Capture the future of the internet: broadband development in China

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Abstract

'Broadband' is the term used for 'always on', higher speed access to the Internet. This additional bandwidth, over and above the typical 56kbps provided by a standard dial-up modem, allows new value-added services to be delivered to consumers and businesses. Consumers will benefit from video and audio streaming; new forms of interactive entertainment and new ways of learning over the Internet, and businesses stand to benefit from productivity improvement.

‘Broadband communications refer to the technological environment that permits the use of digital technologies at maximum levels of interactivity’-----Italian Broadband Report, 2002

Through our observation, the Chinese Government believes that rapid roll-out and adoption of broadband across China is important to both its social and economic objectives, much strength is mobilized by the government promoting the broadband industry and market recently.

We believe there is no 'magic bullet' that will deliver a step change in broadband roll-out and usage in China. Instead, we need to stimulate a virtual circle in which demand and supply grow in parallel, each reinforcing the other. Market players will be the main drivers of the broadband economy, but government can influence the pace of change.

In this article, we first take a look of the broadband infrastructure construction status in China, then we forecast the broadband application development, and ultimately make several recommendations to the government on a broadband development strategy.

Keywords: Broadband, Telecommunication, Interactivity, Policy, Government
1. ‘Broadband’ and broadband economy

Defining broadband is not as simple as it seems since an exact definition would become exclusive and would tend toward obsolescence as technologies progressed. So speed standards such as 1.5 Mbps transfer rates and above are not widely accepted as a definition for broadband.

For that reason, functional definitions are generally used in many researches and papers for broadband. The key is access speeds that allow voice, data and video to be delivered in an interactive environment.

The U.S. Federal Communications Commission (FCC) defines broadband as ‘A descriptive term for evolving digital technologies that provide consumers a signal-switched facility offering integrated access to voice, high-speed data service, video-demand services, and interactive delivery services.’

To clearly differentiate broadband from narrow-band, the access speed of the broadband should never be below 200Kbps.

There are evidences that Internet connectivity is taking an impact on business competitiveness profoundly. Particularly, specialists expect e-commerce to enable enterprises to lower costs – in stock, production, selling and distribution. We expect this impact to become more important as we move into a broadband world. This move from narrow-band to broadband has a profound effect on Internet usage, resulting in higher connectivity and enabling new sorts of services.

The two factors of ‘higher speed’ and ‘always-on’ of the broadband network enhance the user’s experience of the Internet significantly. Users therefore spend more time online and undertake more activities. Analysis by McKinsey suggests broadband users spend nearly four times as long online in the U.S.

The additional capability of higher bandwidth also provides scope for new value-added services not feasible over narrow-band for all kinds of customers such as government, business firms and home/individual consumers.

Taken together, these factors suggest that a broadband economy is likely to be one with a higher degree of connectivity, higher levels of e-commerce activities and a wider range of value-added services taking place across the net. We expect broadband will be a significant growing industry worldwide over the coming years.

2. Broadband in China

While both U.S. and Japan have been suffering economic recession, China has successfully kept its GDP growth higher than 6%.

Stimulated by necessary reform, telecommunications are the fastest growing industry in China. By the end of 2001, the total subscribers including wired and wireless has reached 350 million - China appearing to be the largest telecom market around the world.

Since the late 90s, China has become aware of new opportunities that broadband could bring. The central government wants to take an advanced position with broadband in next wave of the information age.

[1] China has adopted a $151 billion, five year investment in telecommunications, focused on extending high-speed connections.
The statistics in Picture 1 show that Asia-Pacific has the highest broadband penetration rate. Unfortunately we can’t obtain detailed figures about China. But since China is the economic locomotive in the Asia-Pacific area, we strongly expect a huge broadband subscription development within the next few years.

2.1 Overview of the China Broadband infrastructure

Two state ministries constructing the optical backbone of China separately – The Ministry of Information Industry (MII) and The State Administration of Radio Film and Television (SARFT). By the end of 2001, MII had deployed 1.46Mkm of optical network mainly for voice and data communication services covering all provinces and cities. SARFT had deployed 30,000 Km of optical cable mainly for cable-TV delivering, which covered over 30 major provinces and most cities, and the switch capacity at main segments reached 1,600Gbps.

The transfer and switch capacity of the total backbone of China has largely exceeded current market demands of both voice and data. Through our forecast, the network infrastructure could support all the developing needs of various broadband services until 2005.

Although the technology used in backbone construction is exceptionally advanced and the capacity could support a huge amount of broadband services and data transfer, the quality of the access network, mainly the PSTN (Public Switched Telephone Network) is relatively poor compared with other countries. Due to the lack of government financial budget, most access lines were put into use a long time ago and haven’t been overhauled for several years. The poor quality of the line stops it from carrying the signal at a high transfer rate. So several broadband access connections based on PSTN, such as ADSL (Asymmetrical Digital Subscriber Loop), could only be offered in limited districts where the condition of the PSTN line is good enough.

2.2 Main Broadband operators in China

The communication network owner, MII, had reformed to be market oriented in the early 90s, while the SARFT, as the owner of the national cable-TV network, is still operating largely through government control.

Statistics from 2001 show the total revenue of MII owned network as more than RMB 350bn ($42.7bn), while the HFC (Hybrid Fiber Coaxial) network brings only RMB 8bn ($0.98bn) to SARFT. From the middle of 2001, SARFT began to push reform actively and reconstructed the organization’s structure to face market competition directly. In February 2002, SARFT has established a nation-owned flagship corporation called China Radio Film & Television Group to fully conduct all kinds of business including broadcast, television, film, network services, etc of SARFT.

The central government gives positive comment on the organizational reform of SARFT, and publicly support the administration to stimulate broadband application service business on their Cable-TV network infrastructure.

Until the end of 2001, network operators were all operating on MII’s communication network infrastructure including China Telecom, China Mobile, China NetCom, China Unicom and several local provincial operators.

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China Telecom monopolized the market from the emergence of the telecom industry. As the reform pushed on positively by the central government, China Telecom was recently urged to split. New China Telecom holds the original network operation businesses in the 21 provinces of south China. The resources and businesses in the other 10 provinces of the north integrated in New China NetCom, which has begun formal operation from 16th May, 2002. Former China Telecom was the major ADSL access network provider. After the split, New China Telecom and New China NetCom are both providing customer’s ADSL access services. Both of the two telecom giants have gained the permit on all kinds of basic telecom network operations except mobile network operation, so that a new round of competition will begin soon.

Through the broadband service market, China NetCom is the most vibrant access and service provider. After integration with north China Telecom, New China NetCom also spawned an independent firm whose business is focused on broadband data transfer. It is this firm which announced its “CNC Connected” plan recently to provide high quality broadband access and value-added services to the 1,000 highest ranked office-buildings covering the biggest cities of China.

As the last potential entrant to the broadband service market of China, SARFT not only possesses a complete broadband network on its own, but also it is a major shareholder of China NetCom. Thus even without formal approval by the central government to develop a data transfer business on its own network, SARFT could easily penetrate the broadband market through China NetCom to accumulate both operation experience and a customer base. Once the reform of the organization eliminates the biggest blocks in its growth, SARFT could be the most powerful rival to the existing operators.

What’s more, since the media of China mostly serve the government, telecom firms have little opportunity to enter the content and entertainment fields, which are monopolized by SARFT still.

2.3 Market demand of broadband services

With the total Internet user base exceeding 33 million; China has become one of the largest internet markets around the world. However, compared with a china population of 1.3 billion, the Internet usage rate is less than 2.6%. A huge development potential of this market is still on the way. Picture 2 shows the growth trend of Internet users in China.

On the other hand, the education level of internet users is diversifying from higher grades to a mixture of different grades, which are showed in Picture 3, indicating the users are dispersed to the masses of society.

With the fast growth of Internet users and diversification of the different social levels, consumers apparently need faster access speed and more colourful services.

Although the data transfer capacity of the network could easily support the great increase in demand, and the government is promoting the broadband project actively, the real access via broadband interface is hovering below 5% in the three biggest cities of China. Obviously, subscribers would not be satisfied paying broadband access fees monthly just for page browsing or e-mail sending that could be well done via narrow band access. In our opinion, the low broadband access ratio is due to the absence of the broadband application and contents. In other words, ‘no traffic on the road’ makes the access rate of broadband hard to gain a rapid growth.

Through our observation, we forecast six kinds of services that could probably meet the broadband

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[1] China has adopted a $151 billion, five year investment in telecommunications, focused on extending high-speed connections.
market demand of China, providing various services to different customers defined as government, enterprises and home/individual consumers. Each service could satisfy specific customer needs. The services are listed below:

- Video on Demand
- Interactive real time gaming
- Interactive video conferencing
- Interactive Tele-education
- E-commerce
- Community information services

Table 1 shows a demand matrix of these services.

2.4 SWOT analysis of current broadband industry of China

The current situation of the China Broadband industry could be well concluded by SWOT analysis showed in Table 2.

3. Recommendations to the Chinese government

A broadband future is seen as a national objective by many countries:

- In Europe, E-EUROPE 2005 ACTION PLAN (SEVILLA 21 JUNE 2002).
- In the United States, government funds have been directed to creating a "next-generation Internet".
- In Singapore, the government has played a leading role in creating the "Singapore One" nationwide broadband network not only as a way of delivering its services to its citizens, but also as a way of establishing a lead for the city state in the global information economy.

As discussed above, we indicate that the Chinese broadband industry is at a very early stage, and it is unclear whether or not market mechanisms will eventually be able to deliver broadband services to all who want them. Against market uncertainty, what role should the Government play in assisting development of the broadband market? We suggest three main themes for Government strategy on broadband:

3.1 Provide leadership

The Republic of Korea leads the world with around one third of households connected to broadband (see Pic.1), either by cable modems or by ADSL.

Behind this successful uptake of broadband Internet, one of the fastest growth rates in the world, lies the Government's strong policy drive. This involved drawing up a long-term plan for the broadband Internet infrastructure back in 1995, and implementing various information projects aimed at creating demand for ICT (Information and Communication Technologies) services.

Considering the success of the Republic of Korea and Canada broadband industry, the Government should set out a goal for broadband in China, in order to emphasise the central significance of broadband to future China competitiveness and give a focus to the work of industry and rule-makers. The aim should be to ensure that as the broadband market develops globally, China’s economy is at the leading edge.

3.2 Continue to drive forward competition in the supply of broadband infrastructure and

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Government should recognize that competition should come from several sectors, including cable, DSL (digital subscriber lines), wireless, and digital satellite. The best thing we can expect is that the government can create a level playing field of cable, telephony, wireless, and other service providers, all of which are subject to vastly different sets of rules and policies right now.

But we must understand that every revolution or policy change in China needs time and a special Chinese route. Recently, we strongly welcomed the government pro-competitive approach for broadband roll-out. Some key measures are already in hand to strengthen competition, yet these should be driven forward as a matter of urgency. The China Telecom’s splitting by MII last year is quite helpful in this endeavor, and we are encouraged that the issues are finally receiving a great deal of attention among policy makers. However, we are a long way from achieving a regulatory climate that will encourage investment and marketing in broadband.

By executing the ‘Management regulation on foreign investment in telecom corporations’ established at the beginning of 2002, foreign investment will be allowed to enter the China broadband market. This could obviously re-enforce the competition in this field. Customers could expect more colourful applications and better service qualities with foreign investment entering China.

3.3 Tackle barriers to the growth of broadband market and stimulate broadband service demand at the same time.

Currently, the biggest duty of China’s government is how to make the market shift from supply-push to demand-pull. Competition, facilitated by the actions described above, will be the major driver of broadband roll out. However, we should highlight four barriers that may hold back market development:

- Low level awareness about the benefit of broadband;
- Demand for broadband services is often fragmented;
- Skill gaps may hold back both broadband roll-out and content development;
- Less private investment in the Broadband industry.

Recommended actions to tackle these barriers are set out below.

**Low level awareness about the benefit of broadband:**

Most broadband users came to see the benefit only after having used narrow-band services. So driving forward the country’s online program is vital. For instance, UK goes far ahead of other countries at this through developing “UK online centres”. The centres are based on communities and designed to meet the needs of local people who have low or no ICT skills or access to ICTs. Over 600 centres had already been set up by 2001, and this figure will rise to at least 6,000 by the end of 2002. The UK Government will encourage UK online centres to have at least 2 Mbit/s connections in order to demonstrate the benefits of broadband.

Therefore, we recommend that China should develop an advocacy program to inform and encourage central government to make broadband a core component of their e-government agenda. The public sector has the potential to be the major broadband consumer and driver of broadband demand by employing broadband applications and content. Such services as distance learning, telemedicine and interactive governing will require broadband to allow citizens to realize their benefits and will improve the whole country’s awareness about the benefit of broadband.

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Demand for broadband services is often fragmented;
Concentrations of demand for broadband services in metropolitan areas (the largest cities, such as Beijing, Shanghai, Shenzhen, etc) are likely to be well provided. In rural areas, however, there may be market failures – which mean market action may not deliver optimal results. The only way to sort out this problem is by developing a strategic approach at national and regional level. In China, this kind of work can only be done by the government. For example, government at all levels – central, provincial, city and county – could give broadband a powerful boost and improve services to the citizenry by committing to e-government. Imagine the capability to renew driver’s licenses, file forms, etc. To spur the rollout of broadband to under served areas of the country, the government could leverage its status as a prime customer to provide the incentive to providers to work to close the digital fragment.

Skill gaps may hold back both broadband roll-out and content development
Another key constraint on the successful and timely roll-out of broadband networks could be a lack of skilled people, both to provide the content requirements of broadband applications and to install and maintain the network infrastructure. The digital content industry is expressing increasing concern over the availability of skilled labour to meet the demands of the sector. Businesses are not getting the right people with the right mixture of knowledge and skill. Local government should make some educational strategic policy for universities, colleges and extent-educated schools to increase certain skill and technology training courses.

Less private investment in the Broadband industry.
Industry losses over the past two years and massive devaluation of some of the key players have been anything but ordinary, leaving a number bankrupt and making it difficult for those remaining. Obviously, China should encourage new investment in Broadband networks and services through tax and policy incentives, especially for the deployment of broadband to under served communities and to accelerate the development of next-generation services.

4. Summary
To sum our opinion up on the Chinese broadband industry, the benefits of broadband roll-out are not yet quantified, and the costs of immediate action to pump-prime the market seems high. Therefore it is reasonable to keep the situation under review rather than intervene before it is fully clear how the market will develop.

As it was discussed above, information on many aspects of demand and supply in the developing broadband market is patchy, and the market is at a very early stage. From our analysis, we expect 6 kinds of broadband services to be deployed and developed within the next 1 or 2 years, and the customers of these services will cover a wild range from government to home/individual consumers.

Considerable work is needed to ensure that the government has accurate and up-to-date information of the broadband market as it develops both in China and worldwide, so they can judge whether market intervention may be necessary, and whether the benefits of any intervention would outweigh the costs.

Tables and Figures

[1] China has adopted a $151 billion, five year investment in telecommunications, focused on extending high-speed connections.
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Pic.1: Broadband deployment, subscribers per 100 inhabitants (Dec. 2000)
Data source: ITU the development of broadband access in OECD countries.

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**Pic.2: The total internet user growth trend in mainland of China**
Data source: CNNIC, internet survey Jan. 2002

**Pic.3: The education level diversification during 5 years**
Data source: CNNIC, internet survey Jan. 2002

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Table 1: The demand matrix

<table>
<thead>
<tr>
<th>customers</th>
<th>Home/individual</th>
<th>government</th>
<th>enterprise</th>
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<tbody>
<tr>
<td>Video on Demand</td>
<td>Need</td>
<td></td>
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<tr>
<td>Interactive real time gaming</td>
<td>Need</td>
<td></td>
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<tr>
<td>Interactive video conference</td>
<td>Need</td>
<td>Need</td>
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<tr>
<td>Tele-education</td>
<td>Need</td>
<td></td>
<td>Need</td>
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<tr>
<td>E-commerce</td>
<td>Need</td>
<td></td>
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<tr>
<td>Community information service</td>
<td>Need</td>
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Table 2: The SWOT analysis of current China broadband industry

<table>
<thead>
<tr>
<th>STRENGTHS</th>
<th>OPPORTUNITIES</th>
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<tbody>
<tr>
<td>- Comparatively large amount of narrow-band users;</td>
<td>- Exploit China large market for Broadband;</td>
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<td>- Largest potential Broadband market of the world;</td>
<td>- Encourage infrastructure investment to increase coverage and competition;</td>
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<td>- Relatively big investment(^1) from center government;</td>
<td>- Exploit content, applications and services development to drive demand;</td>
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<td></td>
<td>- Harness Broadband for more effective and efficient public services;</td>
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<td></td>
<td>- Aggregate public sector procurement to support Broadband rollout;</td>
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<td></td>
<td>- Boost education and the ICT skills base;</td>
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<td></td>
<td>- Increase China innovation, growth and competitiveness;</td>
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<td>- Make China more attractive for inward investment;</td>
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<table>
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<tr>
<th>WEAKNESSES</th>
<th>THREATS</th>
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<tr>
<td>- Low percentage of narrow-band users;</td>
<td>- High cost of capital limits infrastructure investment;</td>
</tr>
<tr>
<td>- Low level of e-commerce activity;</td>
<td>- Lack of new content and applications inhibit take-up;</td>
</tr>
<tr>
<td>- Low level of competition at the network and services provider level;</td>
<td>- Low level of take-up delays content development and innovation;</td>
</tr>
<tr>
<td>- Comparative high price of both Narrow-band and Broadband access;</td>
<td>- Unbalance regional economy leaves rural and poor areas commercially unattractive and unserved;</td>
</tr>
<tr>
<td>- Access limited to some big city and urban areas with rural areas commercially unattractive;</td>
<td>- Unclear government policy.</td>
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<tr>
<td>- Low level of awareness of Broadband and benefits of Broadband;</td>
<td></td>
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</tbody>
</table>

\(^1\) China has adopted a $151 billion, five year investment in telecommunications, focused on extending high-speed connections.
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4. Galit Cohen, Peter Nijkamp, ‘ICT, the city and society: an analysis of perceived opportunities of urban ICT policies in Europe’, Tinbergen institute discussion paper, TI 2002 -030/3