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Reshaping APEC for the Asian Pacific Century -
Priorities and strategies

Platforms for IT productivity

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1. INTRODUCTION

What should be the priorities and strategies to reshape APEC for the Asian Pacific century?

APEC was founded as an informal ministerial-level dialogue group with a mission to support trade liberalisation. The global program to build open markets has expanded and APEC's focus now needs to be on wider determinants of sustainable economic growth and widely enjoyed improved living standards. Infrastructure – physical, intellectual, societal and political - is the core of what is needed for this purpose and should rightly be a priority in APEC policy initiatives.

In particular, telecommunications platforms will be crucial for the development and the competitiveness of APEC members, with an efficient "information system" central in the reshaping of the region. This expanded vision is reflected in APEC's transition from a focus on "*Asia Pacific Information Infrastructure*" to the "*Asia Pacific Information Society*".

However, at the risk of seeming old fashioned, the primary focus needs to be on getting the information *infrastructure* right before hoping for the *information society*. This accords with the conference purpose: what should be APEC's focus and discussions in terms of platforms for IT Productivity? Can APEC assist members to build the new bases for growth and how?

The high-level objective of APEC discussions in the area of telecommunications is to improve telecommunications and information infrastructures in the Asia-Pacific region by developing and implementing appropriate telecommunications and information policies that will stimulate investment and innovation while delivering sought-after low cost services to consumers. In particular, this involves:

- assisting developing economies reform their policy and regulatory structures; and
- matching this regulation to the market developments of new technologies and convergence.

Members of the Telecommunications and Information Working Group have been working towards implementing open trade and investment opportunities in the region. This is clearly evidenced by the report prepared in 2004 by the Australian APEC Study Centre: *A Stocktake of Progress Towards the Key Elements of a Fully Liberalised Telecommunications Sector in the APEC Region*.

One of the most positive conclusions of the report was that APEC economies were successfully working towards reducing telecommunications trade barriers and that it resulted in increased accessibility and the long-term affordability of telecommunications access in the region, particularly for people in developing countries. In other words, the trends were towards more and more satisfying market performance outcomes ("the targets").[1] The good results were largely attributed to fully liberalised markets – or at least a trend towards full liberalisation of the telecommunications sector in the APEC Region.

Having had some success in this area, where to from here? Celebrating the first decade of APEC, Alan Oxley ventured the following views:

> *The future of economies in APEC depends upon development of effective free markets in the region. This will maximise the opportunities for growth, increase prosperity, raise standards of living and improve security: nations that are prosperous and interdependent usually live in peace. APEC's capacity to encourage the effective operation of markets among member economies is needlessly constrained by the tendency to date to focus on trade liberalisation. There is more to do than reduce trade barriers to get markets working efficiently. It would more effective if APEC deliberately adopted the strategy of becoming an agency to promote free markets, rather than just free trade. […]*
>
> *From the wider standpoint, the broader goal is to get markets to function better. Removing trade barriers is important. But in a number of economies there are greater impediments to the effective operation of the market than trade barriers. These include restrictive business practices, cartels, controls on distribution and monopolies. There are concrete policy problems such as how to establish privately-owned infrastructure and improve competition law.*[2]

Looking toward the second decade, the Chairman of the Australian APEC Study Centre continued by saying that there was no need for APEC to try to become an operational agency, that it should stick to policy advice and lend its political weight to policy solutions. In the area of telecommunications and IT platforms, the public policy question for the third decade of APEC is likely to be about is finding the right regulatory touch – applying appropriate remedies only where needed, and bringing together economic efficiency and social policy considerations.

In this vein, in this paper the following questions are addressed:

- How is telecommunications and information technology ('telecoms and IT') important? What is its impact on economic growth, social/distributional issues and political/governance questions? (**Section 2)**;

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1 These targets included lower Prices; Increased Teledensity; Investment; Globalisation; and Bridging the 'Digital Divide'.

2 Alan Oxley, APEC - The next 10 Years, Australian APEC Study Centre Issues Paper 16, presented the APEC Study Centre Consortium Conference "Towards APEC's Second Decade: Challenges, Opportunities and Priorities" held in Auckland 31 May- 2 June 1999.

- What has been the telecoms and IT experience in APEC member countries, relative to rest of the world and to each other? (**Section 3**);

- Where are things going in the telecoms and IT area? What developments can we expect and what will be their fruits? (**Section 4**)

- Having established that telecoms and IT has an important contribution to make on a number of fronts, what is the appropriate approach to public policy and regulatory practice in this area? How can competition and social policy objectives be met while maintaining incentives for substantial new investments to exploit technological developments? (**Section 5**);

- What should be the role of APEC in the telecoms and IT area? (**Section 6**).

2. THE IMPORTANCE OF TELECOMMUNICATIONS AND INFORMATION TECHNOLOGIES

The influence of telecoms and IT on the economy and society is unique in at least two ways: ubiquitous relevance and rapid technological change.

- **Ubiquitous relevance**: unlike many technologies that are relevant only to specific sectors of the economy, telecoms and IT touches virtually all businesses and most individuals, with the potential to increase productivity in all sectors of the economy. This ubiquity of relevance does not in itself make telecoms and IT unique. For example, electricity was similarly pervasive (although not to the same extent) when introduced in the early twentieth century. Nonetheless, telecoms and IT becomes distinctive when combined with the second feature, which electricity does not share.

- **Rapid technological change**: the pace of telecoms and IT technological change that is driving productivity growth is of an order of magnitude faster than in any previous wave of technological development. The industry rule of thumb – known as Moore's law - is that computing power purchasable per dollar spent doubles every two years[3]. Similar trends are at work in telecommunications e.g. very sharp falls in the price of data communication per kilobit.

These two factors give telecoms and IT the potential to have an economic impact more profound than previous technologies.[4] The evidence of this occurring is examined in this section.

2.1. ECONOMIC GROWTH

Recently, the OECD examined differences in, and sources of, growth patterns between member countries:

- Three countries – Australia, Ireland and the Netherlands – registered markedly stronger trend growth of GDP per capita over the decade 1990-2000 compared with the 1980s.

- Several other countries also experienced a significant improvement. These include the United States, where trend growth of GDP per capita accelerated strongly in the second half of the decade.

3 The original quote from Gordon Moore refers indeed to 2 years and not to 18 months, as is frequently argued. Regardless, the point remains: it is that your very average desktop now incorporates computing power affordable only to the Pentagon and Nasa in 1970. Moore G, 1965, "Cramming more components onto integrated circuits", Electronics Magazine, Volume 38, Number 8, April 19, 1965, page 4.

4 Turner A, 2001, Not the e-conomy, Prospect Magazine, Issue 62, April 2001.

- A pick-up in trend growth in the second half of the 1990s also occurred in Finland, Canada, Greece, Iceland and Sweden.

- In contrast, the growth in GDP per capita in many other OECD countries, including Japan and much of Europe, slowed in the 1990s.

Reviewing the empirical data on productivity in its member countries, the OECD concluded that:

- the divergences in growth were real and could not be explained by different measurement techniques;

- that none of the traditional factors (the amount or productivity of labour or capital, or growth in multifactor productivity (MFP)) stand out as being the single most important growth driver in all OECD countries

- a prime new factor driving growth in many countries is telecoms and IT.

In its analysis of what it called the 'new economy', the OECD had particular regard to:

- **New capital**. Telecoms and IT hardware and software were the most dynamic areas of investment in the 1990s, thanks to rapidly falling prices and the growing scope for application of IT. The contribution of telecoms and IT investment to growth over 1995-99 was much larger in the United States than in most other countries.

- **Multi-factor productivity**. MFP growth increased in several OECD countries in the 1990s. In some countries, such as the United States and Finland MFP growth partly reflected rapid innovation in telecoms and IT. In new industries, MFP growth was partly due to start-ups that used a more efficient mix of labour and capital than existing firms.

The role of telecoms and IT as a source of growth, delivering productivity improvements to the production process was cited as exemplified by the well-documented experience in the United States that witnessed strong growth over an unusually long expansion period, 1992-2000.

The importance of telecoms and IT in recent growth patterns has also been observed in many other empirical studies. This emerges for example from analyses of the sectoral sources of macro-economic MFP growth. In addition to the effects of telecoms and IT on output and labour productivity via the production and use of capital goods, telecoms and IT equipment generate spill-over effects in the economy. For example, the economic benefits of improved communication via the Internet do not all arise directly from quality improvements in the stock of IT materials, but also from different and more efficient ways of organising production and sales. These effects of technological change can be detected in estimates of MFP growth, which was the purpose of the following studies.

- For the United States, Oliner and Sichel and Jorgenson and Stiroh find that a sizeable part of overall MFP growth can be traced back to the telecoms and IT producing industries (computers, semiconductors and communications equipment)[5].

- Pilat and Lee examine contributions of telecoms and IT and other industries to economy-wide labour productivity growth and find notable contributions of the telecoms and IT industries in a number of countries[6].

- Gordon attributes the entire acceleration of trend MFP growth to MFP advances in the computer and computer-related semiconductor manufacturing[7].

- In an analysis of ten OECD countries, van Ark finds that productivity growth differentials between the United States and several European countries are at least partly explained by a larger and more productive telecoms and IT producing sector in the United States[8].

This empirical evidence supports what many of us take as a given – that the impact of telecoms and IT on productivity and economic growth has been important and pervasive and is likely to continue to be so.

2.2. SOCIAL AND DISTRIBUTIONAL ISSUES

Beyond pure efficiency and economic growth considerations, telecoms and IT have a bearing 'social capital' and distributional considerations.

5 Oliner and Sichel attribute 0.65 percentage points of an overall 1.16 percent MFP growth over the period 1996-99 to MFP advances in the computer and semiconductor sectors. Jorgenson and Stiroh identify a 0.5 percentage point contribution from the ICT sector to an overall 0.75 percent MFP growth over the period 1995-99. See Oliner S and SICHEL D, 2000, "The resurgence of Growth in the Late 1990s: Is Information Technology the Story?", Journal of Economic Perspectives, Vol. 14, No. 4, pp. 3-22; and Jorgenson D, and Stiroh K, 2000, "Raising the Speed Limit: U.S. Economic Growth in the Information Age"; Brookings Papers on Economic Activity (1), pp. 125-211.

6 Pilat D and Lee F, 2001, "Productivity growth in ICT-producing and ICT-using industries. A source of growth differentials in the OECD?" STI Working Paper, OECD.

7 It should be stressed that this result depends critically on the specific methodology to adjust for cyclical swings in productivity. See Gordon R, 2000; Comments and Discussion on JORGENSON and STIROH (2000); Brookings Papers on Economic Activity (1), pp. 212-230.

8 Note, however, that this is not necessarily an occurrence of spill-overs, from producing to other industries. It is a simple statement of the fact that MFP grew rapidly in ICT industries. See van ARK B, 2001, "The Renewal of the Old Economy: An International Comparative Perspective"; OECD STI Working Papers 2001/5.

2.2.1. Creation of social capital

Bourdieu defines social capital as

> *the aggregate of the actual or potential resources which are linked to the possession of a durable network of more or less institutionalised relationships of mutual acquaintance or recognition.*[9]

Three types of social capital have been identified in social networks:

- **Bonding capital** refers to relationships within homogenous groups (such as an ethnic, religious or socioeconomic group) that strengthen bonds and provide individuals with support and a sense of common identity. It builds a sense of close knit community that provides the individual with a sense of belonging and identity and social support and conforms most closely with the more traditional idea of community.

- **Bridging capital** refers to ties between groups that provide access to a diverse range of resources and facilitate cooperation. Examples of bridging social capital include the civil rights movement and ecumenical religious organisations. It develops ties between diverse groups under a common network. This allows the individual to access different resources, promotes shared understanding between groups, increases the flow of information and develops a broader sense of community

- **Linking capital** relates to the networks developed between individuals and groups at different levels of power, status and wealth that provide access to new and increased resources across different social strata. This is differentiated from bridging capital in that it allows people to draw on the different levels of power and status that operate across society rather than simply those across different networks. It can be the foundation of cooperative development where power and status play a key role in accessing the necessary resources. [10]

The central argument around the changing nature of social networks as a result of the impact of technology is that, with the highly portable and 'always on' nature of telecoms and IT, social networks are increasingly based around individuals rather than simply groups or places. The typical debate around the impact of telecoms and IT frames the Internet in terms of diminishing, supplementing or transforming the social capital of individuals and communities.

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9 Bourdieu P, 1986, "The forms of capital", in Handbook of Theory and Research for the Sociology of Education ed. J.G. Richardson, 241-258. New York: Greenwood Press.

10 The Information Economy Division within the Australian Department of Communications, Information Technology and the Arts (DCITA) prepared a discussion paper on *The Role of ICT in building communities and social capital* as well as a set of case studies to illustrate the scope and nature of some social and community impacts of ICT. Available at http://www.dcita.gov.au/communications_for_consumers

Empirical research has focussed on how telecoms and IT supplements and transforms social capital. For example, Lin argues that social networks increasingly rely on and develop through electronic mediums. Without diminishing the importance of face-to-face contact, telecoms and IT transforms social networks through "cybernetworks [that] are defined as the social networks in cyberspace and specifically the Internet"[11]. As we all experience ourselves, the Internet provides increased opportunity for connections across different types of networks and strengthening of existing networks, building all three types of social capital.

With the provision of telecoms and IT infrastructure, individuals can engage with government, non-profit organisations, business and civil society to access services and meet higher needs including those related to education, health, housing, transport, creativity and culture.

Traditional utility infrastructure (electricity, water, roads, etc) relates to the needs and capabilities of individuals, organisations, institutions and the wider community and are universally recognised as the foundation necessary for higher level community development. Telecoms and IT services should now be considered as one of the critical elements of this essential, supportive infrastructure.

2.2.2. Distributional issues: the telecoms and IT divide

Regardless of how one measures it, a wide digital divide exists. An UNCTAD analysis using its information and communications technology (ICT) diffusion index by region[12] shows the following:

- Western Europe, the European Union and the OECD countries are consistently at the top of the ITC diffusion ranking.
- The CEE and CIS average ranking has improved steadily from 1997 to 2004;
- The Latin America and Caribbean average has improved slightly in the same period;
- East Asia is the most diverse region in terms of income levels and ICT development:
  - It includes economies such as Hong Kong, ranked 12th, Singapore, ranked 16th and the Republic of Korea, ranked 19th, as well as Cambodia, ranked 140th and the Lao People's Democratic Republic, ranked 145th;
  - The differences between the developed and emerging countries in this region are much greater than the slight drop in average ranking for the region.

11 Lin N, 2001, Social Capital: A Theory of Social Structure and Action. Cambridge University Press.

12 Regions are defined as per the UNDP regional classification. The Index of ICT Diffusion is designed to evaluate ICT development using indicators of ICT diffusion across countries. It is available in UNCTAD, 2006, The Digital Divide Report 2005.

- The worse-off countries have not in general experienced clear improvement in their position:
    - Sub-Saharan Africa has remained nearly constant in its ICT diffusion ranking at the bottom of all regions;
    - The average ranking for the Arab states is nearly unchanged while South Asia has declined; while
    - North Africa has improved somewhat despite the fact that Libya's ranking fell between 1997 and 2004.

In what follows, we present a high-level analysis of

1. ICT diffusion; and
2. ICT affordability

by income group.

ICT diffusion by income group

To put income inequality into context, the table below shows the distribution of the world's population across the World Bank income categories. The majority of the population lives in low- or lower-middle-income countries.

Income group	Gross national income per capita (US$)	Number of countries	Population (millions)	Population (%)
High	Above 10,066	55	1,001	16
Upper middle	3,256-10,065	40	576	9
Lower middle	825-3255	54	2,430	38
Low	Below 825	59	2,338	37
World		208	6,345	100

Source: World Bank, 2006, World Development Indicators Database and UNCTAD, 2006, "The Digital Divide Report 2005".

The next table shows the relationship between income groups and some commonly used ICT indicators.

Income group	Internet users per 1,000 people	Mobile phones per 1,000 people	Fixed phones per 1,000 people
High	366	698	575
Upper middle	209	355	211
Lower middle	62	195	144
Low	16	24	27
World	150	223	176

Source: World Bank, 2006, World Development Indicators Database and UNCTAD, 2006, "The Digital Divide Report 2005".

The key points from this table are:

- A person in a high-income country is over 22 times more likely to be an Internet user than someone in a low-income country.
- In spite of their rapid growth in developing countries, mobile phones are 29 times more prevalent in high-income countries than in low-income countries.
- Fixed line penetration in high-income countries is over 21 times that of low-income countries.

ICT affordability by income group

While there are many reasons for this digital divide, most of them correlate with income. As we see in table below, the Internet is prohibitively expensive for with people with low-incomes.

Income group	Monthly price for 20 hours of Internet use (US$)	Internet price as a % of GNI per capita	Average price of local call per 3 minutes (US$)
High	24	1.7	0.07
Upper middle	30	13.3	0.09
Lower middle	32	32.2	0.03
Low	56	285.3	0.07
World	37	88.7	0.06

Source: World Bank, 2006, World Development Indicators Database and UNCTAD, 2006, "The Digital Divide Report 2005".

The following observations make clear the extent to which telecoms and IT services are not equally affordable in rich and poor countries:

- Twenty hours of Internet service for a low-income country costs roughly twice that of a high-income country and is over 2.5 times the average monthly income in a low-income country.
- In a high-income country, Internet affordability relative to income is over 150 times better than a low income nation.
- Even in lower-middle-income nations, the cost of 20 hours of Internet service represents nearly one third of the average monthly income.
- It is only in high-income countries that the cost of Internet service is low enough to be broadly affordable for most households and small businesses. However, even in these nations, there can still be internal digital divides between urban and rural areas, genders, age groups and racial groups.

Beyond these figures, the reality is an even more divided world:

- Internet service in low-income nations is in general far inferior to that in high-income countries. Broadband connectivity is rare, and poor infrastructure often results in substandard dial-up speeds and low reliability. Backbone networks to and from many poor countries are often congested, as are international phone links.
- As a result, the applications which are available on these networks are limited and more difficult to use. An Internet user on a slow, unreliable dial-up connection in a low income nation may be limited to character-oriented applications. Even simple Web browsing may be impossible. The Internet experience in a low-income nation is qualitatively different than in a developed nation.

Furthermore, direct and indirect impediments to diffusion result in a situation where anticipated returns are often insufficient to attract capital to build new networks in these countries.

Investment in, and use of, telecoms and IT can be a strong driver for growth in capital and labour productivity and multifactor productivity at the firm level, as well as at the macroeconomic level. However, to play its role, telecoms and IT must act as an enabler of growth and change across traditional segments of society. A digital divide introduces new challenges: poorer countries and populations are facing another disadvantage. A broader understanding of success factors in telecoms and IT diffusion is required to guide the development and implementation of appropriate public policies to better tap this driver for growth and equality.

2.3. TELECOMS AND IT AND E-GOVERNMENT

A related issue is the potential of ICT to revolutionise the way citizens engage with government generally. For example, it has been pointed out that the widespread growth of the Internet can assist the democratic process by facilitating the continued proliferation of networks not limited by immediate geographic boundaries. IT enables like-minded people in distant places to converge, share perspectives, access information and pool resources.[13]

The adoption of telecoms and IT in the delivery of public services can improve efficiency in administrative terms. In the US, people can pay their local property taxes and parking tickets on commercial sites such www.govworks.com or www.ezgov.com. Many Asian economies follow these footsteps towards e-government and create e-government portal: to name a few, these include South Korea (www.egov.co.kr), Taiwan (www.gov.tw), Hong Kong (www.info.gov.hk) and Singapore (www.gov.sg).

There is still little documented evidence of substantial changes in the behaviour of citizens as the result of online interaction with government, but governments internationally are increasingly recognising and acting on that potential. For example:

- The OECD says

  > *New forms of ICT, alongside more traditional media, can be used to help connect people to their local neighbourhoods as well as more distant communities. ICT offers new opportunities for government to consult and communicate with citizens, and to open up its own actions to public scrutiny.*[14]

- DiMaggio et al. state that there is a gradual realisation that web based interaction does have a unique and politically significant property but that much of the focus has been on increasing political knowledge. Those who are already interested in politics use the Internet to supplement their existing resources[15].

- Han noted that the dynamic impact of ICT on political and social movements in Korea provides evidence of the use of ICT to mobilise citizens for political action[16].

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13 Rosenau J, 1998, "Governance and Democracy in a Globalizing World" in Archibugi D, Held D and Koehler M, eds, Re-imaging Political Community, Cambridge: Polity Press.

14 Organisation for Economic Co-operation and Development, 2001, The Well-being of Nations: The Role of Human and Social Capital, OECD, Paris at page 69

15 DiMaggio P, Hargittai E, Neuman R W and Robinson J P, 2001, 'Social Implications of the Internet.' Annual Review of Sociology 27: 307–336. http://www.princeton.edu/culturalpolicy/workpap17.html

16 Han J, 2002 'Internet, Social Capital, and Democracy in the Information Age: Korea's Defeat Movement, the Red Devils, Candle Light Anti-U.S. Demonstration, and Presidential Election During 2000–2002".

- Rheingold has also highlighted examples of the role of ICT in facilitating citizen cooperation and collaboration on a mass scale (the 'smart mobs' that use mobile phones and websites for rapid mobilisation of protests or other actions).[17]

Telecoms and IT infrastructure has a clear role going forward in strengthening the political process and improving the efficiency and effectiveness of the delivery of government services.

In conclusion, there is much evidence of the key role of telecoms and IT in driving economic growth, and growing evidence of it enabling societal development, strengthening democratic processes and assisting in the effective delivery of government services. Not surprisingly, however, these benefits are not evenly distributed between nations or regions. For these reasons, an APEC focus on telecoms and IT is clearly warranted.

17 Rheingold H 2002, Smart Mobs, Perseus Books, USA.

3. WHAT HAS BEEN THE TELECOMS AND IT EXPERIENCE IN APEC COUNTRIES?

The studies cited in the previous section indicate a key role for telecoms and IT in meeting economic growth, wealth distribution and wider societal goals. They also highlight the sharp telecoms and IT divide between countries and regions. In this section we address the question of how well APEC member countries are being served by developments in telecoms and IT.

3.1. RECENT SUCCESSES AND SOME INEQUALITIES

3.1.1. The big picture: Internet backbone capacity

In early 2000, international bandwidth devoted to Internet traffic surpassed the bandwidth devoted to voice and private line networks. By 2005, this had increased to a factor of more than six to one. This means it is possible to get a first cut high level picture of whether an international 'digital divide' exists by observing international Internet bandwidth capacity.[18]

The following table shows the distribution of international internet bandwidth capacity between major regions.

18 See UNCTAD, 2006, "The Digital Divide Report 2005", UNCTAD/ITE/IPC/2006/5

Table 1: International Internet bandwidth capacity

Regions	1999		2005	
	Mbps	Percentage	Mbps	Percentage
Africa-Asia	0	0	359	0
Africa-Europe	62	0	4,159	0
Africa – US/Canada	145	1	2,364	0
Asia-Europe	172	1	24,416	2
Asia- US/Canada	6,267	32	307,318	28
Europe-Latin America	63	0	8	0
Europe - US/Canada	12,164	61	668,757	60
Latin America - US/Canada	953	5	100,943	9
Total Interregional bandwidth	19,825	100	1,108,323	100

Source: Global Internet Geography and UNCTAD, 2006, "The Digital Divide Report 2005".

The table above shows that bandwidth between the United States and Canada and Europe and Asia far exceeds that of routes between other regions, and that the disparity has remained fairly constant between 1999 and 2005. The International Telecommunications Union (ITU) has taken note of the scale of this disparity issue and has set up some working groups exploring solutions.[19] ITU's Telecommunication Standardization Sector Study Group 3 (see Section 4.9) and ITU Telecommunication Development Sector (see Chapter Five) are particularly active in exploring solutions

If we consider the bandwidth to individual countries, the divide is even deeper. For example:

- the majority of interregional bandwidth to Africa is to Egypt and South Africa;
- the majority to Latin America is to Brazil, Chile, Peru and Argentina; and
- the majority to the Asian region is to Japan, Republic of Korea, Taiwan Province of China, Hong Kong, Singapore and Australia.[20]

19 ITU's Telecommunication Standardization Sector Study Group 3 and ITU Telecommunication Development Sector are particularly active. See ITU, 2004, "ITU and its Activities Related to Internet-Protocol (IP) Networks", April 2004, Geneva

20 TeleGeography, 2006, "Global Internet Geography" and UNCTAD, 2006, "The Digital Divide Report 2005"

An examination of intraregional bandwidth patterns is also instructive.

Table 2: Intraregional Internet bandwidth as a percentage of total international bandwidth

Region	1999	2005
Africa	0	1
Asia	6	35
Europe	70	72
Latin America	5	12
US and Canada	28	21

Source: Global Internet Geography and UNCTAD, 2006, "The Digital Divide Report 2005".

The table above shows the percent of international capacity within the regions as a percentage of the total international capacity (within and outside the region). We note that

- 72% of European international capacity in 2005 is between European countries, while bandwidth among African countries only represents 1% of international capacity.
- All international African traffic is routed through countries outside Africa.
- The same is true to a lesser extent for Latin America, but we do note an increase between 1999 and 2005 indicating that some international links have come online within Latin America.

The message of this high-level evidence is clear: IT infrastructure in primarily focussed around the wealthier nations. The rapid deployment of long haul transmission capacity has led to a situation where the Internet is organised around, first, the United States and, second, the European Union. It is evident that this mirrors the current distribution of wealth. However, the telecoms and IT world map will require reshaping if the 21st century does prove to be the 'Asian-Pacific century'.

3.1.2. Access to telecoms services and its affordability

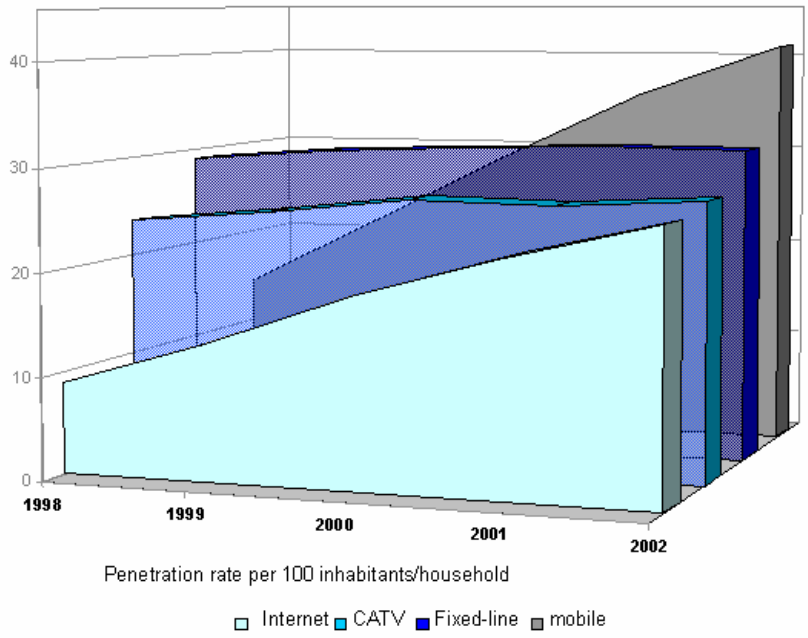
A recent study presented to APEC ministers in 2005 sheds light on the question of availability and accessibility of telecoms services in APEC countries.[21] We use the results of this study to illustrate the inequalities of access to, and affordability of, telecommunications in the APEC region.

21 Roy Chun Lee, Asia Pacific School of Economics and Government, Australian National University, published "PECC Report to APEC Ministers, 2005 Implementing the e-APEC Strategy: progress and recommendations for further action."

The take-up of telecommunications services in APEC economies as a whole has improved significantly in recent years. The chart below illustrates the basic trend in service penetration:

- At the end of 2002 the average per capita penetration rate for fixed-line PSTN network in the APEC region reached 31%, which is well above the world average of 17.9%;
- Mobile penetration rate exceeds 40%, making APEC region the world leader in this regard;
- Internet access has increased significantly in the region, reaching a penetration rate in excess of 25%; and
- Cable penetration rate was 27% per TV household, reasonably close to the world average of 31.8%.

Trend of accessibility growth in APEC region



Source: PECC Report to APEC Ministers, 2005 Implementing the e-APEC Strategy: progress and recommendations for further action and ITU 2003.

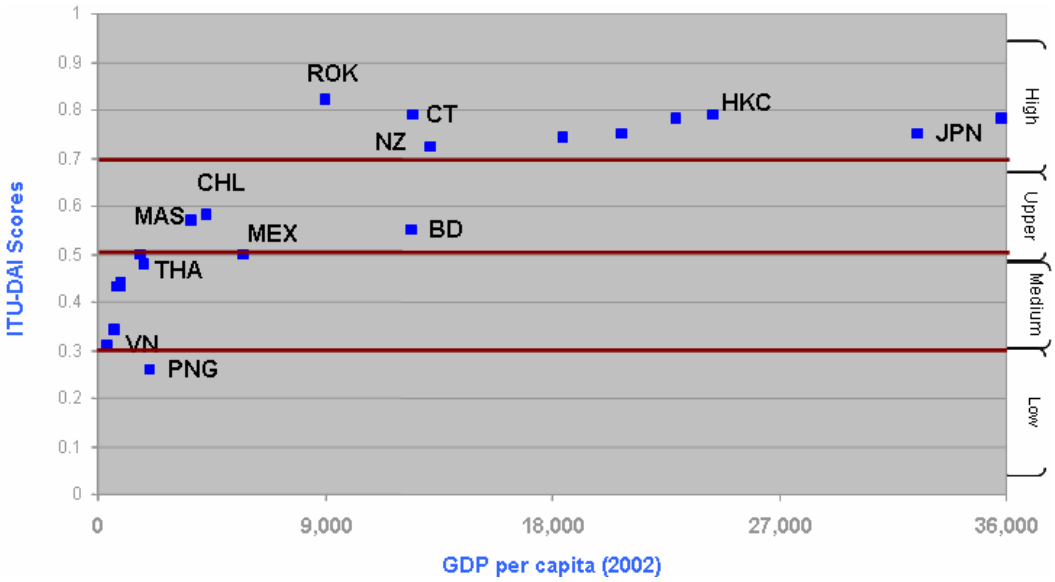
Over the period 1998 to 2002 there has been slow but steady growth for fixed-line telephony and cable TV, while far sharper increases have been recorded for mobile and Internet services. The most remarkable development is the rapid expansion of mobile and Internet accessibility particularly in developing member economies.

While this information is now somewhat out of date, these trends are confirmed in the latest ITU study that aims at measuring the global access condition for the Information Society: The salient characteristic of IT infrastructure development in APEC region is that affordability conditions in developing economies have improved significantly.[22]

The main task of the study was to establish a Digital Access Index (DAI) that uses a wide set of indicators to capture the ability of individual economies to access and use ICT. Methodologically, the reading for each indicator is converted into a value between zero and one by comparing it to a pre-determined "goal post", so the results can be compared across economies. The higher the DAI score of a country, the better the digital access in that country, with those countries with a score close to 1 approaching the goalpost value.

The figure below provides the scores of APEC member economic under the DAI index.

Digital Access Index and GDP



Source: PECC Report to APEC Ministers, 2005 Implementing the e-APEC Strategy: progress and recommendations for further action and ITU 2003.

The DAI index provides a useful reference to examine APEC economies' performance vis-à-vis international benchmarks.

- Of relevance is the inclusion of the "goalposts" for each indicator that are considered by ITU as longer-term policy goals for the realization of the Information Society.
- The goalposts are decided by benchmarking the best-performed economies in each category worldwide.

22 ITU, 2006 World Telecommunication/ICT Development Report 2006: Measuring ICT for social and economic development.

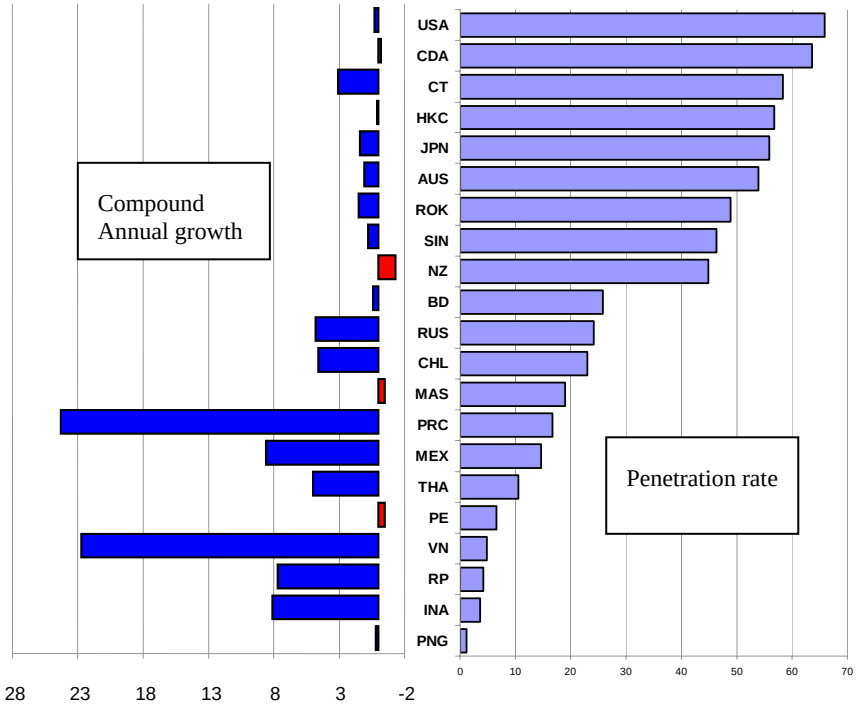
- Taking the goalposts as global benchmarks, the performance of APEC economies in relevant segments is reviewed in relation to international best practice.

Fixed lines

While fixed-line networks in most developed economies have reached a saturation point, most developing economies are rapidly catching up (although with sometimes a long way to go). The figure below demonstrates the growth trend for fixed-line accessibility.

- While still low, most developing economies enjoyed a compound annual growth rate of at least 5% between 1997 and 2002;
- Even stronger performance is recorded for China and Vietnam where compound annual growth rate exceeded 20 % within the period; and
- There are, however, a few exceptions: Malaysia and Peru have a negative compound annual growth rate during the period.

Penetration rate and compound annual growth rate of fixed lines



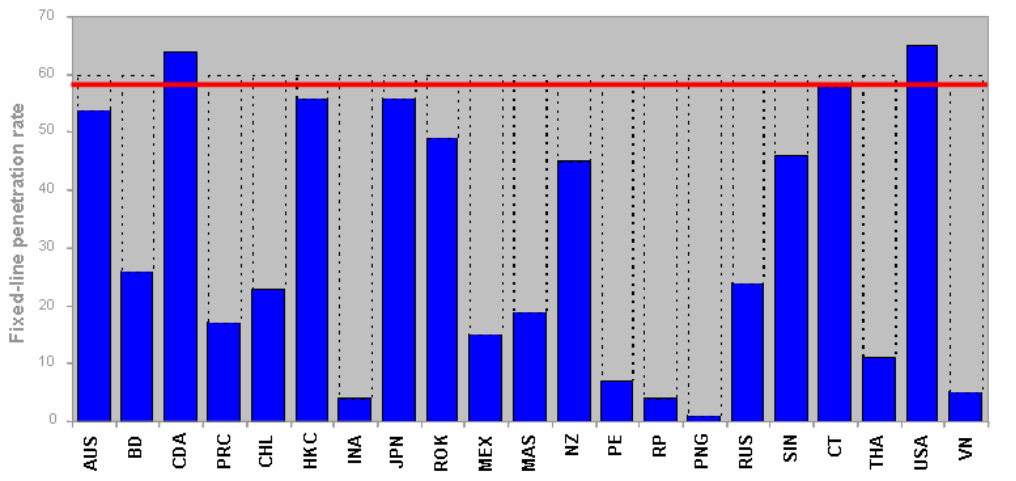
Source: PECC Report to APEC Ministers, 2005 Implementing the e-APEC Strategy: progress and recommendations for further action and ITU 2003.

The most critical policy issue in relation to fixed-line accessibility faced by developing economies is perhaps the uneven distribution of infrastructure resources between urban and rural areas. In most circumstances, development is centred at metropolitan areas where a significantly higher-than-average penetration rate is often recorded.

- Indonesia's fixed-line penetration rate was only 3.5 % at the end of 2003; in contrast the penetration rate in the capital city Jakarta is around 10 times higher than the national average, reaching 35 phone lines per 100 inhabitants.
- Similar situations can also been found in China, the Philippine and Thailand.
- In comparison developed economies (Korea and Chinese Taipei in this case) tend to have more evenly distributed infrastructure coverage.

At the end of 2002, Canada and USA have both achieved the goalpost of 60 subscribers per 100 inhabitants for fixed line penetration, and Chinese Taipei, Hong Kong, Japan as well as Australia are in close proximity. Meanwhile Indonesia, the Philippines and PNG are falling behind the goalpost.

APEC economies' fixed-line development as % of DAI goalpost (= 60)



Source: PECC Report to APEC Ministers, 2005 Implementing the e-APEC Strategy: progress and recommendations for further action and ITU 2003.

Mobile phones[23]

Performance in the APEC mobile sector is outstanding in any aspect. Contributing factors include relatively low network deployment costs, less policy sensitive issues, high market demand and an increasing variety of services.

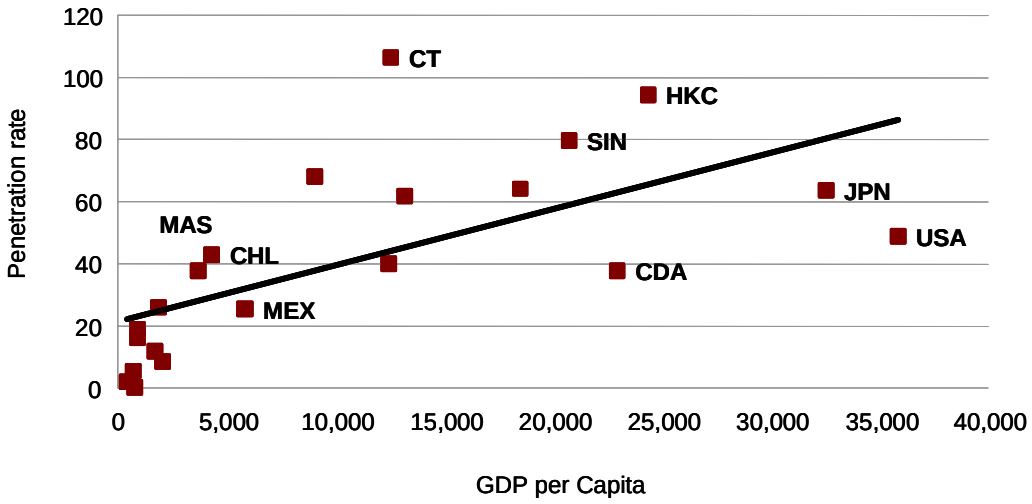
23 Additional elements on mobile telephony are provided in Appendix A.

- Unlike the fixed-line sector, the relationship between economic development and network accessibility performance in mobile network has been less relevant.

- As shown in the figure below, some developing economies, for example Chile and Malaysia, enjoy an equal if not higher penetration rate compared with their developed counterparts.

- It is worth noting that Chinese Taipei and Hong Kong are ranked number 1 and 3 in the world in terms of mobile penetration.

Mobile penetration rate and GDP per capita



Source: PECC Report to APEC Ministers, 2005 Implementing the e-APEC Strategy: progress and recommendations for further action and ITU 2003.

Interestingly mobile growth occurs regardless of the level of economic and network development.

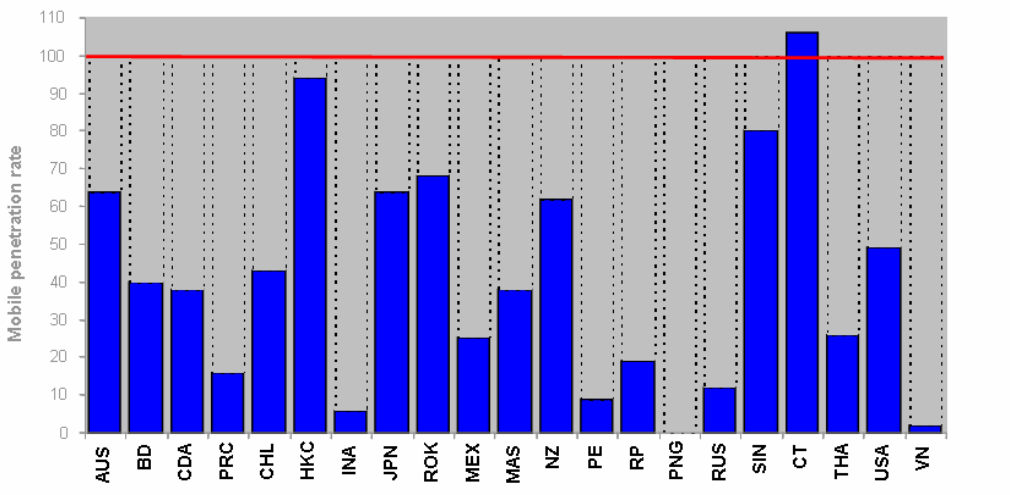
- Chinese Taipei, for example, maintained a 20 % compound annual growth rate between 1999 and 2002 despite the fact that the penetration rated has already reached 52% in 1999.

- By comparison, the average penetration rate for Europe in 2002 was slightly above 51%.

- In fact mobile networks are rapidly becoming the most widely used IT infrastructure in the APEC region: at the end of 2002 the number of mobile subscribers in majority of APEC economies had over taken that of fixed-line subscribers to become the most commonly subscribed telecommunications infrastructure.

For mobile penetration performance, Chinese Taipei is the only APEC economy reaching the goalpost of 100 per 100 inhabitants at the end of 2002. Hong Kong follows with a 94% achievement rate, and the figure for Singapore is 80%. On the other hand Indonesia, Vietnam and especially PNG have so far been lagging behind the goalpost.

APEC economies' mobile development as % of DAI goalpost (= 100)

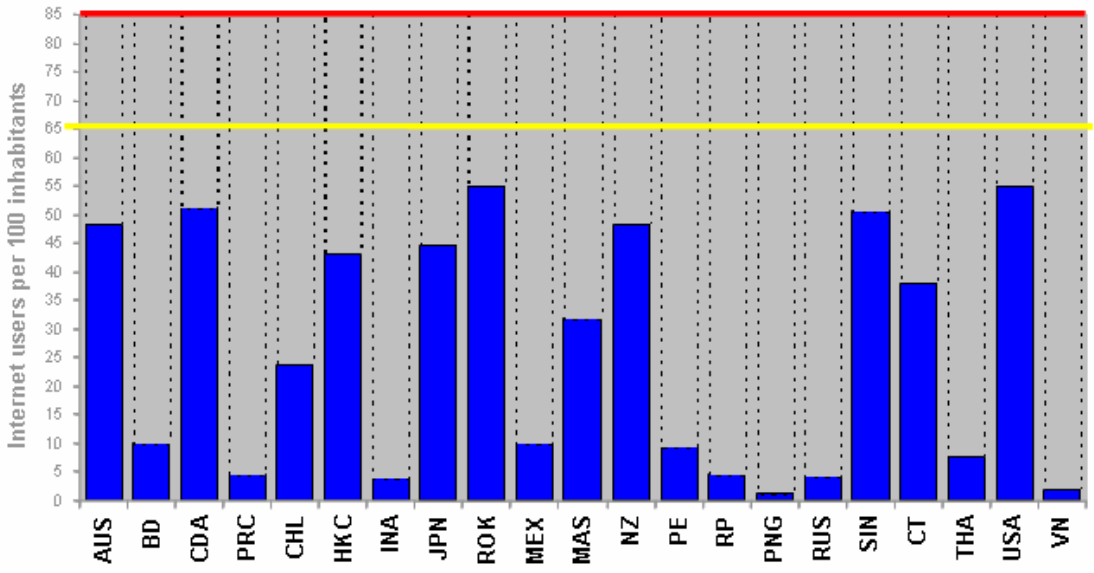


Source: PECC Report to APEC Ministers, 2005 Implementing the e-APEC Strategy: progress and recommendations for further action and ITU 2003

Internet and broadband access

Both Korea and the US have the highest number of Internet users in the region but are still well below the international benchmark (the ITU goalpost). Many economies, including China, Indonesia, the Philippines, PNG, Russia, Thailand and Vietnam, achieved at the end of 2002 less than 10 % of the goalpost.

APEC economies' Internet users as % of DAI goalpost (= 85)

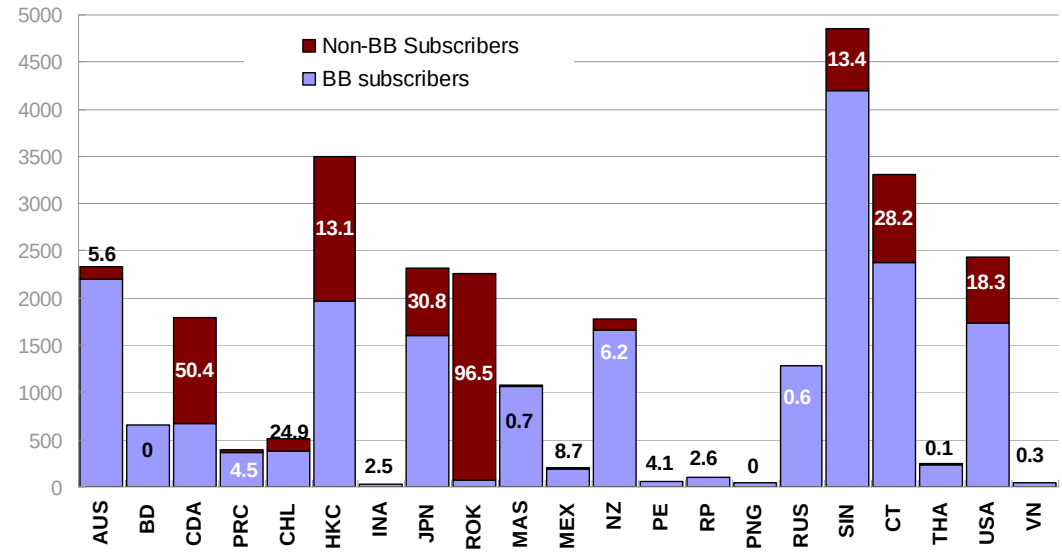


Source: PECC Report to APEC Ministers, 2005 Implementing the e-APEC Strategy: progress and recommendations for further action and ITU 2003.

The majority of broadband subscribers are found in developed APEC economies. Yet there are large disparities even among developed members. The most advanced APEC economy in broadband development is often considered to be Korea, which is also the world leader in broadband accessibility.

With respect to market take-up, broadband is the preferred internet access technology in Korea and Canada with 96.5% and 50.4 % of total Internet subscribers using broadband access at the end of 2002. Other economies with mass conversion include Japan, Chile, Chinese Taipei, Hong Kong, Singapore and USA.

Broadband subscribers as % of total Internet subscribers



Source: PECC Report to APEC Ministers, 2005 Implementing the e-APEC Strategy: progress and recommendations for further action and ITU 2003.

Broadband development in developing APEC economies has been slow in the past but the gap has been reduced rapidly:

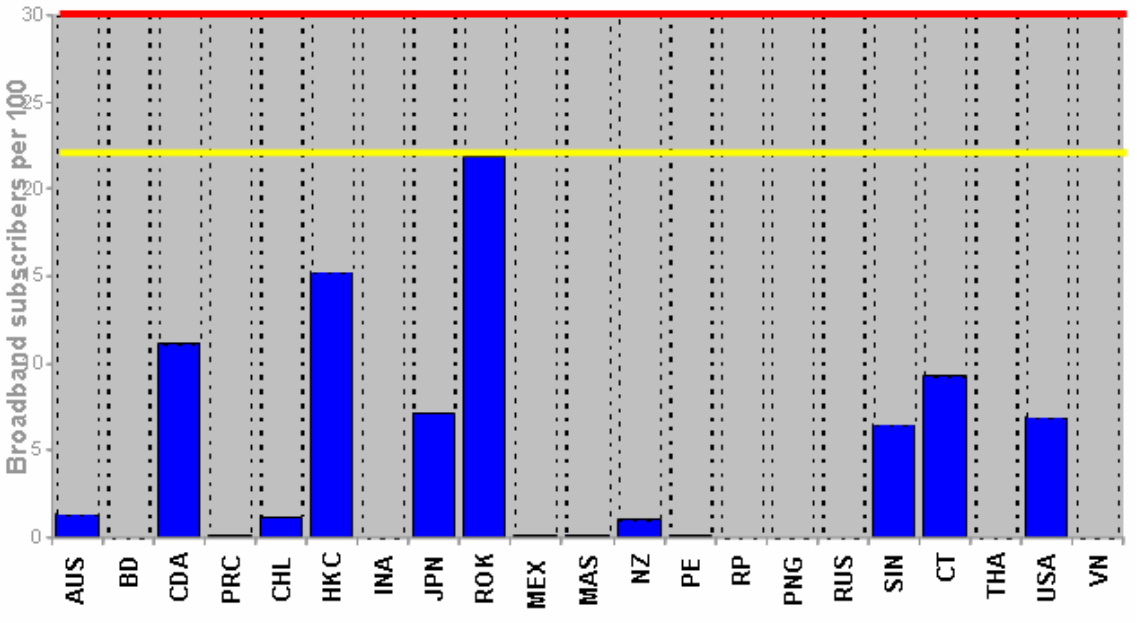
- Thailand for instance has an average growth rate of 900% during 2001-2002;
- A 650% growth rate is also recorded in China; and
- A 200% growth rate is also observed for the rest of developing APEC economies.

It should, however, be pointed out that in some economies, namely Russia, Vietnam, PNG and Brunei, broadband accessibility has remained severely under-developed.

Broadband subscription performance

The broadband subscriber rate is another area where results are unequal. Many economies have not achieved 1 % of the target set by the demanding goalpost. Again the goalpost adopted is based on the forecast Korea's development in broadband Internet.

APEC economies' broadband subscribers as % of DAI goalpost (= 30)



Source: PECC Report to APEC Ministers, 2005 Implementing the e-APEC Strategy: progress and recommendations for further action and ITU 2003.

What do these studies tell us? Access to information and communication technologies continues to grow at high speed and the digital divide – in terms of mobile subscribers, fixed telephone lines and Internet users – is in general shrinking. At the same time, the APEC region continues to be separated by major differences and disparities in terms of ICT levels. High growth rates in some areas, particularly the mobile sector, are not sufficient to bring digital opportunities to all and many developing countries still risk falling behind, including in terms of standard Internet access and newer technologies such as 3G and broadband.

This suggests a role for APEC in counteracting a new technology divide, particularly since broadband is playing a crucial role in transforming countries into Information Societies. However, more widespread broadband roll-out will necessitate very large investments. The nature of these investments and their potential are discussed in the final sections of this paper, which focus on APEC's potential role in setting up the appropriate public policy framework for this investment to take place.

4. WHAT CAN WE EXPECT? THE FUTURE OF IT PLATFORMS

Before considering the appropriate policies for stimulating the investment needed to lessen the digital divide, it is interesting to briefly explore the current key developments in the telecoms and IT industry as an indicator of its potential to continue to spur productivity growth and better functioning societies.

4.1.1. From Internet protocol to convergence

While the precise development in the telecommunications industry is, of course, unknown, there is a widespread expectation and emerging evidence of the coming together of previously separate communications and entertainment services: fixed and mobile telephony, broadband internet access and television. This so-called convergence promises for consumers the freedom to use any service under any circumstances they choose.

In addition to this consumer-focused description in which telecommunications users will benefits from practical, ubiquitous access to numerous services, convergence actually involves a technological shift that will also reduce costs and improve telecoms and IT services affordability. Simply put, convergence is the result of the telecoms industry's embrace of internet technology, which offers a more efficient way to transfer data across networks. By using 'packets' of data, encoded using internet protocol, or IP, the same system can also be used to encode phone conversations, text and photo messages, video calls and television channels and indeed anything else. In a way, the ultimate goal is to have one IP infrastructure, with all services provided over that platform.

These future networks will be based on a range of access technologies. These will include fixed networks based on optical fibre to the premise, ever more capable radio-based technologies for applications requiring mobility, and other wireless technologies for fixed connections for competing networks or in areas with low subscriber density or hostile terrain. Despite this range of access technologies, we will move from a world of somewhat jumbled and overlapping overlay networks towards one in which there is a significantly greater degree of integration in the transport and management layers.[24]

Moving to all-IP network has two immediate technical advantages for network operators, recently described as follows:

> *The first is that it costs less to run, thanks to its far simpler architecture and the economies of scale associated with internet standards. BT, a firm widely regarded as a pioneer in the switch to next generation networks, expects its operating expenses to fall by 30% once its new "21st Century Network" (21CN) is completed in 2009. By 2010 you will have to look very hard to find a fixed or mobile operator that is not running its traffic over an IP core, says Mr Lloyd of Cisco.*

24 Ergas H, 2004, Telecommunications: Competition Regulation and Communication via the Internet ACCC Regulation Conference 2004 – Evaluating the effectiveness of regulation.

> *The second advantage is that in theory, new services can be added far more quickly and easily, without the need to add any new network infrastructure. Adding a new service amounts to little more than adding software to the core of the network and perhaps some new access technologies around the edges.*[25]

We also note that, beyond the broad trend of convergence between voice and data on the one hand, and the networks and platforms used to carry them on the other, two possible evolutions are likely to take place in the next decade:

- The first is the convergence between telecoms and computing, which are moving together as the use of IP networks spreads. On the one hand, telecoms networks are becoming ever more reliant on software and complex computer systems to handle service delivery. Information technology, meanwhile, is increasing looking more and more like telecoms as software is increasingly delivered as a network service. Consequently, we are likely to obverse a move of the big systems integrators into telecoms services, and the move of telecoms firms into IT services.

- The second is “device convergence”, where devices such as computers, televisions, radios, phones and even fridges are also converging into single devices. However, there also appear to be some counter-trends. For example, mobile phones were expected to converge into a single ‘do-it-all device’ but quite the opposite seems to be happening with people preferring specialist pieces of equipment to meet their specific needs.

4.1.2. Impact of new Information Technologies

As defined by Telecommunications and Information Working Group, the Next generation networks" (NGN) is a catchall phrase for the infrastructure and platforms that will enable a very wide range of advanced new services to be offered by fixed and mobile network operators, while continuing to support all of today's existing services. To achieve seamless services at a global level, APEC TEL actively engages the private sector to identify new technologies and issues.

In this section, we summarise the three major impacts of the changes described above[26].

25 “A survey of telecoms convergence”, The Economist, page 2, October 14th 2006

26 See Bezzina J and Terrab M, 2005, Impacts of New Technologies on Regulatory Regimes, *Communications and Strategies*.

- **The end of the layered networks model**. Telecommunications infrastructures have traditionally been were organised as a "layered network model" composed of consecutive layers (duct/mast, cable/antenna level, transmission, network and application). The interface between layers was technically standardised by protocols and commercially agreed in service level agreements. For example, one player on the transport layer could rent fibre from several dark fibre providers to span its network. Increasingly these layers will tend to be disintegrated at different levels. The move from the existing network – in terms of the access layer, transport and network management – to a substantially new network creates great scope for contestability, both through competition to be the future network of choice and by greater opportunities for service and applications layer competition within those networks.

- **The decentralisation of intelligence**. Traditionally the "intelligence" was located centrally in the functionalities of the switch and usually controlled by one organisation. Simple devices (i.e. telephones) were attached to a network and had only a limited set of functions. By contrast, in the IP network no single entity controls anything but the most basic transport and relationships with other networks. The service-providing "intelligence" is out of the network architecture. For example, a computer accessing the network has a far more complex range of service functionalities in its application programs and this is not solely related to its size. The decentralised "intelligence" in IP networks will consequently allow strong growth in innovative services, content and applications, as well as a divergence between infrastructure and services. It will also allow for strong competition in the provision of these services.

- **The divergence of infrastructure and services**. Formerly, infrastructure and service provision were integrated in individual companies. The same companies rolled out the infrastructures and supplied the few services provided on these infrastructures (such as telephony). First, with digitalisation and then with packet switching technology, the technological potential for separating the different layers in the provision of communication services has increased. The ongoing transition from large vertically integrated organisations (like incumbents and second national operators) to a small number of infrastructure providers feeding a mass of service-based companies is likely to mean that there will be a far greater number of intermediary and downstream players, also creating an environment for very active competition.

In conclusion, technological developments in the telecoms and IT sector will have a number of very important effects. First, through convergence it will greatly enhance the functionality of telecoms and IT services. Second, it will result in a proliferation of emerging and presently unknown ‘next generation’ services. Third, it will sharply reduce the cost of providing telecoms and it services. Finally, it has the potential to enhance the scope for robust competition in serving customers. These effects will in turn enhance the scope for economy-wide productivity growth and social and political benefits. These developments will, however, require very substantial investments.

The challenge for APEC member governments emerging from these developments is to effectively develop and implement policies that ensure widespread access to affordable telecoms and IT services, facilitate the competitive process and retain the necessary investment incentives.

5. TELECOMMUNICATIONS AND IT POLICY

In the preceding sections of this paper we have established that telecoms and IT services:

- are an important driver of economic growth, contribute to the effective functioning of modern societies and play an increasingly important role in democratic processes and the delivery of government services;
- are continuing to develop and evolve in a manner that increases their potential to contribute in these ways going forward - but will require substantial investment to capitalise on technological developments; and
- have become more widely available over time - but that a substantial digital divide still exists.

The challenge for policy-makers and regulators is to balance the policy framework to:

- ensure competition in the provision of telecoms and IT services continues and strengthens - to deliver low prices, service innovation and a strong customer focus;
- ensure the digital divide is narrowed rather than widened by the current and imminent spate of next generation technologies and services; and
- ensure that, in pursuing these competition and social goals, the commercial incentives for efficient investment in new infrastructure, technologies and services are not dampened.

5.1. COMPETITION REGULATION AND THE NEED FOR A SUFFICIENT INCENTIVE TO INVEST

The primary question in proposing some guiding principles for APEC members is the need to understand how, in a fast moving technological environment, effective policy and regulatory practices may be developed to fully leverage the opportunities created by rapid technological change.

Underlying the telecommunications liberalisation initiatives in the APEC region (and consistent with its initial mission) was a desire to improve the competitiveness and flexibility of the economies and deliver higher living standards. Increased competition is generally expected to promote these aims through the incentives it provides to:

- raise productivity;
- lower costs and prices;
- improve quality; and
- deliver new (and innovative) products and services.

The principle that underpins sound competition policies seeks to promote efficiency by ensuring that restrictions on the free working of the market are only maintained where their benefits clearly outweigh any costs that might be imposed (which is generally done by setting out a number of criteria to be considered in conducting the public benefit test).

However, the policy framework underpinning telecommunications regulations in the APEC region is often not consistent with this principle nor is it subject to review against the public policy criteria established in the principle above.[27]

In telecommunications, where significant innovation and investment is required as second generation broadband and third generation mobile services are rolled out, the impact of inappropriate regulation could threaten investment in new products and services in the APEC region. These emerging technologies and next generation networks could provide an effective impetus to justify applying general competition law principles to telecommunications sectors rather than sector-specific regulations.

In saying this, it must be recognised that principles do need to evolve over time. Public policies were originally constructed in an environment in which the relevant infrastructure was in place and the aim was to create competition where none existed through regulated access to this infrastructure. In such an environment, affording third party access at long run marginal cost has often been seen by regulators as the best way to meet the policy objectives. Going forward, public policies needs to be able to accommodate incentives for efficient investment by largely private investors seeking an adequate return on capital employed.

For example, in Australia, the Telecommunications Competition Bill introduced by the Federal Government in 2002, in response to concerns that the operation of access regulation could discourage new infrastructure investments through a series of amendments known as the safe harbour provisions. The intended objective of these safe harbour provisions (anticipatory exemptions and special access undertakings) was to facilitate investment in new telecommunications infrastructure by providing investors with regulatory certainty. However, a number of practical difficulties with the legislation risk the provisions being rendered largely ineffective in providing such pre-investment certainty.

27 To use an example of a country with a seemingly advanced regime, the telecommunications sector in Australia is subject to industry specific regulation, both in terms of access and conduct through the application of Part XIB (Competition Regulation) and Part XIC (Access Regulation) of the Trade Practices Act 1974. The Telecommunications Act, and Parts XIB and XIC of the Trade Practices Act (telecommunications industry specific legislation) are not included in the schedule of legislation to be reviewed under the National Competition Policy process.

It is critical for the future success of the telecommunications industry in the APEC region that these issues are addressed and appropriate incentives exist to encourage investment. The commercial risks include technology implementation technology redundancy risk, demand risk and competitive by-pass risk. While substantial, network operators are likely to be able to manage commercial risks, which in and by themselves pose a barrier to the necessary investment proceeding. However, APEC should advocate that governments set policies to ensure the regulatory authorities of its members are not adding a very substantial regulatory risk, as it has been the case in some countries with a history of below-cost pricing for regulated access to legacy networks.

5.2. COMPETITION AND SOCIAL REGULATION

Two key thrusts of social regulation in the telecoms area have been the use of retail price controls to ensure that basic services (e.g. standard telephony services) are available at affordable prices, and the use of universal service obligations (USO) to ensure that these standard services are available to the whole of the population. While these regulations have in general been reasonably effective in meeting there goals, this has increasingly come at a cost in terms of distorted competition and dampened investment incentives. In this regard, a number of policy challenges exist.

For APEC countries with well-developed, competitive telecoms and IT markets, there are strong grounds for believing that these social goals will be increasingly met by the market. Robust competition ensures low prices and that the services customers want are produced. Technology advances in wireless telecommunications in particular make it increasingly attractive to service smaller groups of customers in less densely populated areas.

Here the appropriate policy direction is clear – constraining socially focussed regulation can be relaxed to foster competition and investment without fear of serious social (distributional) consequences. If required, these can be replaced with more sharply targeted measures to address specific needs, delivered to foster rather than dampen competition and investment.

For developing APEC countries the policy challenge is greater – how to stimulate telecoms and IT investment where effective demand in embryonic, develop competition where single providers currently exist and ensure the fruits of these developments are widely available to the broader community. Here the lessens from the policy experience of developed countries is helpful – avoid social policy constructs that unfairly burden particular service providers in the market, design measures to introduce and strengthen competition that minimise the impact on investment in next generation services, and use sharply focussed social policy tools rather than measures that impact well beyond their intended requirement.

With regard to the changes in need for, and effectiveness of, particular policy settings over time, the history of retail price cap regulation is instructive. This is presented in detail in Appendix B.

The dynamism of the telecommunications industry in APEC countries poses significant challenges for all stakeholders:

- for telecommunications companies, future success will be limited to those who invest efficiently in next generation networks, best manage uncertainties and select the right strategies for developing new services;
- for policy makers, there is the challenge of formulating the right approach to regulation (including price control regulation) when markets are very uncertain, and investment requirements substantial.

Incumbents and their competitors are all likely to adopt different investment strategies. These strategies in many cases are still uncertain or, at least, likely to evolve with new technological opportunities and changes in consumers' needs. It is vital that, whatever choices telecommunications carriers and service providers make, the policy makers ensures that *successful* investors can expect an appropriate return on risky investments.

The industry is undergoing a process which will effect fundamental change in some areas. Trends in the telecommunications industry are likely to include the following features:

- continuing rapid advances in the technology both of telecommunications networks and of the services provided over those networks leading to the availability of platforms that deliver ever-greater bandwidth. These platforms will be capable of carrying information more quickly and carrying a wider range of applications over a single medium, using common underlying protocols;
- increased consumer expectations for a set of information-based services, with delivery based on their individual identity and location, but regardless of access technology required;
- increased consumer focus on content rather than on the means of conveying services; and
- some voice services becoming low charge (or even bonus) 'add-ons' to broadband packages and others becoming high value enhanced services.

While these trends are well accepted among industry analysts and stakeholders, many parameters are less predictable. For example:

- the exact timing of these changes;
- the nature and extent of competitive entry and expansion; and
- the specific form and impact of emerging technologies.

Faced with these uncertainties, the regulatory approach needs to anticipate change, but not seek to determine outcomes. In other words, the regulatory strategy in APEC countries should be designed to let markets – not regulations – fulfil the role of identifying the services and businesses that will succeed.

The common public policy question for APEC members will to be about is finding the appropriate remedies in liberalised markets to ensure that they work properly. The task is difficult and APEC should push for the general adoption of an important principle – finding the regulatory approach that correspond best to the situation and the precise market failure to be addressed.

In circumstances of rapidly evolving markets, the more prescriptive approach of ex ante regulation is likely to be relatively costly. This is both because the framers of regulation are likely to lack the necessary information to set efficient forward-looking tests, and because changing circumstances may mean that prescribed norms are no longer welfare-enhancing. Of course, the fact that errors may have been made in determining ex ante regulation does not mean that regulation cannot be changed; but having to change incorrect or inappropriate regulation each time this has been discovered leads to additional costs, both direct and indirect.[28]

In these circumstances, adopting a less prescriptive form of ex post regulation or relying on competition laws without the need for economic regulation, is likely to be preferable as less hinges on "getting it exactly right" before the fact. The less directive nature of ex post regulation also reduces the need for regulation to be overhauled, as conduct is not so precisely specified that errors in the initial specification need completely rule out efficient conduct. Instead, there is greater opportunity for "self correction" under ex post regulatory approaches because parties' conduct will be guided by precedent, as much as by the initial framing of the regulatory standard.

The difference between ex ante and ex post approaches to regulation is akin to the difference between "rules" and "standards."

- Rules, which often correspond to ex ante regulation, are legal commands that provide greater specification in advance. Prescriptive environments require detailed and specific instructions reviewed and expanded as situations and conditions change;

28 These include the costs of rent-seeking and other forms of influence activity that are aimed at changing the regulations, as well as the uncertainty and instability that ex ante regulation creates.

- Standards provide general guidance on appropriate conduct. A proscriptive approach should entail a shorter list of rules and requirements that are strongly enforced on an ex post basis.[29]

Although ex ante remedies are generally imposed through sector-specific regulation, such remedies may also be imposed on the basis of antitrust rules. This is, for instance, the case where remedies are imposed a condition for clearance of a merger between telecommunications operators. For example, in the US and the EU, antitrust enforcement authorities have used merger control procedures as a way to extract significant concessions from the merging entities.

The analytical framework that economists have developed for comparing rules and standards is applicable to framing a discussion of the costs and benefits associated with ex ante and ex post approaches to regulation. For example, the rationale for the ex ante approach may be one or more of the following considerations:

- The probability of anticompetitive behaviour in the absence of the prior restraint is high;
- The magnitude of the harm from such behaviour would be great;
- The likelihood and magnitude of offsetting efficiency justifications for the behaviour are low; and
- The danger of false positives is small.[30]

In addressing concrete policy problems, APEC should assist member to reform their policy and regulatory structures by suggesting the taking into account of these considerations. Working towards creating sustainable markets through both convergent and new technologies in the Asia-Pacific region would need an effective balance between ex ante and ex post remedies. The table below summarises some of those elements.

29 In ex post regulation, the regulator's effort is directed toward the determination of the appropriate value of penalties and determining compliance with the restriction as opposed to writing and implementing plans that would normally be defined and managed by the regulated entities. This may reduce the complexity of regulatory rules.

30 Geradin D and Sidak G, 2003, “European and American Approaches to Antitrust Remedies and the Institutional Design of Regulation in Telecommunications”, available at http://ssrn.com/abstract=351100

Overall, a prescriptive, ex ante approach to regulation is likely to be most attractive when:	In contrast, reliance on a more proscriptive, ex post approach to regulation is generally desirable when:
❑ The benefits that the regulator hopes to achieve are highly sensitive to the specific manner in which the actor conducts itself. In other words, the only way the regulator hopes to achieve outcome A is if the actor undertakes tasks X, Y and Z and does so in a specified order and time period. Outcome A cannot be achieved if the actor were to skip task Y or to undertake entirely different tasks;	❑ The benefits to be achieved from the desired outcome do not depend on the precise path of action that the actor takes to attain the targets;
❑ The regulator is well informed that the only way the desired outcome can be achieved is by following the specified regulatory directions. In other words, the regulator knows (as does the actor) that the only way outcome A is achieved is if the actor undertakes tasks X, Y and Z in the specified order and time period;	❑ Asymmetric information exists with the regulator being less well informed as to the best means by which the actor may achieve the desired outcome (where multiple paths to that outcome exist) and hence the costs of mandating particular conduct can be high, relative to the benefits, if the regulator specifies a particular path of conduct to achieve an outcome when another path would be more efficient;
❑ Absent specification of the manner in which the actor must operate, there is a real risk that the outcome would depart substantially and persistently from that which would be desirable;	❑ Temporary deviations from the desired outcome by the actor are to some extent self-correcting given environment reactions to the regulated actors conduct;
❑ If the conduct did depart from that desirable level, detecting and correcting those deviations ex post would be costly relative to any benefits that flow through the greater flexibility provided by a less prescriptive approach. There are thus high monitoring and detection costs if ex ante regulation is not pursued.	❑ To the extent to which temporary deviations are not self-correcting, it is possible to develop guidelines that set broad but meaningful standards within which actors can seek to achieve the desired benefits at minimum cost to themselves, to society more broadly; ❑ Should deviations from those standards persist the regulator can readily detect and correct those deviations at reasonable cost by imposing sufficiently strong sanctions to credibly discourage future infractions.

Given the inevitable propensity for error in any regulatory decision-making, which of these approaches is preferable depends on a more detailed enquiry of the conduct to be regulated, and the markets in which the conduct occurs.

6. WHAT IS THE ROLE FOR OF APEC IN TELECOMS AND IT?

Coming back to our introduction on the points made by Alan Oxley, while celebrating the first decade of APEC (how to establish privately-owned infrastructure and improve competition law), we agree with the general principle that APEC should not try to become an operational regulatory agency and that it should stick to policy advice and lend its political weight to sound policy solutions. APEC has never been intended, nor designed, to usurp national sovereignty ion the setting of government policy.

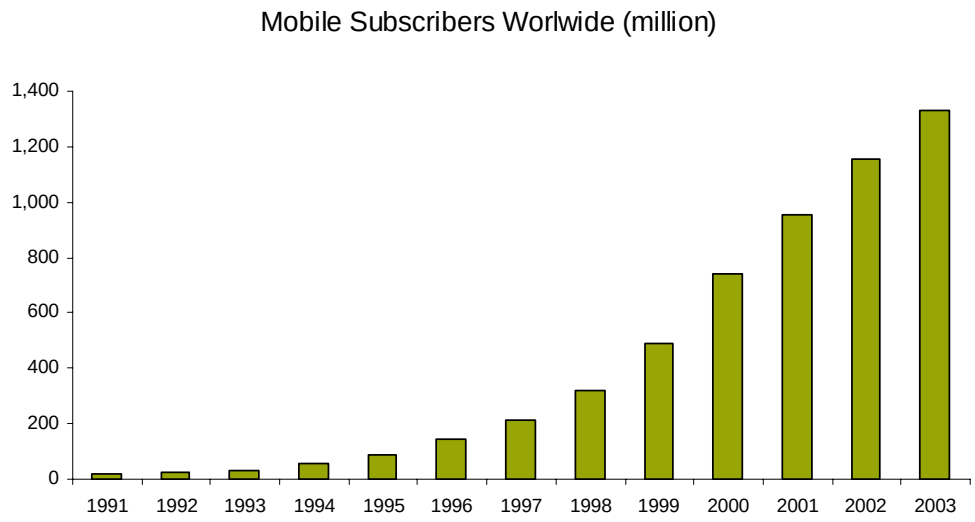
Does this mean that APEC should be conscripted to a passive and minimalist role in the telecoms and IT area? Not at all! A clear and compelling role for APEC lies in:

- Highlighting the multi-faceted contribution the telecoms and IT sector has made and con continue to make;
- fostering research-based policy thinking that grapples with the complex and challenging issues outlined in the previous section;
- exposing politicians and policy-makers to new developments in policy thinking and the lessons of the past; and
- advocating an approach to telecoms and IT policy in member countries that acknowledges and addresses the potential tensions between economic and social policy goals in a manner that matches the unique circumstances of each country.

APPENDIX A: THE SPECIAL ROLE OF MOBILE NETWORKS

Originally limited to business people and the wealthy few, cellular telephony has spread rapidly around the world in the 1990s. From 1991 to 2003 the number of cellular subscribers worldwide increased from 16 million to more than 1.3 billion. The following chart illustrates this impressive growth.

Global diffusion of mobile telephony



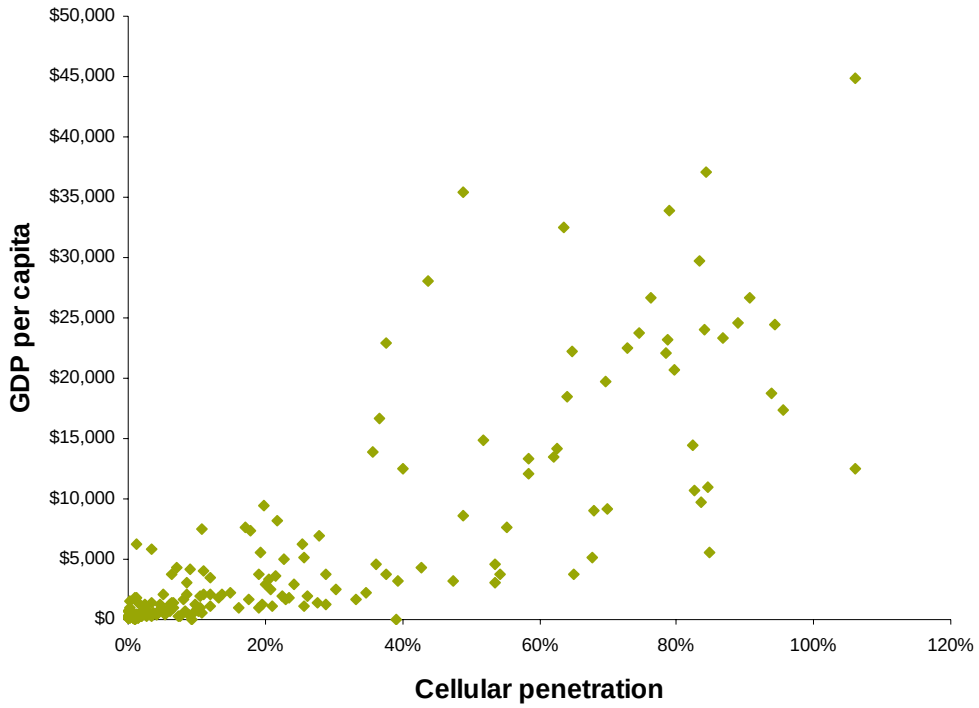
Data source: International Telecommunications Union

Furthermore, the absolute number of subscriptions shows that poor countries are attaining increased take-up of mobile telephony.[31] Importantly, the diffusion of mobile telephony in developing countries is higher than that achieved by fixed line networks. What is significant about this fact is that mobile phones have only been in existence for a comparatively short period of time relative to fixed line networks.

31 In contrast the growth of mobile telephony may have reached saturation levels in developed countries. For example, 2002 was the first year where the number of British persons aged 15 and over who own or use a mobile phone did not increase. This indicates that a threshold has been reached beyond which growth will not be explosive, at least in a 2G world. See Oftel, *Key trends in fixed and mobile telephony, and Internet – residential consumers*, 17 June 2002, available at http://www.ofcom.org.uk/static/archive/oftel/publications/research/2002/trenr0602.htm)

However, large disparities in mobile penetration remain between rich and poor countries. As illustrated in the following graph, the penetration of cellular phones is strongly and positively correlated with per capita GDP.

Worldwide penetration of cellular telephony by GDP per capita



Note: The coefficient of correlation between the GDP per capita and the cellular penetration equals 80.8 per cent Data source: ITU

The majority of countries whose average annual per capita GDP is below US$5,000 have relatively low mobile penetration rates. That said, the take up of mobile telephony across relatively poor countries varies significantly. Moreover, some relatively poor countries have take-up rates that exceed those of much richer countries. This suggests that factors other than income influence take-up.

One factor contributing to the speed of expansion of mobile telephony in APC countries compared to fixed line telephones has been the much lower average sunk costs involved in adding a subscriber to the network. Even if that subscriber ultimately proves unprofitable either because she is not creditworthy or subscribes to very low usage, the loss to the mobile operator is low. As a result, mobile operators have been more willing to sign up customers who fixed line operators would not accept, and even more so under pre-paid plans. This has allowed mobile telephony to bring particular benefits to low-income users.

Second, the pre-paid alternative allows individuals to tightly manage their telephone expenses, avoiding the exposure that results from post-paid options. Especially for new customers who are unfamiliar with call costs, prepaid services offer predictability, and prevent unpleasant surprises when invoices are received.

Third, access to mobile telephony increases the probability of low-income earners obtaining employment because they are more likely to obtain information about job opportunities. Low income workers (in particular young people originally from rural areas) are more likely to be itinerant either because of their employment in seasonal work or because they are homeless, not well integrated into cities and isolated from traditional ties.[32] Such workers are more likely to obtain employment if they are contactable by telephone.

Similarly many poor urban families live in homes to which they do not have clear legal title. In these circumstances, fixed line operators are frequently unwilling to connect these people to their networks.[33] Obtaining a mobile telephone may create opportunities for improved access to educational and health services, which may redress poverty. In this way the lack of connectivity which may have previously inhibited the ability of an individual or group to gain access to the tools they need for economic and political success may be redressed.

Overall, in developing countries, including in Asia-Pacific, state-owned fixed line operators have traditionally failed to develop adequate infrastructure, a problem that recent privatisation and deregulation has not always alleviated.

Central to the diffusion of mobile telephony has been a general policy of relatively "light handed" regulation as compared to that which applies to fixed line services. Instead competition for customers has encouraged innovation, increased efficiency, and provided consumers with choice, reduced prices and increased quality of service.

Further, since mobile telecommunications networks represent a competitive alternative to fixed line operators, the latter are facing a competitive constraint that would otherwise be absent. The competitive pressure has the potential to reduce the regulatory burden involved in the control of fixed monopolists and in any event is likely to force those monopolists to increase their efficiency, yielding additional social gains.

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32 In the last 20 years there have been large population movements throughout Latin America, in particular away from rural areas to urban areas: See *A Decade of Light and Shadows*, The Brookings Institution, 2003, p. 321 available at http://www.un.org/esa/usg_ocampo/books/pdf/lcg2205i_cap9.pdf (accessed May 2004)

33 See Melo J. R. 2000, 'Telecommunications and the Poor', *World Bank Conference Infrastructure for Development: Private Solutions and the Poor*, 31 May - 2 June, London, available at http://www.ppiaf.org/conference/section3-paper1.pdf (accessed May 2004)

APPENDIX B: THE EVOLUTION OF RETAIL PRICE CAP POLICY

In many countries, the stated objectives of the price control arrangements are a combination of:

- promoting efficiency in markets not yet effectively competitive and pass on the benefits to consumers;
- allowing network operators to gradually rebalance line rentals and protect low-income consumers from any adverse effects of line rental increases;
- ensuring rural and remote consumers share in the benefits from greater competition; and meeting other social policy objectives.

At the time of its introduction price control regulations had a clear objective: to increase the telecom monopolist's incentive to make productivity gains and to share those gains with consumers.

Since then there has been a progressive increase in the level of service and infrastructure competition, in the types of service available (mobile, broadband cable, broadband wireless, ADSL, satellite) and what they are used for, and also in the quality of service offerings. The demands of consumers have also changed, with a shift from voice to data services and to the purchase of services bundled together.

Ideally, but not consistently in practice, these types of changes in the market have been recognised in the changing nature of price controls over time. It is important indeed that the public policy decisions about future price controls (the need for them, form and duration) fully recognise current market characteristics and the changing nature of the economic welfare benefits that can flow to the community through the telecommunications services of the future. Any future retail price controls placed on telecommunications operators must be supported by a clear identification of resulting benefits to the economies and societies, and not continued just because of historical precedent.

As competition has increased and the nature of telecommunications services has evolved, the basis for price regulation has changed. The risks associated with getting price controls wrong have increased.

The long-term interest of end-users is best promoted by having an efficient price structure for telecommunications services: the primary aim should be restricted to maximising efficiency through telecommunications pricing. Efficient pricing is that which reflects underlying cost and is responsive to market demand. Prices more closely aligned with cost will result in a more efficient consumption of telecommunications services. For consumers the more flexible the price control regime the greater the level of total demand and the greater the level of flexibility for telecommunications operators to meet individual customer needs. For the industry a more efficient pricing structure will send the correct signals as to the potential for appropriate returns on new investments.

B.1 ACCESS-BASED COMPETITION REDUCES THE NEED FOR PRICE CAPS

Strong access-based competition is a reason why the need for price caps has reduced. The declaration of these wholesale services means that incumbent's competitors can and do, provide retail telecommunications services without sinking large investments in network assets, and hence can readily enter and compete in the fixed voice telephony market. Regulators in various jurisdictions have repeatedly drawn attention to the relative ease with which entry can occur under such arrangements and have drawn attention to the tensions existing between wholesale and retail regulation.

Given the competitive discipline that the wholesale access regime imposes on pricing a continued lack of acknowledgement of the access regime when setting retail controls would be distortion and wholly inappropriate. Internationally, the view expressed by former US regulator Alfred Kahn, for example, is that network access policies

> *"have come as close as conceivable to making the provision of telephone services at retail perfectly contestable and therefore regulation of the retail rates simply unnecessary. What these provisions do, at the extreme, is to reduce the sunk costs associated with entry into retailing close to zero […] What it means, specifically, is that the typical requirements in governing statutes or regulations for reclassifying the entire range of retail local telephone services as competitive will, as a matter of economics, be satisfied by these rules. In these circumstances, deregulation of the retail operations of the ILECs becomes not just possible but mandatory. Effective competition demands that they have the identical freedom to compete at that level as is now enjoyed by their competitors."*[34]

If multiple telecommunications service providers can compete for a customer's business, even if they do so by leasing the incumbent's facilities, then in the absence of specific social policy objectives it would seem that prompt deregulation of all charges to these providers' customers is appropriate. This is simply because

- if a carrier tries to charge too much *overall* to the customer then another will undercut those charges; and

34 Kahn A,1998, Letting Go: Deregulating the Process of Deregulation, Michigan State University Institute of Public Utilities

- if a carrier tries to charge a reasonable amount overall but in an *inefficient manner*, then another carrier can offer a more profitable alternative pricing package that is also better for the customer.

In other words, in those circumstances, there should be *no* need for regulators to resolve the difficult issue of what to charge for and how customers want to pay the cost of service.[35] This is because when wholesale telecommunications markets have been opened to competition through the availability of mandated wholesale elements at cost-based rates, a price cap on retail prices either.

- has no impact on competitive outcomes when it is set higher than the prices that competition would produce; or

- distorts competition when the upper limit is too low. In particular, an overly restrictive retail price limit will produce less entry and less investment in network facilities by both incumbents and entrants. [36]

The above discussion demonstrates that it is important that future decisions about the design of any retail price regulation take full account of the prevailing network access regulatory arrangements.

B.2 FUTURE MARKET DEVELOPMENTS WILL FURTHER REDUCE THE RATIONALE FOR PRICE CAPS

Two key disruptive technologies facing existing market structures (and hence the regulatory regime) are:

- The wide spread roll out of 3G Mobile networks which for the first time make wireless networks an effective substitute for both fixed voice and fixed data services. The extent of take-up, the level of investment and the coverage of these 3G networks remains extremely uncertain and will be impacted by and impact upon the regulatory regime; and

- Voice over Internet Protocol (VOIP) enables calls to be carried either entirely or predominantly over the Internet, bypassing the PSTN altogether. In a VOIP world such core price cap concepts as rebalancing and un-timed local calls are rendered largely irrelevant.

35 See Farrell J., 1997, "Prospects for Deregulation in Telecommunications," May 30. Available at (http://www.fcc.gov/Bureaus/OPP/Speeches/jf050997.html).

36 See Kolesar M and Weisman D, 2003, 'Accommodative Competitive Entry Policies and Telecommunications Regulation', *Info - The journal of policy, regulation and strategy for telecommunications*, 5: 34-40.

Policy makers need to be very careful to ensure that the price cap regime does not artificially distort the development of mobile telephony and VOIP solutions or indeed other potential next generation technologies. Investment and innovation by the telecommunications industry is vital for economic development, the international competitiveness of APEC members, and, ultimately, for the standard of living of all their people.