is anything else you really need it for, up to the kind of high speeds you are predicting in the future. But when we talk about the future fixed networks, we tend to forget that there are two other very wide band networks already existing, namely television networks, which, when they go digital from terrestrial and from satellite, will give a large number of channels. The point about the terrestrial and satellite networks is that they are based upon the standard, channelised, time slot, programme scheduled, television programming which I do not think you would do on a fixed network – if you had broadband, you would use video on demand – but then, if you look at the advantages of the television networks, the production and transmission quantities is insensitive to the number of people demanding it. You just go to the top of the mountain, you squirt it out on radio and anybody, at any time, within those areas, can receive it and it does not have any affect on the transmitter.

Unfortunately, with a fixed network, the number of people who want to access video on demand does have an affect on the head-end equipment; it has an effect on the server. The more people who watch, the more money it costs to provide the service and I have not seen any future projections of the economics of providing services to the extent of a broadcast service over a fixed network which includes the server costs and it makes me wonder whether, also, particularly, as most people watching television are couch potatoes and really do not want to make any decisions about what programmes to watch, they just watch it, whether there is, in fact, any future. There should be a demand for it, because a certain proportion of the population is intelligent enough to want to watch intelligent programmes but the economics of it might, in fact, not make it feasible because of these factors. Would you like to comment on that?

Christian Morales: That is a very, very challenging one. We still think the two will continue cohabiting. We do not see people using a computer in a room and accessing their bank accounts, or having a chat, or taking part in video conferences at the same time they are watching films or whatever. Also we see the mobility of computers within the home with a wireless infrastructure, those pieces becoming more mobile so you do not have to be hooked to any cable, you can still move around and still be connected. But we still see very different usages for television, whether it is HDTV or whether it is a PC. And if it is online on demand for movies or programmes, we might see a preference for the PC. If it is normal television watching, as you were describing, it might still be more on the TV, but this is what we have been thinking for the last five years, when people thought that everybody would be moving to television or everybody would be moving to PCs, we still thought that both would be cohabiting and that is why we still have solutions, in terms of architecture, for both kinds of networks.

It is very difficult to predict. If anyone is going to take over from the other, what we see going forward from the server is that DSL will keep on growing much faster than cable, for example, on a worldwide basis and we might see 802.11 just taking over on maybe some other means like 2.5G or 3G, just much faster because, from an economical standpoint, it is more efficient. But, saying how much percentage is going to come through one versus the other, I would say it is very difficult at this time.

Participant: It does seem also that, although it has not been terribly successful so far, TVRO, which is a home recording, a selectable recording of transmitted time slot recordings, seems to also be a threat to it, because people who buy TVRO and use it, love it. It is only a question of time before it is going to be the preferred method of video recording at home and which also allows you to view the programmes when you want to see them. And that also seems to be another counter to the great idea of broadband video on demand.

Participant (OFTA): To come back to the point that John raised earlier on about the dog chasing its' tail and going around in ever decreasing circles could turn into a black hole. Because we are talking about content here and it parallels with the international bandwidth area, where there is excess capacity out there. "build it and they will come", but they did not come and I just cannot see the content out there in the foreseeable future which will fill up that capacity. The technology is there, fine, but whether the economics are there, which depends on the content, I just cannot see it. You talk about efficient use of bandwidth, but to send down TVRO or video on demand, or, god forbid, high definition television, using up all that bandwidth just for a video, which you can get free-to-air to a large extent or you pay a monthly subscription on your cable networks. There does not seem to be an economical or efficient use of resources there.

Now, that is news to me about the FCC decision, was that just today or the last couple of days?

John Ure: The last couple of days.

Participant (OFTA): Yes. That is interesting. If there is a promotion service, I can understand, in the sense that it is discretionary expenditure and the debate about access regimes are generally about non-discretionary telecommunications or telephony services, which are considered somewhat as a fundamental of life, like bread and milk, and other things we may need rather than just want. But, to the extent that it is a discretionary expenditure, I do not find any...it is an information service that is content, it is video, I do not see that there is anything fundamentally wrong with that decision.

John Ure: But it does overthrow the intention of the 1996 act. It reverses the decision to unbundle the cable access network, rightly or wrongly.

Participant (OFTA): I would need to look more closely at the decision.

Peter Lovelock: Is video on demand not going to be the same as ISDN? The technology that was a good idea, but never happened? One more question.

Participant: Yes. I'll come back to the same topic. One of the statistics you quite often hear the game industry bat around is that games make more money than the film industry. If you also look at the internet versus television, you see a very similar phenomenon. While television viewing in North America, as a whole, has not gone

down, the demographics have changed. If you look at people less than 20 years of age, their television viewing time has gone down drastically over the last four or five years, being replaced by internet usage. And a lot of the traditional television networks have been trying to capture this market back. So there have been a number of experiments that have been done, trying to tie television shows to web pages, so that they can get people back watching the TV.

If I look at my older kids, who are teenagers, they do have the television and the internet running simultaneously and the trouble is we cannot get enough computers in the same room. They do watch both of them at the same time and I think that part of this means that video may be going down.

The other thing is that there is a big leap between going from telephone modem to broadband. There is a considerable leap in performance there. I am not sure that pushing that performance much further is going to be a big win. You do get to play your games a bit faster and you do get your downloads a bit faster, but I am not sure that is going to be the big win there. Video is the only thing that is going to consume that high bandwidth, so I am not quite sure that people are going to want that if they have the television service and if the younger generation continues to watch less television.

Peter Lovelock: This statistic is coming up more and more of traditional television entertainment being eclipsed with the younger generations, by the take-up of internet usage. I always get worried that new statistics we are comparing are like apples and oranges, because everyone in my office in Beijing, we discover periodically leaves the computer on overnight while they are downloading music. So, from Morpheus or whatever, they just let it run, and they are downloading clips from Seinfeld and various music and that is going to throw the statistics way out. This is not someone sitting there and watching the internet. This is someone leaving a connection running for hours on end.

Participant: I suppose that this really is as much an observation as a question. I design websites for a living and, a few weeks ago, out of the blue, a new client approached me and she was looking for a particular area of business and she had seen a couple of websites I did, and then hunted around and found some others that I did. It turned out that the reason she came to me, specifically, was that most of these sites make very little use of complicated graphics and large numbers of photographs and flash animations. Yet the industry, itself, seems to be pushing this idea that the more speed you get, the more you can put in photographs, you can put in animations. You only have to look at any of the ISP websites to see that, even on a fast circuit, you have got time to go off and make a three-course dinner while the home page, the flash page, which has no information on it, is still loading. But business users who are searching for information on the web - and, of course, the website owners are trying to get that information to them - do not want all these bells and whistles. If you want information, you want information; you do not want irrelevant things on top. Why does the industry not see this and, certainly for most web access, you do not actually need faster and faster speeds.

Christian Morales: Well, an observation is that people do not want to wait for more than eight seconds on average. They pick a site and they want to get some information, and after eight seconds they just go to another site. They do not want to wait longer. So why people keep on going to Google or Yahoo is because they get a more instant response and you get an instant response because they only have 1D or 2Ds, they do not have 3Ds in terms of content, they just want to make sure that whether you are connected through a dial-up connection or broadband, you still get almost the same kind of response because they have got 20k going back and forth, in terms of communication, they do not have the one to three megs and this kind of capacity you need for Flash and more 3Ds and video streaming kind of content. The bottleneck is that there is not enough broadband employed. Even in Hong Kong, we are doing well with about 500,000 or 600,000 connections out of the almost three million people who access the internet. Still, even if it is 15 or 20 per cent or whatever, of households in Hong Kong, it is still a small percentage.

Even when you have a 10 meg connection and the network is a bit busy and you only get one or two megs, you refrain from going to rich data back and forth because you know you are going to stay there a long time. So that is why there is still so much to be done on infrastructure.

Participant: Another point this lady made was that she knows that a lot of her customers, the people she is aiming at, she expects to be logging on from hotel rooms and there are not many hotel rooms at the moment that can offer anything more than 56k, if that.

Christian Morales: And if there were, you would need to reset your computer and, in many cases, you cannot even get connected. So this is yet another issue.

Peter Lovelock: Just to wrap things up, a final question to the two of you. In the next 18 months what is the key drive of your respective businesses? What is the thing that is going to drive revenue for each of you?

John Mak: We keep seeing the changes from service providers. A typical example in Asia is Korea. Korea is the country with the highest broadband penetration and the greatest and largest DSL market in the world. They far exceed north America already. However, in view of the broadband access, Korea is starting to move on to the next generation of providing ethernet access, putting lan switches in their buildings and providing the building with Cat5 cables, and laying fibres over natural areas and that is why we take that as an example, as well as Japan. NTT is also doing the same thing.

Cisco, as a network or it technology provider, is seeing that the broadband market is still growing, even in this downturn in economy for service providers. Having said that, with the bandwidth available, the next thing will be the content, especially local content. Typical examples are Korea and Japan. They have very popular internet cafes where there is lots of local content and I think that Hong Kong is heading in that direction also. We need more local content to boost the local broadband market.

Christian Morales: I think there is no 'one size fits all' kind of answer here. I think it depends on the infrastructure you have in your respective countries. If you are in Hong Kong you are going to be very open to just do online gaming, that is why the cyber cafés are so successful here. If you go there, you have to queue up because people are there for two or three hours and they just want high-speed computers, high performance computers and high-speed connections to play online. So gaming is a killer application in places where you have a lot of bandwidth. Video streaming is also a killer application in the consumer arena.

In the business arena, where you have a lot of bandwidth, you are going to see more and more people going into e-business and doing transactions using their computers. Any kind of transaction, because, even today in Hong Kong, you go through a high speed connection, you go to a bank, for example, and you want to carry out a transfer, rather than going to your bank or going to an ATM and sometimes it still takes five to ten minutes because their servers are still slow. Now, if you go to places like India, if you go to South East Asia or to China, it is even worse, because there you get 26k or 28k, or maybe 40k if you are very lucky, but then you have to go through the firewalls, so you really try to limit your usage to very short mails, in terms of connection. Or you go to cyber cafés if you know they have a higher bandwidth.

I think the company, when we are communicating between countries like with Korea, or the United States, or Europe, or whatever, we do not care sending 20megs, 40megs or 100megs, even the video streaming. If we communicate with China, we try to limit it to 50k, 100k or 200k maximum, because they know it is going to take ages for them to download. I think, depending on the bandwidth you have, you are going to be using richer or poorer data and applications.

Peter Lovelock: With that, can I get you to thank Christian and John? In particular, can we thank Intel for their sponsorship of the forum?

John Ure: I would like to reiterate that, especially Intel for the sponsorship. Thank you, John, for coming in from Cisco and also, again, to Bloomberg for the auditorium which is, as usual, perfect. And thank you to Sam, who is in that little room there behind the wall, working it all.

Later this year, actually in December, the ITU Asia 2002 is being hosted in Hong Kong, so watch out for that.

We will be looking forward to doing another forum in about three months.

Thank you very much.