

## **Telecoms, the Net and China's WTO entry: a new playing field?**

**Telecoms InfoTechnology Forum, 14 April 2000**

**Furama Hotel, Hong Kong**

### **Executive Summary**

1. This TIF meeting took place after the US-China WTO agreement was reached but before the agreement between China and the EU. After the failure to agree in Washington, 1999, China scaled down from 50 per cent to 49 per cent the equity ceiling it was prepared to offer in the fixed wireline business, but conceded a faster track. The subsequent deal between the EU and China in May 2000 failed to raise the ceiling on wireless above 49 per cent, but did further fast track implementation from five years down to three. (A summary of the WTO agreements on telecoms is, at the time of writing, posted on the TIF website.) These WTO negotiations formed the backdrop to this meeting of TIF.
2. External pressure on China to liberalize its telecoms sector had been strongly resisted by the old Ministry of Posts and Telecommunications (MPT) and its successor, the Ministry of Information Industries, both headed by Minister Wu Jichuan. Yet within China there have been various pressures for an opening of the sector to competition, some of it coming from ministries with their own networks, others from the growing number of young entrepreneurs in China, many of whom have exposure to overseas education or working opportunities, yet other pressure from academics and the media. A leading entrepreneur is **Edward Tian**, who heads up China Netcom who TIF invited to speak. Due to his last minute unavailability, **Mr Stephen Lai** bravely stepped into Edward Tian's shoes and TIF is grateful for his contribution to the roundtable. Unfortunately we cannot reproduce his slides due to commercial sensitivity at a time when stock market offerings may be under consideration, but we are able to reproduce his talk. And leading among academics from China is **Professor Zhou Qiren** was able to accept our invitation to speak.
3. TIF was also very pleased and honoured that **Robert Cassidy**, who headed the US negotiating team with China, was able to accept our invitation. We also hoped to invite an EU representative, but with the EU-China talks still in progress, the EU was able only to attend as an observer and guest of TIF on this occasion.
4. Our other speakers were equally impressive. **Anthony Yip**, renowned in Hong Kong and China for being one of the new young Internet start-up success stories, and **Hyam Bolande**, journalist for the Asian Wall Street Journal and specialist on China's IT sector, both stepped in late to provide us with unique insights into China's Internet sector. And **Ian Johnston of Agilent Technologies, our sponsor**, unveiled for TIF the new frontier of switching and routing technologies, photonics, with a truly fascinating presentation of the technology, the size of a thumb-nail!

5. Our China speakers underlined just how significant the emergence of new competitors is. China Netcom, for example, has been sanctioned by the State Council to proceed with a trunk network, with voice-over-IP, and provide points of presence in all cities. In discussion it became clear that China Netcom fully expects to get the go-ahead for the building of a local loop service, offering FFTB and LMDS broadband connectivity. With the railways ministry as a stakeholder they can utilise the MOR optical fibre cables, and with the State Radio, Film and TV Bureau as another stakeholder, alongside the Shanghai Municipal government, CNC also has plans to build upon the convergence of telecoms and cable television. To date the MII has insisted upon a clear separation of these services, but it is worth noting that municipalities and cities have, over the years, built out their own cable TV networks which, with upgrading, could offer local access opportunities.
6. **Prof Zhou Qiren** shot to national prominence in 1999 with his well-publicized criticisms of China Telecom's pricing policies and monopoly practices. He looked forward to China's accession to the WTO as a catalyst for further liberalization, again stressing the opportunities for using TV networks as access networks. He stresses the importance of allowing China's domestic telecom operators to list on both the A-share domestic markets (which permit foreign investment) and overseas markets. This would open up opportunities to Chinese citizens to share in stock market gains and allow the capitalization of domestic competitors to reach critical mass. He also stresses the need for asymmetric regulation to protect new entrants against anti-competitive practices by the dominant player, and for universal service obligations. On the sensitive issue of industrial policy, **Prof Zhou Qiren** made the point that traditionally the industry in China had been run by planning engineers, but the time had come for more market focused policies which require the expertise of people with business, legal and economics backgrounds.
7. Session One was concluded with a presentation by **Ian Johnston (Agilent Technologies, created from the instruments and measurements arm of Hewlett Packard)** which was not so much a view into the future (although it felt like one) as a view into what was already passing from the research labs into development. The all-optical future would enter commercial reality by 2001, and this would influence the economics of the industry. 'Moore's Law' (roughly the doubling of microprocessor capacity, or the halving of cost, every 18 months) + 'Metcalf's Law' (the value of a network is the square of the number of users connected to it, or the number of connections =  $n(n-1) = n^2 - n$ ) led George Gilder to claim a third 'law', that bandwidth would triple every year for the next twenty-five. Ian's presentation gave this an underpinning. Optical transmission is now well-established. Photonic or optical switching is the next piece of the jigsaw. Ian demonstrated how it works, although he emphasized that the technology had reached the development stage that was good for backbone back traffic. Beyond that lies optical switching for the local loop, but the plug-in-the-wall socket technology was already being developed for this 'great leap forward.'
8. **Bob Cassidy** introduced the background to the US-China WTO negotiations by saying he believed in the astrological school of negotiation: in steering the different constellations of interests into proximity, and then trusting in the dynamics of the different forces to reach

countervailing balance and trade-offs. In the case of telecoms the trade-offs were essentially timing of implementation against levels of implementation. (*Later, as noted above, the EU-China deal was struck along the same lines of agreement.*) But **Bob Cassidy** made two other very important observations. First, in his view a really important aspect of the agreement was on the right of foreign companies to invest in their own, or jointly owned, warehousing and transportation systems to improve the distribution network of goods from the ports of China to the cities of the interior. (*We may note here that the subsequent EU-China deal similarly liberalized the retail sector. Taken together, these concessions could bring dramatic improvements in China's consumer goods sector in terms of choice, quality and price. The stimulus this may give to real incomes and wider sector reforms is likely to have interesting knock-on effects to the benefit of the market for telecoms and IT services.*) Second, the next crucial step is for China to agree the rules and protocols with the WTO's working party prior to membership accession. This will require China to start putting in place administrative and judicial procedures and rule-making to facilitate the implementation of WTO membership obligations. (*This process had hardly started in April, but by July already in circulation were the pre-WTO membership rules governing telecommunications for consideration by the State Council. These lay the framework for any subsequent opening to foreign investment in the sector. At the time of writing a summary of these telecoms regulations are posted on the TIF website.*) And in light of the many disputes that may lay along the road towards opening China's telecoms markets, issues of interpretation and implementation and regulation, the need for an Alternative Disputes Resolution (ADR) mechanism to reduce the cost and time of using the official WTO disputes resolution procedure, was also raised. This is now gaining widespread international attention.

9. **Hyam Bolande** gave TIF a different insight into China's IT world, a view of the concerns China has with dependence upon Microsoft operating systems, not least security issues. Now it is known that Microsoft software can be used, and in some cases (*apparently unauthorized*) is used to plant 'cookies' and other 'spy' devices into systems using it, Chinese military and security forces are deeply hostile to the idea of foreign intelligence agencies using this as a Trojan horse. This is just one of the concerns driving the growing popularity of Linux software, which is currently used mostly on servers in China. Price is another driver, no Microsoft licensing fees. But from the security perspective, transparency of open source software is the big advantage. Hyam lists six major Linux software packages in China right now, including Red Flag Linux developed by the Chinese Academy of Sciences. But an attempt earlier this year by Chinese security to ban the use of foreign encryption was successfully opposed by the emerging industry in China who rightly recognized that no-one, not even China, can afford to lock themselves into home-grown IT standards without running the risk of being rapidly by-passed by the rest of the world.
10. Our closing speaker, **Antony Yip**, demystified the process through which he, and others, successfully built up electronic communities in China. Many young people develop their own websites with a passion for something, it maybe soccer, in one case it was jokes. Before they know it they are attracting hundreds, then thousands and then tens of thousands of

'hits', even though they don't even have a server of their own. Entrepreneurs like Antony, who learned his trade in New York and Hong Kong, buy up these sites and aggregate them, turning them into commercial ventures. The next step would be IPO, but currently the MII forbids Chinese content to be included in the assets of ISPs and ICPs selling stock overseas. *(This is very much in line with the China Telecom Hong Kong model - now China Mobile Hong Kong - which claims to be backed by cellular assets in China, but the shares of the company do not entitle the shareholders to a claim on those assets. How many shareholders actually understand that?)* But, as Antony remarks, the genie is out of the bottle. If the WTO signals change at the top down, China's Internet boom signals even more radical changes from the bottom up. Watch this space!

**2:00 – 3:30 Session One – Bigger and better? The benefits of WTO accession to China’s telecommunications and network industry(s)**

Chairperson: John Ure, Director Telecommunications Research Project

Speakers: Stephen Lia for Edward Tian, China Netcom Corporation – Why Netcom is *not* Unicom; the prospects for broadband development in China.

Zhou Qiren, China Center for Economic Research, Beijing University – IP developments and the future of telecoms policy in China.

Ian Johnston, Asia CSG Marketing Manager, Agilent Technologies – Next Generation Networks - Optical Switching

**3:30 - 4:00 Coffee Break**

**4:00 – 5:30 Session Two – The door opens a little further: opportunities and challenges.**

Chairperson: Peter Lovelock, Deputy Director Telecommunications Research Project

Speakers: Robert Cassidy (Lead US negotiator in securing the recent WTO agreement) – How open is open?

Antony Yip, Founder of My Rice.com - Internet in China

Hyam Bolande, Technology Journal, Asian Wall Street Journal – Linux in China

European Union – What have the WTO negotiations achieved on paper, and in practice?

## LIST OF PARTICIPANTS

Agilent Technologies	Robert Cassidy
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Asia Capacity Exchange	Geoffrey Pyatt
Beijing University, China Center for Economic Research	Peggy Kwan
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Graham Mead Associates	Bob Weis
Hong Kong Economic Journal	Graham Mead
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Sing Tao Daily	Leung Wai Yee, Joy
Smartone Mobile Communications Ltd	Alan Mok
Smartone Mobile Communications Ltd	Ben Yeung
Social Welfare Department	Andrew K P Leung, JP
Star TV	Henry Tse
Star TV	Wong Mo Keung
The Asian Wall Street Journal	Hyam Asher Bolande
The Sun	Nina Hau
Trade Department	Carmen Chan
Trade Department	Chow Kun Chun
Trade Department	Mo Chi Kwong
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STEPHEN LIA  
CHINA NETCOM CORPORATION

*[PLEASE NOTE: At the request of CNC Net the diagram that accompanied this presentation not shown for reasons of commercial sensitivity.]*

CNC was incorporated in August 1999 with the mandate to build a nationwide all fiber-optic base deploying the latest IP over DWDM technologies to service a broadband backbone in China. Right now this known as the CNC net.

China Netcom currently has four shareholders, with an equal percentage share. Each of the shareholders has defined a role to position China Netcom as a successful telecom operator in China. Among the shareholders are:

- The Chinese Academy of Sciences, a country leading research and development technology organisation in China which initiated the foundation of the China broadband internet pilot project last year;
- The China Railway Telecommunications Centre provides the railway and job expertise to build and install the CNC Net nationwide optic fiber cable backbone network in China;
- The State Administration of Radio, Film and Television provides part of this fiber optic backbone network aiding some of the access network in the cities;
- The Shanghai Alliance Investment Limited, an investment arm of the Shanghai government, especially in securing the Shanghai municipal access network for CNC implementation.

The strategic values and functions of these four shareholders enable CNC to implement fast the best utilisation of its shareholders resources. This has been proven by the fact that it took less than six months for it to complete its network services from the support of MOR. And at the same time to achieve the successful trial of IP over DWDM backbone network trial in three cities with the support of the State Administration of Radio, Film and Television (SARFT). CNC has secured an operating license from MII to provide: nationwide IP-based domestic and international long-distance voice services; nationwide ISP services; IP backbone bandwidth services; facilitate international gateway services.

CNC is ready to build a large scale next generation IP broadband full-service telecom network by utilising both the DWDM and gigabit routing technology with a fully redundant infrastructure. The telecom product and service role out is totally linked to the market requirements and demand in China.

The current corporate structure of CNC is 5 major functions under the CEO office of Edward Tian. He has autonomy given by the Board of Directors. So among these five functions, basically are:

- finance and corporate offices;
- business and network operation;
- strategy and business development;

- corporate marketing
- and also the human resources.

Most of the employees at CNC are university graduates with background exposure to a lot of multi-national telecom organisations. CNC Net is a broadband multi-media backbone network with open interfaces to cater for different traffic requirements. The backbone network will connect to different telephone access infrastructures. Initially, it will offer up to 5 gigabits per second, later upgrading to 20 gigabits per second. The CNC network backbone is designed to utilise the state-of-the-art G.655 fibre optic core specification. CNC reuse commercial DWDM and 16-channel technology, expanding from 2.5 Gbps fibre to 40 Gbps in the long run. CNCnet can provide telcos class quality of service, security of transmission, network restoration and self-healing for high volume multi-media transmission.

To build the local access network in four cities is the target this year for CNC. By deploying the microwave LMDS broadband access technology in eight cities by next year is also another aggressive schedule to be achieved by CNC. The current architecture technology is the platform to achieve a much better cost order of transmission. Joint venture with the railway telecom centre now to build six conduit cable network around the whole country to accommodate different cable top quality requirement to serve the latest technical requirements. The network topology from the diagram basically is a ring architecture connecting the major cities and then sub-ranged to other cities. The fibre cable topology that shows in the diagram. You see the cable sectors we provide right now from our shareholders like the Ministry of Railway, the Cable TV Bureau and some other sections that need to be built.

CNC has a three-tier business model which the broadband IP backbone network will support:

1. VOIP service is one of the latest allows the CNC nationwide access number '17930', and also is currently awarded the international gateway in China.
2. Wholesale services: this is what we call carrier wholesale services. Basically, it is a leased line and gateway bandwidth to cable operators in China. It also supports the access port leasing arrangement
3. One of the targets is to meet with the commercial customer in the commercial area, so they provide unparalleled integrated multi-media bandwidth services to major businesses.

CNCnet has already rolled out the 15 cities with VOIP network service by November last year. This also covers capability in the international market of the IP calling card. The network will be retroactive to cover 100 cities by this year. The international gateway is in the construction stage and it will deliver service in July, tentatively. It is also progressively completing the implementation of the 5,000 mile IP/DWDM backbone network to provide broadband wholesale services by this year. The access network build will also be completed by this year in four major cities, such as Beijing, Shanghai, Guangzhou and Shenzhen. The whole CNC network build-out schedule will be completed in four phases over eight years. The total cities covered will be 200. The total fibre miles is estimated to be 3.3 million. The

local access roll-out is estimated at 11m miles. It is a very big infrastructure build currently by CNC.

The business strategy of CNC is targetted at revenue-drivers from VoIP, cable wholesale, and enterprise solutions. The target is based on 60 POPs by year 2000, utilizing a mix of leased lines from China Telecom and CNC network. In the VOIP network, based on the 17930, the nationwide access number, can offer the dial-up solution for business and interconnect terms. In the carrier wholesale sector, 60 cities will be reached by CNCnet by 2002. In the enterprise solution sector, they will provide 4 FTTC cities by this year and eight LMDS cities by year 2001.

So on the product and service side provided by the CNC backbone network, VOIP for corporate, based on the 17930 -- the dial-up solution. On the wholesale side, we target carriers by providing leased line bandwidth, IP bandwidth and even the back-fibre leasing arrangement. We are currently looking at the mobile operator and ISP provider in China. For the enterprise solutions, CNC putting in big effort to build the fibre optic solutions for four major cities in China this year and will also build the LMDS technologies in eight cities by 2001.

ZHOU QIREN  
CHINA CENTER FOR ECONOMIC RESEARCH  
BEIJING UNIVERSITY

I am delighted to discuss with you about telecommunications reform in China. As we all know the main stream idea and the policy, the principal, of how to introduce competition, the mechanism into telecommunications industry has been changing since the 1990s. So the new idea before 1993, nobody can think about introducing competition into China's telecom industry. But after 1993 something changed, and until 1998, the basic debate is not whether competition or the monopoly. Rather there is debate about introducing competition to which level in the telecommunication industry service. On the one side they always argue, China need to open the value-added service to the market. But the State still needs to keep monopoly control on the basic network operation. The fundamental argument is that China is a developing country. We have no such rich capital like UK and United States, so if competition is opened at the basic network level, this should lead to over capacity and over investment, etc. The other point of view on this debate, is to try to induce competition into all telecom industry services, including the basic telecom network provider. So the key difference is whether China needs one network, or several networks. I supported the second school. The problem is why competition among several basic telecom networks is so important.

First of all, the so-called model of the one monopoly network plus several service providers never works, based on international experience, as in the UK, United States, Hong Kong and Singapore. Firstly there is no clear line between the basic telecom costs and value-added services. And also only competition among several networks can cut the rent for all value-added providers who have no networks of their own. That's a very important mechanism. If there is just one network and several competitive value-added service providers they should shift all profit to the rent of the network monopoly controlled by the State. The second reason is in this industry the technology moves so fast and time is a highly valuable resource. First if there is only one network it will probably choose the wrong technology, just like China Telecom did. If there are several different networks, they can choose different. The third reason is in China there already exists several networks and the only problem is the policy did not allow competition.

Before 1993 there was only one public telecom service provider in China. That was China Telecom and it belonged to the government. From 1993 to 1994 the Chinese government made a decision to build the second telecommunications provider, Unicom. From 1994 to 1998, there was very limited competition, confined to the mobile phone market. And all the other services are still a monopoly by China telecom. They only opened the mobile phone market. And even in the mobile phone market after four years of reform Unicom, as a second competitor had just a 5% market share. We can compare to the UK after three or four years, Mercury, as the second competitor, shared 23% of the market. So until 1998, there were several networks but with very limited competition in China. Also they got a system called cable TV in China. They use broadband technology but just offer television. And also there are

probably more than 20 special telecommunication systems which belong to different bureaucracies. But despite all the systems there was no competitive mechanism. Only the mobile phone market in 1998.

So to face the WTO agreement negotiation, China needed to do further reform. In 1999, China has four actions to restructure its telecommunications industry.

First, breaking up of China Telecom: we called that the American model in 1984 (the FCC break up of AT&T). So in 1999, China followed this model with the break-up of China Telecom. First in China, the mobile became an independent corporation. And the second is the fixed-linked telecom, called China Telecom. And the third one is called China Paging, which has moved to China Unicom. So the break-up of China Telecom made four major competitive markets in the telecommunication sector. This is the first action in 1999.

The second one is expanding Unicom. That means shifting all the China Paging business to Unicom. The State made investment and gave resources to Unicom to build CDMA with the US. [Now on hold – editor] And also Unicom still has plans to develop the national fixed-link system. Of course they also have the rights to do IP phone business in China. This is the second action.

The third one is very important. The build up of ChinaNetcom. The broadband technology linking from Beijing, Shanghai, Guangzhou, Wuhan, forming a very important circle.

And the last one is to reorganise China Cable TV. As you may know, China cable TV is highly decentralised, controlled by the local government. There are 88 million subscribers, which makes it almost the second largest market in the world. So in 1998, the Chinese government made a new policy to reorganise the cable TV market. For the more than 20 special networks, also build up some new companies. One example is what they call Optical Com. The Chinese State Council allowed the Citic Group to invest in Optical Com. They also have a national system. So the picture somehow is changing in the Chinese telecommunication sector. Very importantly are the high developed areas of wireless access, data transmission and IP phones. These are three areas I see as key areas. And a new competitive structure of network has emerged since 1999.

There are two mobile phone service providers. The potential is to make the wireless access to the internet. It's very important to have the potential. Also there are four, and even five data transmission, and IP phone service providers. So based on this structure there are more opportunities to value added services providers with lower cost to use the networks.

However, the picture is not good enough, because technology changes very fast, and the new technology brings up new opportunity to China. So by the view we can see the 1999 reform still has some limitations. First most final subscribers are linked by the old system, not by the new technology system. Second, only Unicom has the right to become a full-fledged public service

provider. (China Telecom separate become the special mobile phone service, fixed service, etc). So only Unicom has the right to become the full-fledged service. If we compare with the United States and UK, we know that this is an important issue for China to develop telecommunications. The third is the problem of no transparent regulatory regime. China is not based on legal system to make very clearly the rule what kind of business people, especially the private sector business, can do. So this sector is still highly controlled by the government.

So I think the new challenge is how to reintegrate China telecommunication networks based on the competition principle. WTO may help China to get a new chance. Based on the 1999 reform and if in 2000 China enters the WTO there maybe a new chance to licence several full-fledged service providers. That is a very important basic structure for the development of the telecommunication industry. So it may happen that international telecommunication companies might come into China and combine with China Telecom, with Unicom and with Netcom to make several, I think at least three, full-fledged service providers. For this target, there are several policy issues. First, there is the IPO investment policy. I think China needs to open telecommunications companies to list both in the A-share market and overseas equity market. The telecommunications companies listed in A-share market is very important. First, that makes it fair to domestic people. In the case of China Telecom listed in Hong Kong and overseas markets, the domestic people had only the right to pay high rent, but no right to buy the highly profitable shares. That's unfair for the Chinese people. The second is very important. If Chinese telecommunication companies list A-shares first, or list in both, that can enlarge China's telecommunication equity size. During the WTO agreement limitation foreign companies can invest a lot. If they list in IPO first that means the equity size is large, and domestic capital is large so the foreign investment in the company can be large. That is the first issue. The second one; we talked about the China cable television system. Firstly, how do we integrate the cable tv network in China. The second one is how to open cable tv to foreign investors. The third policy issue is when and how to allow telecom and cable tv to enter each other. That can combine voice, data transmission and image together. The fourth is interconnection and universal access. The fifth is very important. How to make a privatisation in telecommunication industry and IP service. Because China has made promise to open to foreign private companies. Why doesn't China open this key sector to domestic private sector. The last one is China needs to learn the lesson of unregulate the internet, from the United States. We know the United States has made new policy, the principle. It is not deregulation. Because always after deregulation is re-regulation. In the United States the deal with the internet usage regulations does not mean needing a special licence to do internet business, so I think China needs to learn a lesson from the United States.

IAN JOHNSTON  
ASIA CSG MARKETING MANAGER  
AGILENT TECHNOLOGIES

(Presentation slides follow text)

Maybe before I launch into this technology segment, I'd like to explain quite clearly who Agilent are. From November 1<sup>st</sup> last year, Agilent was spun out of Hewlett Packard and we are today what was the measurement and test division of Hewlett Packard. But you will see from this presentation there are exciting things happening, mainly from our laboratories. Because not only did we spin out the test and measurement but we also inherited a lot of exciting technology from the research laboratory.

So typically if we look into the future, and in fact, I've actually tried a few of these would you believe about 6 months in Tokyo. There's tv; I wasn't too impressed but it did work, so I actually got to see a few things. These are the sorts of devices that are really, from an American viewpoint, starting to drive the need for more and more bandwidth. I think you see this daily, with the WAP protocol, the other suppliers of mobile phones looking at how they can develop devices to allow people to communicate with video, audio, text, the whole range of services. And in fact just to complete the picture we're finally getting to wristwatch level. These are some of the devices that have come up in discussions with developers.

So let's do the mathematics on where we are headed from a bandwidth situation today. An increasing number of users: we heard the two previous speakers talking about the market in Shanghai, a large number of people are available to come on. Multiply that by the increased access speeds: again we heard about the demand for bandwidth. And the longer connection: this is really upsetting the traditional telco markets. Those of you who have been involved in it know that traditional voice switching was basically a three-minute call, narrow bandwidth. The internet access has, of course, thrown that model completely out of the window. Then multiply that by the rich media. This is the mixture of video, sound, full motion. We're finding now that bandwidth demand is doubling every six to nine months. Again this has been taken predominantly from a North American model. But I would say it's pretty general in most places I have been involved with. So looking along the x axis, over the number of years it's taken for the traditional backbone technologies, if you like, doubling every 4.7 years. And then suddenly we move on to this really high access area where you are looking at a rapidly developing bandwidth and on the y axis, of course, there is your gigabits, terabits and petabits. You'll have to remember the petabits as they are coming out very soon.

So looking at the history. Again the x axis, the red end of the spectrum are the R&D things about that time, and over to the blue end is what's actually being used in an operational sense. Basically today we are seeing in service in a number of areas the DWDM, or point to point links. That has been very successful and I know a few telcos and users that are using that today.

The next thing to come along will be add/drop mix where we not only want point to point but we simply want to drop circuits out. And again that's happening electronically with SDH technology. The next step up would be a configurable optical add/drop mix. If you're now involving light and you've got DWDM, the whole idea now is to start switching photons rather than electrons. And finally we're headed into the full optical cross connect. So this next set of slides will actually show you the device that has been developed by Agilent to get involved in the cross connecting. So this is the general trend, the all-optical network is coming. And according to this prediction, by 2001 we can see some optical cross connects actually in service.

So basically there are two major features that we see. The first one quite clearly is the DWDM-based re-configurable optical network providing the physical layer infrastructure with bandwidths of 1000 gb/s or more per fibre. This is definitely what's happening. And the second one is a real challenge for manufacturers that are building routers and switches. Again we've heard earlier speakers talk about the need to use DWDM and routing, well the problem for the router people is again they're still in electronics and getting that bandwidth is very, very difficult in the router. So you can see the demand is there both on the point to point and in the switching.

So what I want to talk about is:

- VCSELs (Vertical Cavity Surface Emitting Laser)
- Optical switching
- Parallel optics.

These are all the things that have come out of our laboratories fairly recently and have gone into commercial production.

So basically we have a thing call champagne optical switch. It's a substrate layer with fluid fill between fill holes. The concept is with no stimulation of each point, each cross point, the light simply passes straight through. So it's a case of a wave guide passing through a material that simply allows the light to propagate forward. That's basically the index matching fluid in the channel of the device. Bear in mind, this is a solid-state device. Optical -switching has been done by some mechanical means: small mirrors, some actuators etc. This is solid state. Basically, that is the concept. By activating the liquid it turns to a gas, in other words a bubble develops. The bubble refracts the light, so you've got a situation now where you've got this type of thing happening. [As the substrate heats the fluid a bubble is formed and the light path instead of passing straight through the cross point is refracted at 90 degrees thus creating the equivalent of an on/off state – editor] This is the basic idea. It's a planar microwave circuit. There is a wave-guide that has been etched into this circuit. There is a controlling substrate behind it to activate the cross points, and fill holes for the matching fluid. This is an example of a light beam being switched to another point. So it's compact. The chip actually is about the size of your thumbnail and that's about 32x 32. It's scalable. I'll show you in a minute how these

things could literally be stacked up and made into a large switch. And it's low loss. Again, important features for any device.

The next step, when you think about it, is you have DWDM point to point but you still have to come back from the optical domain into the electronic domain to do any switching. Here, of course, you're now allowing the optical domain to continue. That is an example of a switch sitting connected to its ribbon cables. The chip, by the way, is available in the US. The idea is that it is mounted on a control board and typically used by OEM or NEM network equipment manufacturers to build the boxes to be used by the end customers. A typical example would be to build them up so you could have on the left showing you the 16x32 and then building them to a connection point to have a protection restoration switching. The switching time is something less than 10 milliseconds, so at this stage, you are not looking at immediate routing, you're looking at switching for alternative routes or the other thing to that telcos do is provisioning. If you want to simply provision an add/drop box at a given point that can be done very, very easily.

This is another example of using the switch in an array where you can simply come in on the x axis and leave on the y axis. Typically it's again a 32x32 configuration. An example of using it in a traditional ring where these can be used for add/drop boxing. So again you are simply replacing the electronic part with a photonic part. Another thing is very interesting, combined with this you've now created a very small switching platform. The problem now is to get the fibre, the physical means that carry photons into such small complex areas. Typically there is a bunch of fibres lying there terminated and on the right hand side, this is actually what's replacing it. They're developing ribbon fibres with a block terminal. And basically inside of that you can see the fibres coming from the ribbon, terminated on a device that I will explain to you in a minute. And this is the VSCELs I mentioned earlier (Vertical Cavity Surface Emitting Lasers). At the moment the laser is pretty well-known. There's a typical example. It's an edge emitting laser. This has been around for a long time. Basically, what we're developing is the surface emitting lasers where you get a lot more emanating from one surface, so obviously you are getting a density that was totally impossible by an edge emitting laser. So you can see now by developing this technology they have excellent light characteristics and the key thing is the density. You've now got this very high wall-plug efficiency. We are talking about wall-plug here we're not talking about specially terminated fibres. So I think what is happening in the industry is that fibres tend to need special care and attention. In a lot of cases we're now trying to get it almost like copper with a plug-and-play mentality.

And typically there is an objective to get 30 gb/s in a square inch. By using these planar lasers you can line them up, put them on to a ribbon cable and literally have that plastic moulding connected into a device as you would do an RG11 plug today with copper.

These are things that are happen today. These products are released in the sense that they have been released to manufacturers to develop these devices. The conclusion is pretty obvious. Data traffic is driving huge bandwidth demand. Here is now the next step. Obviously we have to get into optical, and I've shared with you some of the developments and some of the

challenges. That one is self evident. We need to get into optical to simply maintain the growth to meet the demand for bandwidth. The photon just has to be used more and more.


Agilent was created from test and measurement but you can see that we are branching into what essentially is a network element. These are some of the exciting things we are developing. This device was released last month in US. So that's a little bit of a look-see at what's coming down the line certainly from our company and I'm sure a few others will be very similar.

## Next Generation Networks

### Optical Switching

Telecoms Infotech Forum  
Furama Hotel – April 14

Ian W Johnston



LW Johnston – Agilent Asia Pacific

## Communications Industry Revolution

**Regulatory Changes**


- New Entrants
- Market-based pricing
- Wholesale/retail split

**Exploding Demand**


- New devices
- Web services
- Outsourcing

**Network Technology**

- Moore's Law
- Law of the Photon



**Major Services & Infrastructure Discontinuities**



LW Johnston – Agilent Asia Pacific

## Wearable Devices





LW Johnston – Agilent Asia Pacific

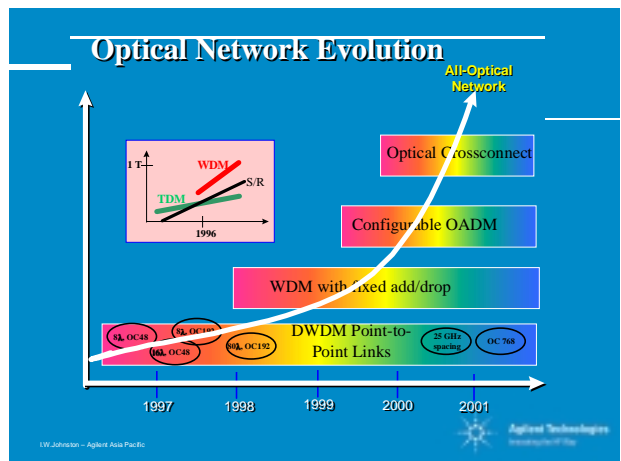
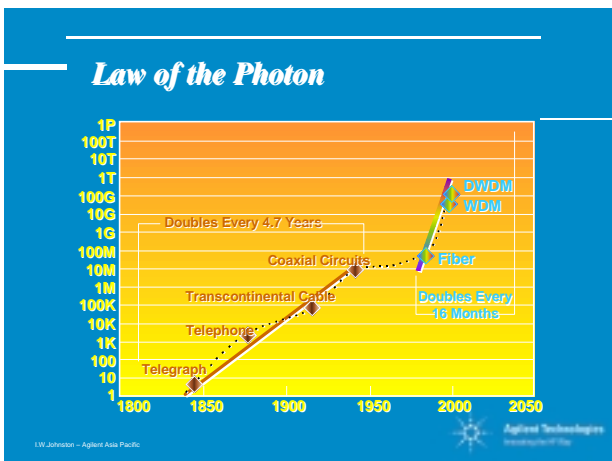
## The New Math.....

Increasing Users  
X  
Increased Access Speeds  
X  
Longer Connections  
X  
Rich Media

= 2X Bandwidth Demand Growth/ 6-9 Months



LW Johnston – Agilent Asia Pacific



### Next Generation Network

- 4 DWDM-based re-configurable **optical network** providing the physical layer infrastructure with bandwidths of 1000 Gb/s (1 Tb/s) or more per fiber.
- 4 **Terabit IP routers and ATM switches** capable of handling terabits per second with multiple ports operating at OC-48c (STM-16c) and OC-192c (STM-64c).

L.W. Johnson - Agilent Asia Pacific



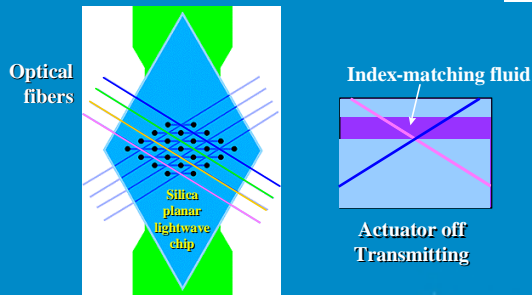
### Optical Networking Research Directions

- VCSELs
- Optical Switching
- Parallel Optics

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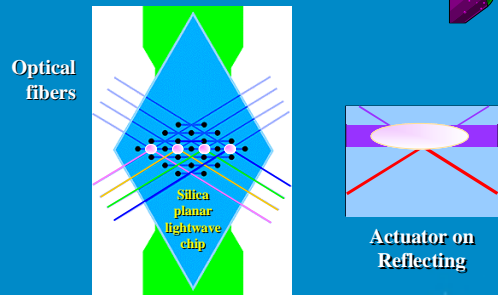
### Champagne Optical Switch



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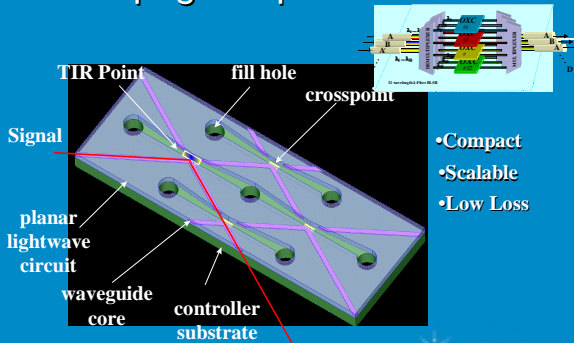
### Champagne Optical Switch



L.W. Johnson - Agilent Asia Pacific



### Champagne Optical Switch



L.W. Johnson - Agilent Asia Pacific



### Champagne Optical Switch



L.W. Johnson - Agilent Asia Pacific



### Photonic Switching Applications

**Optical Cross Connect**  
e.g., 512 x 512 Array

**Protection/Restoration Switching**

**32 x 32 x 16**  
Rearrangable OADM

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### Photonic Switching Applications

**Optical Cross Connect**  
512 x 512 Clos+ Array

**Protection/Restoration Switching**

**32 x 32 x 16**  
Rearrangable OADM

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### Photonic Switching Applications

**Optical Cross Connect**  
512 x 512 Clos+ Array

**Protection/Restoration Switching**

**32 x 32 x 16**  
Rearrangable OADM

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### Parallel Optical Links

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### Vertical Cavity Surface Emitting Lasers (VCSELs)

**Edge Emitting Lasers**

- mature technology
- high power

**Surface Emitting Lasers**

- easier to test and assemble
- excellent light characteristics
- two-dimensional arrays possible
- very high wall-plug efficiency

L.W. Johnson - Agilent Asia Pacific

### Objective ..... 30 Gb/s in 1"

- 12 Channel Tx or Rx Module
- 1.25 to 2.5 Gbit/sec per Channel
- 15 to 30 Gbit/sec BW in 1.5x0.65 in<sup>2</sup>
- Next Generation Multi-Computer Systems & Telecom Switch Systems

L.W. Johnson - Agilent Asia Pacific

## Conclusions

- Data traffic is driving bandwidth demand
- Optical Networking is key to next generation networks
- Agilent provides solutions to help design, build, operate and maintain next generation optical networks

During the discussion period the following points were raised:

**John Ure:** You were talking about the switching speed saying that it was appropriate for alternative routing, does that mean that we still have to wait one or two more years before ATM switches face a challenge from this technology?

**Ian:** basically yes. What we're talking about here is routing of basic light which would be for, say, provisioning and alternate routing. The fastest switching you want is actually is to switch traffic and that would then be determined by the traffic itself. What this device is doing is not switching that, it's switching obviously within that area. So the three areas are switching on demand basically as per traffic carried in the light. This is not this is switching the light. Irrespective of what's on the light, this is simply switching the light beam

**A participant:** My question is actually to China Netcom. In the presentation, you gave a very good overview of the competitive landscape in China. One of the omissions I noticed, is China Jitong. Could you elaborate the role China Jitong in playing in China?

**Stephen Lia:** Well, I can say China Netcom by itself, is trying to roll-out a telecom service based on the latest IP technology. So you see China Netcom, it has the licence in VoIP. It has a licence in internet. It also has a licence to operate the nationwide backbone wholesale services. And also they have the ability to build the backbone and also to build the access network. And they have the gateway licence in hand, and going into operating service. So you see, China Netcom is more or less positioned as a full service telecom service provider in China. China Jitong, we can see the service rolled-out in China is internet VoIP. But they may not have that kind of range of service that China Netcom is going to be offering. So I can say that China Netcom is a full service provider, and that China Jitong is more positioned in a certain range of services.

**John Ure:** China Jitong does have a VoIP licence, doesn't it

**Stephen Lia:** Yes

**John Ure:** Who are the people mainly using voice over IP?

**Stephen Lia:** If you look at the current VoIP roll-out from the four major operators, like Jitong, China Netcom, they have a service based on a calling card. They enhance services. China Telecom is more based on China Mobile, their network, to roll-out the service. And Unicom is also leveraging to roll out the calling card services and also use their mobile network to roll out their VoIP services.

**A participant:** I've got a question for both Professor Zhou and Stephen. I have a further question for Professor Zhou. The first question is perhaps you can just both elaborate for me what Netcom's licence actually is, if you know it. Because I don't understand China Netcom's licence at the moment. I ask the question, because Stephen, you've said that China Netcom is now in a position to be a fully-fledged full service provider. Prof Zhou said that Unicom was perhaps uniquely positioned to be the only full service telecommunications provider. My understanding is that Netcom doesn't yet have all of the licences required to be a full service provider. For example, Netcom can't provide local loop access. Is that correct?

**Professor Zhou:** Yes, I think you are correct.

**Stephen Lia:** The licence for local access, I'm not sure what is the current regulatory situation in China for that to be issued. But China Netcom is right now building the local access in Beijing, Shanghai and Shenzhen for local access in order to support the roll out of the commercial business users.

**Professor Zhou:** In 1999, the State Council approved plan is just to build up in the first stage around two years, the backbone system. Use the cable tv, the ringway, the line resource. This is only the first stage. I think ChinaNet has the strong the potential to become the full-fledged service provider. Up to date it is not yet, like you said.

**Peter Lovelock:** Professor Zhou, can I ask a follow-on question about the relation you described between the cable tv networks and the telecom network. Could you just explain to me the position at the moment as you understand it with convergence in China given the latest regulations saying there has to be separation between cable tv and telecommunications, that you cannot run the same service on the same network.

**Professor Zhou:** At the local level both China Telecom and China Cable tv tried many times to introduce the fully-fledged service. For example, Shandong province China cable tv three years ago offered phone voice service in the Zhibo area. They offered voice service to 30,000 households. Also in Hunan province China Telecom several times offered television program on the network. This is just at the local level. In the State level they always control. They clearly restrict both. China Telecom can just do voice service and China Cable tv is limited to do television service. The problem in China we discussed many times is that cable tv owns the structural resources. They have national size customers total of 88 millions, but most of them is just separating the local highly decentralised. There are no national system controlled by the one centre. They need time. They need to invest That's the one thing. The second situation is that China Telecom is strong enough financially and Cable tv is weaker financially. So at this time if the State Council allowed both into each other's markets China Telecom would control Cable tv. So for Cable tv at this stage, the optimal strategy is keep their own interest. They say they are a politically-sensitive area, that they offer television programs. So nobody else can do such business. They want to protect themselves. In mid-July/August 1999 the State Council

ordered that nobody can enter each other's market. They made a clear line between these two sectors. In the future, this picture should be changed. The policy issue is the State government, the Central government should help the weak, the potential competitor. For example, in this case it is Cable tv. Just like the UK, BT competed with Mercury. In that time, the State has made special policy to protect Mercury's interest, because this group is small and weak. I think China needs to learn this unbalance policy, to protect potential competitors, such as China Netcom and Cable tv. So this is where we need to learn from international experience.

**A participant:** I have several questions about China Netcom. One major question is that they have four organisations over there. They all have the same 25% ownership. Can we say one of them is playing a dominant role? Can we say the Chinese Academy of Sciences is playing this kind of role, or is that just speculation?

**Stephen Lia:** As you saw from the presentation, all the four shareholders are shared equally in China Netcom. They have a role to play to help China Netcom to be a telecom service provider in China. They each have different roles. In terms of the mandate from the State Council, we understand they have full autonomy to offer to the CEO, Edward Tian, to hire people to setup the strategy for China Netcom, to manage the operations. If you look at the candidate or employees in China Netcom, most of them are being hired from outside. Rather than Unicom from before where they were hired from shareholders.

**A participant:** Based on your presentation, it looks like the Chinese Academy of Sciences is responsible for research and development for China Net. But now China Net has just signed a contract with Edward Tian's baby, Asia Info, to buildout the network. Does that mean that Asia Info is taking over the technical role?

**Stephen Lia:** Edward Tian is China Netcom's CEO, I believe there is no relationship with Asia Info in the role with CNC from what you said.

**John Ure:** you mentioned Unicom and implied it had no very clear managerial structure, a lot of shareholders and apparently a very dispersed managerial structure across China. To what extent were lessons learned from that in setting up China Netcom?

**Stephen Lia:** Well, because China Netcom when they were founded they looked at the experiences, problems and advantages from Unicom. China Netcom is also a state-owned enterprise. They need to reform in order to run a team with good people, with new technology, with new minds. That's understood. That's why they have set up CNC in a way to give management full autonomy in all those issues; strategy and implementation. Well, obviously this is the difference.

**John Ure:** I'd like to put a question to each of the three panelists. One reading of why Unicom was apparently to adopt CDMA technology, given the timing, just before the last round of

WTO talks between US and China, did seem to suggest that Unicom was being used as a vehicle to provide part of the negotiating procedure.

China has an industrial policy. The MII clearly has an industrial policy to develop the capability in China of producing third generation handsets. In light of that, I suppose the question directly to Stephen would be to what extent would China Netcom be free from playing a role which is really an extension of industrial policy? To Professor Zhou, the question would be, do you consider the industrial policy to be consistent with the WTO membership? And to Ian, how far as an equipment supplier, do you see the industrial policy in China, such as it is, either being a barrier or a structure that foreign companies can actually work with?

**Professor Zhou:** Industrial policy is a very popular term in China, but I think we need to learn from international experience. For example, the FCC just talked about this policy. If you compare the MII with the FCC you find the structure of human capital is quite different. Most workers in the FCC are lawyers and economists, but most of the top leaders of the MII are engineers. So what's the difference? I'm sorry to say that most engineers like to do things by themselves, not make platform along the society, with different parties playing active roles in this industry. So I think China needs to change the control system, especially the human capital structure. We need a lot more lawyers to play a key role in the core of the industrial policy. That's one comment. And also the WTO is interactive between foreign companies and domestic sectors. Why the Chinese people like me welcome WTO agreement is because it gives the Chinese domestic sector a chance to enlarge the space to do business in telecommunications and the IP sector. If the door is closed it's very difficult to make such change in ideas and policy principles. But if the door is opened to the world it's much easier for Chinese people to learn from international experience. And a lot of the traditional ideas and principles will have gone. So the WTO can help Chinese people to re-think about why industrial policies need restructuring on this and that. We need an open mind to find the technology. The development is so fast today. Why does China still keep the property thirty years ago, the traditional idea. The government tries to control every key area, every corridor of key industry. It's wrong. We can learn from the United States how to deal with internet. In the recent weeks there have been a lot conferences in China and a lot debate. For example, why China took so long to get Sina.com listed in the NASDAQ. If in mid 1999 China had opened the door to allow Sina.com to be listed on the NASDAQ, the situation would be different. Up to today, in the internet sector, we only know China.com and Tom.com. But in mainland China probably yesterday Sina.com just listed in NASDAQ. It's too late. Why is there so much control on this new industry. The WTO agreement is not only for foreign people to get a new chance, also it's a very important, new chance for domestic people and the domestic business sector.

**Ian Johnston:** I think from our perspective, a lot of this boils down to commercial realities and I think most large companies in China had the problem of transparency and the lack of legal network infrastructure. But the question is quite timely because we, as a company, are re-looking at the whole thing. Given the fact that developments are happening with WTO and so

forth. We are reviewing our policies to China rather than simply having it as a destination for selling goods, and more towards the development and cooperative models happen in the west. So your question is very timely. The highest level of the corporation is reviewing strategies in China and that includes everything from development through to fabrication and manufacture. As you appreciate, people are doing this already, but sometimes it's at a quite low value level. We are looking at bringing the value chain a bit higher, if a lot of the stuff that's under discussion comes to fruition.

## SESSION TWO

I know Professor Zhou will have been very vigorous in everything he's researched, but one of the magic numbers in the first section was the 80m cable subscribers. I remember doing a consulting gig in '93, '94? on the cable tv system then. We had to go out and work out how big the cable tv market was. I didn't know. We went and talked to everyone we could in State Statistical Bureau, the Administration for Radio, Film and TV (which was a ministry in those days) and we got so many different variations that I made up a number, which I then got published as widely as possible. I figure if you get a number, and you have everyone saying exactly the same thing, you can use that as credibility. I made up a number of sixty million. I just saw Pacific Century's game plan for China. They're using the same number that we were using way back in '93. I don't think anyone knows how many cable TV subscribers there are out there, let alone internet subscribers in China.

I just thought I'd use that to introduce the second panel which is going to tell us how the China market is evolving. We've got some very exciting people. . Bob Cassidy was the lead negotiator on the recent China/US deal which we presume is almost the penultimate round before China actually gets WTO accession. So as we were saying with Bob yesterday, us Australians are very grateful that he has managed to negotiate on our behalf and potentially get us access to this wonderful market. Hyam Bolande is a reporter for the technology section of the Asian Wall Street Journal. Hyam's been a long time reporter in Shanghai with AFP, recently relocated to start being a tech-head with the journal. I need to apologise for myself towards Hyam for putting him in front of you here. We did think that we had a lawyer who was going to break down the WTO accession for us from the legal perspective. But he couldn't make it at the last moment so I've landed Hyam in here with almost no preparation. He's been twisting my arm for the last four months on a story about operating systems in China, so I'm re-twisting his arm and he's going to tell you about the operating systems battle that's going on in China at the moment. We are lucky enough to be followed by Anthony Yip who I'm sure you all know given he's a superstar in HK. Anthony runs Myrice.com and has spent the latter part of last year acquiring exciting sites across China. He is now in the process of putting those into a money-making venture, I believe.

ROBERT CASSIDY

LEAD US NEGOTIATOR IN SECURING THE RECENT WTO AGREEMENT

I tell everybody that I come from the astrological school of negotiating. If there ever was an agreement that's been negotiated that reflects that philosophy, it's probably the US/China deal, the market access negotiations that we concluded. The reason for that is that this agreement would never have been concluded -- in fact negotiations went on for well over a decade -- unless there has been a leadership shown on both the Chinese side and the US side. When I say in the astrological school of negotiating, I mean what you have to do (for those who have to sit down and negotiate agreements), is to move these astrological bodies into configuration so that they have that magnetic force that gets the agreement done. In the China deal, that always was the central component of the deal; to get the political will together. To get those forces in alignment. It continues to be essential for getting China into the WTO and it will be for implementing them, to get them into the WTO. I just lay that out at the beginning, just so that you will know. So many of the questions you may have about the agreement and about how's it's going to be implemented really, essentially rest on making sure that those astrological bodies are still on alignment. That's what created the agreement and that's what going to make sure the agreement goes into effect. I'm going to try to go through and tell you what I think are some of the strongest points of agreement from your perspective. Not the whole agreement but really more the IT sector and how that's benefited or how it will benefit from the WTO agreement. What are some of the problems of implementing the agreement? And then what is the time table that I think will be there in implementing assuming that all those planets and stars stay in alignment.

First of all, with respect to the gains of the agreement, I think that everybody will recognise that there are some macroeconomic effects. That opening up a market, whatever Peter says about what the numbers (about 1.2 million people), opening up this market is going to have some macroeconomic effects. Not only in China, but in Asia and globally. I think we all have to put that into our equations whatever they may be because a rising tide is going to mean more business for everyone. I think from this industry's perspective the key aspects are, what are the benefits to this industry and how is it going to affect the Chinese market place? And just going on what Mr Zhou said earlier today, I think a lot of things that we've done in the WTO agreement are going to support the directions that he would like to take in the China market. First of all, on the equipment side, China has agreed to fully implement the ITA. What does that mean? For all the ITA (information technology agreement) products in the computer and telecom area, China has agreed to go to zero tariffs. About two-thirds to three-quarters of those items are going to go to zero in three years. The few remaining products will phased in to zero tariffs by 2005. So it will be fully implemented by 2005.

In the services area, I can break it down into number of different areas. But let me just say, first of all, that the most important area in the area of services of liberalisation in my view, is distribution. This will help on the equipment side, because in the WTO, if you reduce the tariffs at the border, all you achieve is to get your product to the border. It doesn't mean that you

can get to 1.2 million people. The key to the agreement is to opening up the distribution system. And that was, I think, the most significant contribution to this agreement, because now not only do you get your product to the border (with reasonable tariffs in the case of IT with zero tariff), you can now control the distribution of your product. You can wholesale it, you can transport it, you can advertise it, you can maintain and repair it. All of those things you can now do. That will be phased in over three years. Beginning the first year with minority joint ventures. The second year with majority joint ventures and the third year, complete control. I think for the most part that's really one of the most powerful aspects of the agreement.

In the telecommunication area, I think this is another area where we have seen where there is going to be substantial opening. Not in the same timeframe as in the distribution. It's in the longer phase-in schedule. The thing we were most concerned about were what were the endpoints of the process. What would be the eventual liberalisation points that China would reach. We were much more flexible on the time frame. Many of you, I'm sure, have seen the agreement on value-added services. Those will be phased in so that there is 50% equity participation within three years. Mobile services within five years, that's only 49% equity, and domestic and international 49% within six years. On the internet services the way we negotiated those, with those will be value-added services. So consequently those will be phased in over three years. I know there is a dispute going on in the WTO as to whether you should break those up into value-added services and fixed-line or basic services, and how do you do that? That's a dispute that will have to go on in the WTO and will be resolved. But the way we negotiated it was with the intent that these would all be covered by the value-added services.

In addition, China has agreed that it will live up to the telecommunications reference paper. That means that they will be on the same basis as every other country. In addition, China has agreed that it will do neutral scheduling. This is one of the Chairman's notes. So that means that the services that are provided from whatever vehicle that they cannot discriminate in their scheduling, in their implementation between, say for example, their satellite services or fixed line services. So it's all liberalised in the same way. China has agreed that there will be gateways, or we have agreed that we will try to still have gateways. But the key aspect is that they must be operated by an independent authority. So MII will not be able to operate those. I think these all are key elements of it. To be sure we wanted more access especially on the equity limits, than we were able to get. But this was the limit of what we were able to achieve and we felt that this would be substantial.

On the computer services side, China has agreed that it will open those services as joint ventures. But more importantly, I think, is on the cross border traffic, or provision of these services, that's completely opened. There are no barriers to it. And I think for some of these areas that's generally the way a lot of those computer services are offered. But those I think are the principal elements, the key components of the deal. I can go into greater detail and I think a lot of this information has been provided through various means, so, I think you probably have a lot of the details of the agreement.

The key aspect, however, is will it be implemented? This agreement is not a self-executing agreement. The fact that we signed this agreement doesn't mean it goes into effect. It will go into effect only if China enters the WTO and only if the United States applies permanent NTR to China. With respect to the first aspect, a lot more needs to be done in the WTO accession. The WTO accession can be broken down into two parts. The first part is market access agreement and China will negotiate with other members of the WTO on specific market access issues. The United States tends to negotiate the most comprehensive agreement. Mainly because our economy is so broad and we have so many interests, so that it tends to be the broadest of the agreements. But the EU is still negotiating its agreement and they have an equally broadly-based set of interests, so they are going to be seeking many of the same things that we are interested in. The second aspect of it, however, deals with the WTO rules and regulations. And that is the protocol and working party report. Those negotiations have not really begun. Some parts have been concluded. China has agreed that it will provide trading rights within three years. We have to work out the details on how that will be implemented. China has agreed on judicial application, judicial review of administrative decisions. Non-discrimination; it will implement the IPR rules upon accession. There are certain things they have agreed to. But there are other rules they have to agree upon in the multi-lateral setting and that all has to be negotiated multilaterally, not bilaterally. And that process is going to go on in Geneva, but unfortunately, those negotiations probably won't commence until the EU completes its negotiations. So that that remains to be seen.

So that's one aspect of the implementation that we have to look at. I put that more in a macro category. But then let's assume they get into the WTO and that the United States does apply PNTR. China will have to implement this agreement effectively, and I think that's where there are going to be a lot of disputes. We do have a lot of disputes with nearly every other country on implementation of the Uruguay round and certainly a number of countries have taken the United States to the WTO over how we have implemented those commitments. I think it would be silly for anyone not to believe that we are not going to have implementation problems with China. It's going to be over many aspects and that's where I think different groups, especially this group will be very helpful in identifying what are the implementation problems that exist. There are two ways that are going to be used to be able to deal with these implementation problems. In the protocol and working party report one of the elements that they have is called the transitional review mechanism. This is the mechanism by which all the countries can get together and, as a group, talk to China about how it's implementing the agreement. Generally my guess is the way it is going to be implemented is that you'll have different topics -- telecommunications, maybe one of them, for example -- and there will be a whole discussion on how effective is China's implementation of its commitments of its accession process. This is a unique provision. It hasn't been negotiated elsewhere. But I think it's a key component of the protocol and working party report because what it does do is it provides an alternative to dispute settlement. A way of trying to deal with problems at an early stage and try to proactively deal with the implementation questions and problems that will arise.

If that doesn't succeed the second method is the dispute resolution. And here we have the WTO Appellate System that would be able to work through each one of the issues whenever there is a complaint. The problem will be to what extent will countries want to take on China in the WTO, and that remains to be seen. I think Peter referred to the Australian view of the United States negotiating on their behalf. Some countries may wish that other countries take China into the WTO and not themselves. We'll have to see how that works out. I think the key thing here is there is an effective dispute resolution system that has worked in the past and is binding. That's the key. And the way it is binding is if a country is found in violation of an agreement they have to bring their laws into compliance with the WTO. And failing that the other country can withdraw concessions. And that is the traditional method in the WTO of resolving disputes.

The timetable for negotiations is somewhat problematic, and to a large extent, it depends upon some of the players involved, primarily China. I've often said that in our negotiations China was determining the timetable and I think that is true now although, perhaps less so. The first thing that has to be done is the EU has to conclude its market access negotiations. I think negotiations are scheduled for late May and they've already had one round. Lamy was just in China just recently, and those negotiations did not succeed. The EU wants more than the United States got and China is in a difficult position to be viewed as giving concessions beyond what they gave to the United States. I think this is a negotiating dilemma they're going to have to work through. Certainly it's true that the EU is going to need different things, more than we got from them. They have some different interests, I think that can be accommodated. The problem is to what extent will China be able to meet those needs. The second thing is that we have to conclude the working party and the protocol. I say "we", not being a formal government official, I should stop saying that! But the protocol and working party report deals with the rules of the WTO, and that's a very complicated and very detailed process. What it essentially comprises is an identification of the trade problem that currently exists; especially with respect to how the rules are applied. The concerns of the different countries involved and then a commitment on the part of China on how it would be brought to conformity with the WTO. These are very important. I don't think that they should be enormously contentious, in part because China has never objected to fully implementing the rules of the WTO. I think the problems will centre on those where the rules are somewhat ambiguous and where there may be different rules for developing countries than there are for developed countries. Those will be the areas of some dispute. But I suspect, assuming the EU concludes its negotiations, that the WTO will go into a series of marathon sessions around the clock for three to four weeks at a time, in which they will try to conclude the negotiations. And that could be done fairly quickly.

The third component that's going to be required especially to implement our agreement is the permanent NTR. If permanent NTR is not granted, then China is, as far as our bi-lateral agreement is concerned, only obligated to implement those elements that it has negotiated with other countries. And if it's dealing with tariffs, and that is covered by our 1979 agreement, and under MFN rules whatever they give to other countries they have to give to us. But that's not true in the services area. So for telecommunications and for computer services, for example,

distribution services, China will not be obligated to give those to us because the MFN principal does not work under the 1979 agreement. So there will be real problems if permanent NTR is not approved with respect to this agreement. Then the question will be what did other countries negotiate? What did Australian negotiate, for example, in its agreement on services. Nothing. Canada? Very little. So it'll largely depend upon what is in the EU agreement, because that will be the rules that China will then apply. So the EU negotiations are critical as far as these negotiations are concerned, especially with relation to permanent NTR.

That gives you an overview of what I think the key benefits of the agreement are; what the implementation problems would be; and finally, what the timetable would be. And once again, on the timetable, that's something that's not controllable. We hope that permanent NTR will be approved by the House in May and then June by the Senate and that would be authority granted to the President to give permanent NTR when China enters WTO. And if that's done then this agreement would then go into effect when China enters the WTO.

**Peter Lovelock** noted that [madeforchina.com](http://madeforchina.com) ran out a campaign about four or five weeks ago. They did it as a marketing exercise for one of their clients that induced the young Net generation in China to come and register on their site. They were going for some basic demographic information. They were trying to get a sense of what the young Chinese net generation looks for on the net and in life. They tried to do it in a classic chat-room context of allowing people when they came onto the site to adopt an avatar. They gave them a specific number of choices: 4 female and 4 male. They were classic choices. One was the Tom Cruise-looking hulk; one was a punk, one was a rebel; one was a geek guy. For women they had a similar disaggregation. They had a stunning, slim Barbie girl; one was a demure traditional Chinese young lady; one was a very stern and one was fiery fierce woman. We figured we knew what they would pick so I started crunching the numbers. I forget them now. Seventy-eight percent of people wanted to look like Bill Gates when they walked into a chat room. They all picked the nerdy, skinny guy with the glasses and the bow-tie! There's an entire nation of geeks out there! They're all Bill Gates. My preface for Hyam is that he's about to trash my heroes in life: Microsoft and Bill Gates. But China wants to be Bill Gates.

HYAM BOLANDE  
TECHNOLOGY JOURNAL  
ASIAN WALL STREET JOURNAL

In reality, I'm not planning to trash Bill Gates and Microsoft per se but I will say though that in talking about operating systems in China, the most important thing to talk about right now is Linux. Merely because Linux is the new kid on the block. Linux is what's likely to shake things up and I think the battle of the operating systems is a little bit of an overstatement. Certainly the waters are quite calm right now in comparison to the way they could go. So what I'm going to try to do for you today is map out to the best of my knowledge some of the forces that are at work in this area.

If you'll indulge me I'd like to conduct a really brief poll because I'm right now in the process of writing a piece about Linux. And for our newspaper's point of view it's difficult sometimes to tell how many people out there really know what Linux is? How many of you have heard of Linux in various media reports lately? How many could describe Linux in detail, its origins and how it works? It dates back about 8 or 9 years. In its early years Linux was something that was in the province of the geeky people. It was a rough and unpolished product, especially when you compare it with Windows. An operating system or so-called platform, are just programs that you run on your computer to manage all the other programs that are running. That makes it sound very simple. But operating systems are at the heart of every issue that surrounds computers and software in general, because of the issue of compatibility. I'll get back to that a bit later. But to talk about Linux briefly. As it started out, as I said, it was kind of a rough product that was not terribly well developed, terribly user-friendly, although technically very sound. It's very modern and incorporates some of the most efficient technology, but was kind of cumbersome to use for ordinary people who weren't technically terribly proficient. So for a long time it was something that was handled by people on a hobby basis. What really changed that was the internet, as it changed so many other things. The internet provided a tool that allowed people who were interested in Linux and its development to communicate with each other on a much more vigorous and widespread scale than they had been able to in the past. The reason why it is important is because Linux, unlike operating systems that have been around to date like Windows, Unix, different types of Unix that are around, is a non-proprietary operating system. That means that it's not owned by any company or person. It's not copyrighted. It can be freely distributed over the internet by any person, through any means that they see, whether they want to hand out CD roms to people on the street, whether they just want to put it on their website, it's freely available. This is because of the open source philosophy that was behind the concept that Mr Torvalds, whom I mentioned earlier, was very much interested in. But he didn't invent the open-source concept. It had been around for quite a long time. As a result Linux was a product that is in transition. It wasn't something that was put out by a company so much as you have some people who put it out on the Internet first. A lot of other people are looking at it. It's published, and then they played with it and they say they think it's quite good, but it could work a little bit better in this area. I've been playing around with it. I'm a programmer and I've come up with this patch or improvement. This is

proposed to others on a kind of a central basis. There is a central authority in control of Linux, kind of by committee, that takes a look at all these suggested improvements and adopts some of them officially.

Now whilst this process has to be polished up somewhat, it results in Linux being a process that is constantly being upgraded and improved by essentially an army of software programmers around the world in all different countries. Especially when it has the muscle of the communication tool that the internet is, behind it it has allowed it to make vast strides in its user-friendliness, in its usability and in many other respects in an incredibly short period of time. Now, Peter was talking before about figures. Linux is an extremely difficult area to get figures about. I've seen some estimates in the mass media saying that there's an estimated 20 million users worldwide. Now what does that mean? Where does it come from? And what qualifies as a user? It's a huge question. When you are basically talking about an operating system that anybody can download anytime from thousands of websites, because the Linux community online is a very, very active one. It's difficult to say how many people out there actually have it or are using it. And if they are using it, are they *really* using it for serious business or they are using it as kind of play thing or toy, or on an experimental basis. My suspicion is that a great many of the people who are the most enthusiastic backers of Linux have it on a computer in their office, they may be using it and tinkering with it, but at the same time when it comes time to get down to business, they pop open their Windows and open Word and start writing their paper or sending email on another more commercial piece of software.

Now, Linux has come to prominence in the last couple of years because of the kind of exponential force of growth behind it because of the internet, but also because of a numbers of companies who are distributors of Linux. That is to say, there are companies that package the core material (which is a free product) and distribute it to people. And they provide support services for it. That is the most important thing that they do. These distributor companies have gone public on NASDAQ. You may have heard of "Red Hat". It's probably the most well-known of these. Just the fact of these kinds of companies that make Linux their bread and butter becoming part of the main stream of the business world has done a lot for Linux's profile worldwide.

Now let's start to take a look at how this comes to play in China. Operating systems markets are determined by three factors. There are three dimensions to their appeal. First, is their technical quality. How sound are they? How stable are they? How often do they crash? Second, is usability, which I mentioned before. It deals with user-friendliness issues. And the third, is, I think, the most important, the absolute killer of the three, is compatibility. How many people out there are also using this operating system? How much applications software is available for this operating system? This is a big determining factor for most people in their choice of operating system. Obviously, even if Linux is the most user-friendly, the most powerful, the most stable, its appeal, at least at the starting date off the blocks, is going to be pretty weak, if nobody out there is using it, and you can't find any applications to run on it. So let's take a look at China. In China, we don't have very specific figures about what Linux's

situation is in China. Even our number crunching friends, International Data Corp (IDC), say that it's simply way too early to be getting into surveys in that area. I have some figures for you about how Linux stacks up on the server market but in terms of PCs and overall penetration it is very difficult to say. But the driving factors for Linux in China is first of all, that it is free. It's a powerful incentive for a country which is developing and has limited resources in many areas. In fact, what drove Linux's entry into China about four or five years ago was the explosion of Internet service providers who were looking to offer their services at cut-rate prices. Linux right now is primarily used on servers, interconnected computers rather than personal computer systems. That's because you can do this without exposing the end-user to some of its clumsiness and unwieldiness. So for these ISPs a few years ago, who were trying to set up and needed a main frame to run their system and keep all of their people who were dialing into the internet through them using email, Linux was a very good alternative.

The other main driving factor, is what I say the fourth dimension of what drives operating system markets beyond the first three that I just mentioned, and that is transparency. This is a crucial issue in China and I think it's uniquely sensitive in China. Because the problem with Windows in all its different forms is that it is a proprietary product. That not only means that Microsoft owns the copyright rights and that you have to pay licence fees when you want to use it, it also means that the inner workings, the source code, are secret. It cannot be looked at by anyone. Even if you are developing software to run on Windows, you are only privy to information that Microsoft chooses to show you and they consider the inner workings of the Windows system to be a commercial system. The reason why this is a big deal in China is because it creates concerns about security. Government and military bodies do not feel comfortable with the idea that their entire offices and bureaucracies run on Windows NT or its replacement Windows 2000 in Chinese, when there is a whole chunk of this software running on their computer. They don't know what it is. It's a black box. It's completely invisible to them. It could contain what they call a backdoor. A secret entrance that would allow someone from the United States, eg, because Microsoft is a US company, in the situation of war or just simple everyday espionage, to sneak into their system. It's quite possible. Microsoft denies it, vociferously and often. The truth of the matter is nobody knows. This causes a great deal of worry. Now Linux, on the other hand, because it's completely free and transparent, every line of its code is available and can be studied. And this is something appealing to China, not only for security reasons, because they know quite well exactly what's in it and know it hasn't anything to threaten them. It also can help develop their national software industry, because software programmers in China can take a look at it and see how this cutting-edge technology is evolving. This is something that many people feel is going to do something for the human resources that are available for building this fledging software industry.

I'll just give you a quick look at the way that Linux stacks up in terms of servers. This is Asia Pacific figures that include China but are not exclusively China. These are from IDC. These are what operating systems are on servers that are shipped out by the manufacturers. And the manufacturers are using Intel service; these are about nine out of ten. These are the big name brand companies. The leader in the market is Windows NT 1999. Windows NT has 66% of

the market, about two-thirds. Novel Netware is number 2 at 24%. Unix in all different forms is 6%, and Linux comes in at only 3%. That gives you an idea where Linux comes in in terms of the commercial server market, but it might have a much larger slice if you look at people out there who may have downloaded the product and are not using a preloaded one. Also, there are a great many people who use servers that aren't name brand products, but are locally made equivalents. And on those types of servers IDC believes that the figure conservatively could be as high as 10% to 12% for Linux. As with Red Hat, China has its own Linux distributors now. There was an explosion of them last year which began around March. From zero in February 1999 to the end of September last year, we went from zero to six.

The first one to hit the market, in terms of a simplified Chinese version, tailored for Mainland users of Linux, was produced by a company called X-team Linux, based in Beijing. I believe the second one on the market was a US distributor Turbo Linux which is based in San Francisco, but has offices in Beijing. And then there are four others Co-six Linux which is a subsidiary of a state-owned enterprise; Blue Point Linux which is set up by some hackers in Shenzhen; Tom Linux which was set up as a private enterprise in Beijing; and Red Flag Linux which is the most government-supported project to develop Linux in China. It is a product that currently does not have a commercial attachment, because it was created by researchers at the Chinese Academy of Sciences and Software Institute. It wasn't the earliest to get on the Chinese market, it only appeared in September last year, one of the late arrivals. But the Chinese Academy of Sciences Software Institute is planning to spin-off a company called Red Flag Software. And that is going to happen probably in a matter of weeks, I'm led to believe. They are actually looking into the possibility of going IPO either in Hong Kong or in the United States. Now Red Flag Linux got a lot of attention earlier this year. In January there was a news report that raised a big buzz saying that the Chinese government was going to ban Windows 2000 use by all government ministries, and that Red Flag was going to be adopted as a national standard to replace it. That report was completely denied subsequently. But there's a great deal of interest from the government side in seeing Linux developed.

There are hundreds of websites out there where people and programmers exchange ideas about Linux and try to improve it and try to get the word at it. That community is kind of at a fledging level in China. There are websites like this and growing vigorously. Many of them supported by Chinese Linux distributors. But as the internet grows, and the number of users continues to grow at incredible speed, I think we'll see a great deal more recognition of Linux and more acceptance of it. Also Linux, as I said, is continuously improving its quality and it's getting to the point where its graphical user interface (that is the user friendly fun thing with icons that we play around with on our desk tops) is closing the gap with some of its commercial rivals. I'm sorry to say that I don't have any more conclusive figures about what Linux's share is in China but I think the focus is on where it is going from here.

**Peter Lovelock:** Let me introduce Anthony Yip who has become a superstar of the net industry down here based on his successful strategy in the mainland of acquiring interesting content sites and now beginning to position them together. My motivation in asking Anthony to

come and participate in this happened actually quite awhile ago at an I and I talk that he was persuaded to give. He was quizzed about the impact that WTO would have on the way the net market was potentially evolving in China. His answer at the time followed shortly after a question he was given by a banker who said "I've appreciated everything you've said about your strategy, I just don't quite understand where you are going to make any money". To which Anthony's reply was; "Get that man out of here. Are you kidding, this is the net!"

ANTONY YIP,  
FOUNDER  
MY RICE.COM

I'm going to talk about some of the things we are seeing and more importantly about some of the things that we're seeing about what people are doing in the internet industry in China. Probably even more importantly what the people that you don't know about are doing in China. You might have heard about the Charles Zhang of the world and a lot of people who came back from MIT and Stanford to start up internet companies. I think one of the interesting things is that there are a lot of people in China who didn't go to MIT and Stanford and didn't just come back who are doing quite interesting things. We actually started out in July 1999. Our big idea at the time was we were going to buy a lot of websites for very low cost we were going to aggregate them together to become a portal. That was sort of the overall strategy. What we did was acquire fifteen websites. Fifteen websites of critical mass that enabled us to bring together 1.5 million pages together. The interesting thing isn't about bringing it together and building a portal, that's what a lot of people are doing. I think the interesting thing is that the people who are building the sites we acquired are very different what you would normally expect. What they were, were basically a couple of kids or one person who, in a room of their family house with no money, would log on to their computer which they actually owned. They would dial up to an ISP. They would talk about soccer or games or jokes. They would talk about one topic very passionately. They would build a site around that one subject. For example, a site talking about soccer. He would just write about soccer news, soccer teams. He would write about Man U playing a game and a Chinese team playing the game and he would cover it in quite great detail. So this one guy who doesn't have a server, doesn't have any venture funding, doesn't have any staff, has no assets, no company, basically was able to create one of the leading sites for his category. So we found these fifteen websites all basically leaders in their little niche. So you have a number one joke site created by a guy in Shanghai; a number one soccer site created by one guy in Guangxi.

You had all these sites created by all these individual people who had never taken a plane in their lives. They are creating what are really compelling sites enough to generate tremendous amounts of traffic. If you think about it from that perspective, it's really interesting. In Hong Kong we have lots of people raising lots and lots of money saying we're going to be portal this, and portal that. They are all making claims left, right and centre. But in China, people you have never heard of, with not a chance in the world, creating sites that have become successful. And I think that was one thing that we saw was extremely interesting. Because you have for the first time something that is pretty democratic. You don't need to be some rich guy. You don't need to have a lot of funding. You don't have to have a prestigious school behind you. You could be anybody. And they are anybody. They are one of a hundred thousand other people building websites in China. Yet they were lucky or they were skillful, they were able to achieve a very dominant position in their little vertical. So I think that was one of the interesting things we saw early on. It helped us grow to become a large site in China. One thing about the Valley is that there are a lot of companies, there are a lot of successful stories, there are a lot of billionaires,

but the one thing is that wages and salaries of these companies are going up and up and up. So you have it where everyday people are getting offers from other companies wanting to offer them double their money to do the exact same job in a position that is much higher.

That is not being offered to just a few stars, just a few people who are very, very talented, but, it's being offered to everybody. I think that one thing, you have in the Valley is that everybody's got job offers at least if they are in an internet company. So they are all starting companies. We're beginning to see that in China. When we started a company, we were paying everybody RMB3,000 on average. This is in Shanghai. But right now the average salary of our staff (we have about 220 staff) is about RMB7,000 – 8,000. So basically in a period of nine months, the salary has gone up to 250% across the board. And this is not for the most talented guy, the superstar we want to pamper and keep, but is for everybody. For the guy who is average as well as for the guy who is a little bit under average on the team. One of the reasons is because if you are going to build an internet company, people become the most valuable assets. Because there is so much foreign funding coming into the country. Yes, the rules and regulations say maybe this is not clear in black and white whether this is allowed. But there is, right now, in reality a lot of money coming into the marketplace from all over the place, It's from granted money. It's from rich people. It's from speculators. But there is a lot of money coming in. What are you going to do with it? You can put it into marketing. You can buy some servers or you can pay your people. What people are doing is they are finding that this guy really knows his stuff, he can really help us. We're going to pay him the money, just triple his salary. We had this one guy, just a network guy. I don't think he's actually very good, but he's our only network guy, so we have to keep him. When he started he was earning RMB4,000. Then we brought in this cool hacker who used to hack into the Pentagon to take the lead. The other guy felt he wasn't as important any more so he felt down. So we raised his salary to RMB6,000. Then he got another offer of RMB15,000 in a period of 2 months! That's what people are doing right now. They are going around and poaching. There's a company called E Teng, which raised US\$40 million in their first-round funding. They hired a couple of our designers for triple their fee. We went back and hired their designer who basically became number 2 because our designers became their number 1s! So we just swapped designers and their salaries went up more than double! And if you think about it, what it says is it doesn't matter whether these internet companies are successful or not because most of them are going to fail. But the people in these companies are going to be very successful. The employees are going to be earning double or triple their salaries and getting more and more experience. They'll be very successful. A lot of these people who are getting more and more money started saying, hey if those guys can become billionaires and we're earning so much money there's very little risk for us to leave and try to do a start up. Because even if we fail somebody is going to hire us for double the money anyway! You saw that in the Valley and what you're seeing in China is that the same thing is happening but it's happening pretty fast. There is this one guy from E-Tang who was going to join us. He never showed up! He went off and we didn't hear from him for three months. We actually met him one day and found he'd started a university site. It's a campus portal targetting all the University students and he's got 40 people, he's 23 years old. He's just finished school. He's just closed venture

funding from Hang Lung Group, the same company that funded Sohu. This guy who had maybe a couple of months internet experience at E-Tang and was about to join us and never came, went off to start up a company! There's a company called HelloAsia that's an Asia-wide loyalty programme. In its first round it raised US\$20m. It's got a lot of people from Harvard and a lot of very smart and talented people from the loyalty programme (airlines) industries. There are also a couple of companies in China that started doing exactly the same thing that have more clients than they do in China. These companies have no funding. One was upstairs from our old office. Another was a VP from that company who left to go do it and stated that he didn't want venture money. He wanted to make it profitable. Whether that's realistic or not, what you're seeing is having people going out and trying to do it, regardless or not whether they're getting money.

I think that's one of the most interesting things I'm finding. The genie's already out of the bottle. People are already starting to create internet companies. They're working at getting experience in internet companies that are willing to pay them many more times what they would be able to get a few years ago. And the risk has dropped dramatically. There is virtually no risk for them. Their cost of living is the same; very low. And yet the salaries have gone up 8 times. They have the opportunity now to create internet companies and they are doing it!

During the discussion session the following points were raised:

**A participant:** A question for Anthony, if you look at the debate that Bob Cassidy mentioned was going on in the US over PNTR, one thing that's very interesting is that it's Silicon Valley that's offering some of the strongest defence of PNTR. You have all these companies in Silicon Valley and Valley politicians who are really the strongest public defenders of the American interest in China's membership of the WTO. I guess my question for you is given what you've described as the evolution of the net industry in China, what do you think foreign investors and portals are actually going to be able to do in the Chinese market. How much room is there for the foreign players when you have this burgeoning industry. Or, in fact, will the local players get bought up once you get the big players moving into China.

**Anthony Yip:** I think the thing is that the local industry never really existed before. There was never any local industry, never any time when people could create companies. It has always been that you have to have connections. Now you can be anybody. I think that foreign companies are assuming that it's not local competition that's going to beat them up, they are assuming it's the Sinas and the Sohus, the ones that are big and branded. A lot of the local companies are just unknown because they're so young. They aren't really trained in the ways of going to the press to publicise. I think maybe a few years down the road they'll learn about marketing. I think what you're having is foreign companies looking at the rules and regulations and seeing there are none; that everything's very grey. They're saying we'll just go for it anyway and assume that somehow something will just come about. So I think the internet economy in China right now is very competitive and is almost like the Valley. It's so cut-throat.

Right now local companies aren't out to create global products but we might see that a few years down the road.

**A participant:** Why is the Chinese government pushing the internet?

**Bob Cassidy:** Certainly the encryption rules the government started off with were intended, I think, to put some restrictions on a lot of the use of the internet. But that seems to have gone by the board. I'm not sure I can answer that question.

Anthony Yip: I'm not sure if anybody knows exactly where the internet is going and exactly what to do. I guess everybody's just learning what this internet thing's about. Sometimes they push and sometimes they pull. It's very confusing. So you just ignore it and go and compete. One thing that's interesting with all these local people creating companies is that you can have very soon companies that can be globally competitive. As small local companies get more and more exposure to creating things and to the ways of the world, it could be very scary to compete with them. When I talk to them I am always in awe of how much they know and how good they are, how smart they are in their little area. If they ever decide that they know how to attack domestically and want to move into a global basis, you'll find a lot of globally competitive start-ups coming out of China.

**Hyam Bolande:** You've identified the main chorus in the Chinese government but I wouldn't say there was this incredible consensus. I think that with most anything in China, especially with new technologies, there is a type of war going on between different factions and people who want to be cautious here and race ahead there. There's a lot of debate going on. The impression I have is that the Chinese government has an understanding, a sense that the internet is the key to business in the period ahead. And that if they don't get up to speed in this area, with the WTO and with increased foreign competition coming on board, they are terrified that they are going to be completely steamrolled by foreign powers who have already mastered these new technologies that seem to be the key to the future. It is that fear of being completely run over if they don't get up to speed, that is driving the desire for the various govt ministries asking state-owned enterprises whether they are involved in technology or not, to get on-line.

**A participant:** Typically when people make an important decision in their life there's a turning point that leads them to do that. In your case I'm sure you didn't wake up one morning and say I'm going to do Myrice.com. I'd be interested in knowing what led you to start it and, maybe more importantly, what led you to stay with Myrice.com as I'm sure you have had several offers to do other stuff. What is your vision for the future for your company?

**Anthony Yip:** I dropped out from school when I was 16 to go and build a computer game company. I found that building a company was very difficult. So I hired 10 people for free. My lead programmer was a high-school student, younger than I was, from New York. Never been out of New York State. He was from French ancestry. He was doing well until finally he got head-hunted by Microsoft. That put the end to my computer games ambitions! Then I

worked at China Com for 2.5 years. A lot of drudge work doing spreadsheets, understanding what US companies are doing. Trying to explain to companies in China what US companies are, in very simple terms. Then I started a company called Outblaze and then I learned what a lot of start-up issues were about. Finally I decided to do Myrice.com. That's the background. As for the vision, we think that China internet opportunities are very big but it's not just one thing. Because the market could be potentially 70m users you could potentially see a replication of the US internet economy over in China. So it's not just about portals or e-commerce. Those are just two very small segments. It can be a lot of things. So what we're doing is looking at different opportunities and building out companies in those spaces and playing some more diversified bets as to what might succeed in China. We don't really know. In terms of staying, well it's a lot of fun to do this. I think if it's a lot of fun and your shares are not that small then it's fun to stay!

**A participant:** On Linux you mentioned the server area. Bill's still very much got the desk-top captured and I was wondering in your research whether you've actually looked at who's got tools. Are guys looking at being able to use commercial tools on a Linux programme to be able to capture the huge desk-top, rather than simply the server market?

**Hyam Bolande:** It could be said that the five home-grown companies that are Linux distributors have their eye more on the desk-top than Turbo Linux, the US company, which is the first foreign company to get into the Chinese market in the native language. One of them has come up with a very interesting concept which is a platform that you can run on a Windows platform, a programme that you launch in Windows that creates a shell that allows you to play around with Linux and see how you like it. I think this product in itself may not be commercially useful but it is interesting to give people a test-drive. I think you're going to see a lot more development of software coming on line next year. Not so much in Chinese language. Some big players are investing heavily in getting an Office suite out for Linux. Once these tools are on the market obviously Linux becomes much more attractive option for the individual user and for the desk-top.

This is a matter of concern for a lot of people in the Linux movement, like the people at Red Hat. What the Chinese were looking for when they first started to play around with Linux (and I'm talking about the Chinese Academy of Sciences which produces the Red Flag version), starting with a project in 1989, was to develop an indigenous Chinese national operating system that could solve all their security problems. That project laboured on for many years and it has continually bumped up against the same problem which is that as soon as they get anything done it's behind the cutting-edge of global technology. Around 1994 when they first started to get exposure to Linux, some of the bright people at CAS said, hey, this is cutting-edge technology. Why can't we just piggy-back on this. We'll use this as a basis to design our own Chinese national system and be closed source. Red Flag was originally set up to produce a closed system. This is my personal opinion. The way this is called in the Linux industry is fragmentation. As soon as one person takes Linux and makes additions or modifications to it without making those modifications public you've branched off from the global mainstream of

Linux and the system becomes closed. The problem is that as soon as you do that you lose the benefit of those constant improvements are adding to it. The Chinese have come to realise that now. Some are still very caught up in the nationalistic idea of security but very quickly it's becoming obvious that as soon as you splinter off from the mainstream you're facing obsolescence in a very short period of time. It's not just a question of fragmenting and coming off the cutting edge of technology, it's also an issue of losing compatibility. If Oracle comes out with a really excellent word processor, database or spreadsheet for Linux, is it going to be able to operate on this Chinese version? Not necessarily. It may do. But even if it does, will these big software companies provide you with technical support? No.

GPL represents the code the surrounds usage of Linux. The Linux kernel which is only about 3% of the total code that's used in the system which was written by Linus Torvalds is copyrighted by him. He extends it to other people under conditions. You can use it, modify and distribute it on the condition that everything you do is published. If China splintered off I guess it would be a violation of that but who's going to sue them.

**Peter Lovelock:** Does the WTO agreement make any difference whatsoever? To Bob the question would be for WTO and, more particularly, for foreign companies to benefit, how important in reality is an independent regulator in the telecoms sector? I don't see this emerging for quite sometime. To Hyam the question would be from an operating systems perspective, is the WTO agreement not too late. Microsoft would have loved some kind of IPR restriction a long time ago so that they could actually charge for licensing fees. To Anthony, the question comes back to the rules and regulations, again does WTO actually make any difference? You mentioned what I see, a lot of money flooding into the China market. People on the outside go on about the differences between ISPs and ICPs and regulatory restrictions. I don't actually see people stopping because of these supposed grey areas. Does WTO really make a difference in that area?

**Bob Cassidy:** with respect to issues such as the independent regulatory authority, I think this is going to be one of the chief problems in the agreement. It certainly was one of the major contentious elements of the negotiations. Originally China had agreed that there would be no restrictions on gateways and it was only later on that they introduced that as someone must have explained to them the difficulties this was going to create. Part of that problem resulted from the fact that MOFTEC was doing the negotiations and not the Ministry of Information Technology. I think that will be one of the chief problems. A solution was to make sure that any gateway that existed would be controlled by an independent regulatory authority. And if you follow these arguments to their extreme, once they begin to implement the provisions, this might be one of the areas where there is a first dispute resolution.

The problem stems from a practical approach to these issues. That is to what extent will they take these complaints to the WTO. Quite frankly it's been an industry that's not been known for being very aggressive and public in its complaints. Since governments are ultimately going to have to bring these cases to the WTO then to what extent will companies complain and will they

be prepared to stand up. I suspect that if they do they'll probably bring complaints to the United States so that the US brings a case. We're going to have to see how this whole thing works out but it's a step in the right direction. As in any law it all depends to what extent anybody is going to pursue implementation of that law.

**Peter Lovelock:** Microsoft is a champion of something called the BSA (Business Software Alliance) which champions IPR enforcement. It has been suggested that Microsoft being one of the most flagrant abusers of the principles underlying BSA for quite sometime as it packaged Windows into the computers that were sold and basically dumped into the Chinese marketplace. An international lawyer once said to me that he was amazed that these arguments were never entered into Microsoft's dispute with the Justice Department. Does WTO change Microsoft's ability to charge for these things and does it change who's going to be the dominant operating system.

**Hyam Bolande:** Microsoft advocates strict enforcement of intellectual property right protection. It is my understanding that the company's viewpoint is that WTO is a good thing as it will bring to China the kind of international rules and practices and norms that include greater protection of intellectual property. That's a good thing for them. There is a kind of sense that in a few more years Microsoft could get a much greater stranglehold on the market. As it has in other markets in China. On the other hand one thing that many people haven't noted, one of the things that really drives operating systems markets is who has the greatest market share. Whoever that is, even if their product is horrible, is going to have a big advantage. Everybody wants compatibility. To some degree piracy has served Microsoft's end in that respect. It's basically weaned millions of users onto Microsoft. Even if they've obtained a copy through fraudulent means, they're used to using it and therefore there's going to be some sort of difficulty in switching to a new system with retraining etc. In a way Microsoft has the best of both worlds in that respect.

**Peter Lovelock:** WTO supposedly means access for foreign companies. Does it change how companies like Myrice conducts its operations?

**Anthony Yip:** It makes things very clear whereas now it's very uncertain. Right now because everybody's saying that internet is going to be so big if you don't attack the marketplace you'll never have the chance to win. Regardless of the risk you go into the marketplace. That's what foreign and domestic guys are doing. They're doing it for the opportunity. But I think right now everything's very uncertain, so if there's anything that China wants to do it'll make a new rule against it. Right now there are no rules. WTO will change that. Technically everybody is supposed to get an ICP (internet content provider) licence in China. There's no real ICP licence however. There is something that stands for an ICP licence but it's not a true one. The WTO makes it clear that there's no turning back, you can't put down rules that restrict things you don't like. Psychologically it means there's no turning back.

**A participant:** Over the past two years in Commerce Net we have observed a shift. People used to download the research off the US website and predominantly it came from Hong Kong. Now I can say that at a factor of 10 to 1 it's distributed throughout China. So we see the Hong Kong government's strategy and belief is still that China somehow needs Hong Kong as an entrepreneurial portal, a gateway to interpret China to the world. I'm not sure that's true right now and I'd like to hear the panel's view.

**Bob Cassidy:** I think China opening up makes it more difficult for Hong Kong. I think Hong Kong has been that funnel for a lot of the trade that takes place and by opening up China you're going to change the whole pattern of trade. Shanghai and other ports will develop further. No longer will China be so dependent on Hong Kong. I don't want to say too much on the internet and telecoms side, but at large it'll change everything. I don't think Hong Kong's going to go into decline but I think other areas are going to go further.

**Anthony Yip:** I don't think the Hong Kong government really knows that it's doing. The reason I say that is because on the internet scene, China is China and Hong Kong is Hong Kong. The guys in China have no idea what people are doing in Hong Kong and they don't care. There are a lot of people developing companies across China. The centre of media is in Beijing. You need to be in Beijing to be in the internet industry. I think one thing that Hong Kong can do is, because it has fairly transparent laws and a strong financial system is to try to nourish itself as a place where Chinese companies go to list. But if you put in restrictions into your regulations, you're just going to have people trying to go elsewhere. Right now the China's Technology Board hasn't really been developed but if it really takes off people are not going to bother to come to Hong Kong. I think Hong Kong's hope is building a NASDAQ for China/Asia. Time is not on their side. There are China markets developing. Hong Kong's so small and there's so much competition. If the pie is small and competition is fierce you're probably not going to make money. If your pie is big you might be able to get your little sliver of something. I think if Hong Kong can get a critical mass of people on their finance and technology board then it'll be very strong.

Question: [BETWEEN TAPES]

**Bob Cassidy:** I cannot see how under the schedule that they negotiated, they will be able to have those limitations. The scheduling on services is negative. Once you've identified with the scope of coverages (and it is comprehensive under the telecommunications area) is schedule those exceptions where they're not going to open up for market access or where they're not going to provide national treatment. It's a beautiful schedule, because the converse is true, is that everything else is open. And that was done, as I often say, with malice of forethought. So unless the Chinese scheduled those exceptions, they don't exist.

**Peter Lovelock:** Can I indulge and put the question straight back at you? If Unicom has been trying to get an international licence for six years. It's been battering down doors, it's been begging, it's been bribing; it's been blackmailing and it can't get that international licence. And

then it gets its international licence to run IP traffic. But it's got its mobile network, it got three fixed networks and it wants to integrate things together. It's got a gateway where its allowed to run IP traffic out. How does anyone stop them doing both, even it got a licence to run IP only?

**A participant noted:** I guess in the case of the licences the way we understand it within China, locally if you want to be able to do voice services, the type of core infrastructure that they have to deploy is something that runs, as you said, over IP. So what that pretends, for example, is there are alternative technologies such as ATM, frame-relay etc, that could as well enable. Actually if you give me a few minutes, I can explain to you something that the leaders in China have done that is actually extremely smart. What they've done is they've already got China Telecom operating over a normal environment as far as telecom goes. Now what they said is OK we are going to create additional competition within the market place. But to do that we are going to put some restrictions on how they can achieve that. For example, we are going to give you the right to do voice telecommunication, which is going to compete with the incumbent, but to force you to innovative, we are going to force you to use one fabric, which happens to be IP. Now what happened is none of the equipment manufacturers, when they did that, were ready to deploy carrier-scale voice over IP services. So they forced both the service providers to come up with innovative solutions as well as the equipment manufacturers to respond to this. So they did the first trial with voice over IP which wasn't too successful, because the products weren't scalable, the quality wasn't good, etc.. So China Unicom did these trials in a few cities around China. Now, the conclusions of that first trial was really we are going to need a multi-service core infrastructure which happens to be ATMS. But the licence agreement that we have with the MI to provide services is to provide voice over IP. So we're going to provide VOIP running over ATM. So really, at the end of the day, the leaders at the MII have been extremely smart in how they actually licence the operators to offer their services. In return the licence operators are very smart as to how they are actually going to be implementing that.