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Broadband plays a critical role in the workings of the economy and society. It connects consumers, businesses, and governments and facilitates social interaction. Hence, broadband policies are now a vital instrument to ensure the competitiveness of OECD countries and to address pressing societal concerns.

This report examines broadband developments and policies, and highlights challenges such as connecting users to fibre-based networks or coverage of rural areas. It also outlines emerging issues that may need policy attention as we move to next-generation networks. The findings are also relevant to emerging and developing economies designing broadband strategies.

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Main findings: Monitoring the Recommendation of the OECD Council on Broadband Development

Broadband not only plays a critical role in the workings of the economy, it connects consumers, businesses, governments and facilitates social interaction. The Recommendation of the OECD Council on Broadband Development recognises this growing importance of broadband and its principles have been instrumental in fostering broadband development.

Over the previous three years, policy makers have followed the Council's Recommendation and implemented many of the suggested policies. Broadband policies are now a vital part of broader ICT policy strategies and are now receiving the same attention as other key economic policies. The principles should also prove useful for non-member economies.

Yet, the monitoring exercise also reveals that there is still scope for OECD countries to improve broadband development. Some principles of the Recommendation need renewed attention and some OECD countries have fared better in their implementation of these principles than others. A number of new issues have been identified which need to be added to the existing principles in a future review of the Recommendation.

Positive market and policy developments

The development and use of broadband has flourished in most countries since the Recommendation. Since December 2004, broadband subscribers in the OECD have increased by 187%, reaching 221 million in June 2007. Broadband is available to the majority of inhabitants even within the largest OECD countries. A number of countries have reached 100% coverage with at least one wired broadband technology and up to 60% with coverage by two. Wireless Internet connections at broadband speeds are also increasingly available and are particularly important in underserved areas.

As broadband connections proliferate, connections are faster – and less expensive – than they were just three years ago. The average speed of advertised connections increased from 2 Mbit/s in 2004 to almost 9 Mbit/s

in 2007. Prices have also fallen. Between 2005 and 2006 the average price for a DSL connection fell by 19% and by 16% for cable Internet connections. Broadband is also affordable in most OECD countries. The price of a broadband subscription in 20 of the 30 OECD countries was less than 2% of monthly GDP per capita in October 2007.

Data on penetration, price, speed and usage of the Internet highlight how member countries have promoted competition, encouraged investment and worked together with the private sector to increase connectivity. Coverage statistics and penetration rate data show that operators and governments have made great strides extending broadband to rural and remote areas. Satellite services are available in even the most remote areas of many OECD countries, although these tend to be more expensive relative to other access technologies. Many governments have also implemented broadband demand aggregation policies to bring connectivity to rural areas. High-speed wireless/mobile Internet connections are increasingly available as an important option for users. Discussions have begun concerning how best to measure and compare connections across countries.

On the demand-side, OECD countries have focused on increasing the uptake of installed capacity, electronic business, digital delivery and broadband applications. Promoting the general ICT business and policy environment, fostering innovation in ICT (including R&D) as well as ICT diffusion and use (including e-government) have been priorities. Likewise, ICT skills and employment, digital content and promoting trust have been key concerns.

In particular, OECD governments have implemented demand-based approaches for spreading broadband access. Policy makers have made particular efforts connecting schools, libraries and other public institutions. Overall, these policies have led to increased use of broadband across the board.

Since the spread of broadband, traditional Internet activities (*e.g.* obtaining information) have intensified. New kinds of – often increasingly participatory - Internet activity and content-rich broadband applications have also been on the rise. Higher data-intensive applications are on the horizon, *e.g.* streaming high-definition video and TV, new peer-to-peer applications, health or education applications, virtual conferencing, and virtual reality applications. Emerging usage trends such as the migration towards user-created content and social networking will stimulate further opportunities but will also present challenges for policy.

OECD governments have also fostered broadband content and applications, for example, by acting as model users, by promoting e-government services and broadband-related standards, by putting content

online and by supporting the development and distribution of digital content by other players.

OECD governments and industry have also put into place regulatory measures to promote a culture of security. On the consumer protection side, OECD countries have focused on developing awareness campaigns to educate consumers about risks to Internet security; they have also instructed consumers on how to protect themselves against fraudulent practices.

Areas which need more attention

There are some key policy areas highlighted in the Recommendation that need more attention.

There are still substantial differences in broadband access and use among the OECD countries. Levels of competition among Internet service providers vary among the different OECD member countries and also between rural and urban areas within each country. Prices for Internet access in some markets remain high and users may have a very limited choice of broadband providers. OECD policy makers can do more to promote efficient competition in some markets. Governments that have chosen to focus on infrastructure-based competition must create a competitive market environment that provides investment incentives for competitive operators and incumbents. Governments that have historically relied on unbundling for competition will need to evaluate the role and future of unbundling in next-generation networks, and should also facilitate infrastructure-based competition.

Furthermore, there exist specific problems with broadband within OECD countries. While the number of broadband connections in rural areas has increased, the qualitative aspects of these connections vary significantly than those in urban areas.

There are also a number of important issues to do with broadband supply in OECD broadband markets which are not covered in the existing Recommendation. Debates over whether Internet service providers should be able to prioritise or limit certain content and data over their networks (commonly referred to as "network neutrality" debates) are spreading across OECD countries and even across platforms (fixed to mobile).

The Recommendation provides little guidance with the exception of promoting competition in markets. Policy makers also face questions about the future of universal service. The Recommendation gives some guidance on the role of governments and the private sector in promoting connectivity. However, questions remain on how or whether universal service will be

adapted for high-bandwidth use, particularly given the Recommendation's emphasis on technological neutrality.

Significant differences in the uptake of broadband in businesses, schools and households still exist among the OECD countries; some with far lower use levels than others. Particular attention needs to be paid to the broadband use of small-and medium sized enterprises and particular socio-economic groups.

The monitoring exercise has also shown that the evolution towards broadband applications and use is only now gaining in speed, and that many services are still in their experimentation phase. The goal of "broadband applications anywhere, anytime and on any device" has not yet been achieved, and commercial online broadband content services are only slowly emerging, in particular, in the areas of audio-visual content, although there are exceptions. As consumers are demanding more advanced content, faster upstream bandwidth is becoming essential for further development of the information society. Advanced mobile (wireless) broadband services and associated mobile content have yet to develop in OECD countries whose access is still largely PC-centric. Furthermore, there is still substantial scope for OECD governments to put more content and e-government services online.

Importantly, OECD firms and governments are only just beginning to realise the full potential of broadband when it comes to advanced broadband applications. The use of broadband in education, for tele-work, for e-government services, energy, health (tele-medicine), and transport (intelligent transportation systems) is still in its infancy. Organisational and institutional barriers hamper the necessary innovation and structural changes needed and leave many OECD countries struggling to move beyond pilot projects. The notions of ubiquitous networks, broadband-based home management, and other new forms of broadband use have yet to develop and diffuse.

A number of broadband-related security threats have emerged in OECD markets over the last three years. The transition to fibre connections and symmetric bandwidth will make these threats more virulent. New or more pronounced consumer and privacy issues are transpiring with broadband's "always-on" connections and its participatory features.

The Recommendation has also highlighted privacy enforcement and consumer protection, both of which warrant policy attention.

Devising balanced regulatory frameworks, especially in fields such as intellectual property rights (IPRs) will be a continuing challenge for governments.

Governments will have to invest in R&D that promotes broadband infrastructure, applications and content. The development of broadband research networks and their use can be developed further.

Finally, only a few countries have specific broadband policy assessment and evaluation activities which would allow them to carry out existing broadband plans in a more effective and accountable manner. Internationally comparable broadband metrics are needed to meet this goal.

Policy suggestions for the way forward

This monitoring exercise of the Recommendation has led to the following policy suggestions.

Evolution of broadband

- The regulation of new broadband connections using fibre to the end user will likely be the subject of considerable debate in the next few years. The pressing question is whether fibre optic cables extending to homes, buildings and street curbs should be regulated in the same way as traditional copper telephone lines. As new fibre connections may fall outside existing regulatory frameworks, a re-evaluation of existing policies may be required. Regulators should consider whether network architectures still relying on portions of the historical copper telephone infrastructure should be treated differently from new all-fibre networks.

- Regulators and policy makers are increasingly concerned about fostering competition on next-generation broadband networks. Some are examining the functional separation of the dominant telecommunication provider into two units, one which handles the physical lines and the other which provides retail services over the lines as a way to ensure fair and non-discriminatory access to "last mile" infrastructure. The results of functional separation, particularly on investment, are still far from certain and warrant significant research. Regulators should actively consider other policy options at the same time, which may provide similar outcomes – such as requiring operators to share the internal wiring in buildings.

- Broadband connectivity has improved but significant divides remain between rural and urban areas. Wireless technologies will certainly play a role in connecting some of these areas but there will likely be more demand for high-capacity fibre to reach as widely as possible into these areas in order to feed wireless connections. Governments need to help

ensure that all citizens have access to very-high-speed broadband networks.

- Competition among providers of communication technology has always been a key goal in OECD communication markets so that Internet subscribers in urban areas have a choice between wired providers and wireless options. However, policy makers should reconsider whether promoting this kind of competition is a realistic goal for rural and remote areas, which may only have one high-speed provider.

- Technological neutrality features prominently in the Recommendation but is not yet a reality in OECD markets. Unbundling requirements on fixed-line operators and local cable regulations are examples of the technological bias still pervasive in OECD countries. With the move to next-generation networks, policy makers may need to re-examine whether technological neutrality is still an efficient policy structure.

Government intervention with respect to broadband infrastructure

- The private sector should take the lead in developing well-functioning broadband markets, but there are clearly some circumstances in which government intervention is justified. For example, connecting underserved areas and promoting efficient markets.

- Governments need to actively look for ways to encourage investment in infrastructure. Civil costs (*e.g.* building roads, obtaining rights of way) are among the largest entry and investment barriers facing telecommunication firms. Governments should take steps to improve access to passive infrastructure (conduit, poles, and ducts) and co-ordinate civil works as an effective way to encourage investment. Access to rights-of-way should be fair and non-discriminatory. Governments should also encourage and promote the installation of open-access, passive infrastructure any time they undertake public works.

- Governments could also help co-ordinate map-making of network routes as a way to encourage the rollout of smaller networks in need of interconnection. Improvement in the overall investment climate in a country should also benefit providers wishing to roll out new networks.

- Governments should not prohibit municipalities or utilities from entering telecommunication markets. However, if there are concerns about market distortion, policy makers could limit municipal participation to only basic elements (*e.g.* the provision of dark fibre networks under open access rules).

- Any government intervention in markets that involves funding should follow a set of basic rules. Requests for proposals should be technologically neutral and simply specify the minimum criteria for the project. Any new infrastructure built using government funds should also be open access – meaning that access to that network is provided on non-discriminatory terms.

- Access to spectrum remains a significant market barrier to wireless broadband provision. Policy makers should adopt more market mechanisms to promote more efficient spectrum use.

Broadband diffusion, use and policy developments and recommendations

- Certain OECD countries have significant scope to renew efforts to promote broadband deployment and use in public institutions, businesses, households and governments.

- Differences in income, education, as well as gender are factors influencing the uptake and use of broadband in OECD countries ('new use divides'). Such factors need to be better understood and addressed. Sustained efforts to improve ICT and media skills and to foster relevant training are also needed.

- OECD governments should continue promoting the business use of broadband and e-commerce. The imposition of national boundaries on the Internet is a barrier to progress and threatens the positive expectations of the Internet as a global trading platform. Innovation in the area of new web-based services and moves towards more advanced business applications should be encouraged. Studies and policies should focus on the remaining bottlenecks and remedies.

- The business- and user-centric innovation spurred by broadband networks in business but also social and cultural areas needs to be sustained. Governments should focus their attention on improving metrics and analysis to better understand new usage trends, their impacts on the economy and society as well as policy.

- There still remain a number of bottlenecks in the deployment of broadband services and content. Most of these will be resolved by the market-place. However, governments can also help by providing a forum to resolve issues. Activities supporting the development and distribution of digital content, and policies ensuring competition and innovation in broadband services should be intensified – especially as they relate to R&D. Improving framework conditions, skills, common

standards, and facilitating cross-industry collaboration is also necessary. With increased digital convergence of broadband and media services, the regulation of digital content will require more policy attention in the future.

- Bottlenecks in the use of advanced mobile (wireless) broadband services and associated content should be resolved. Efforts are needed to move to more complex and data-rich mobile applications. Governments should assess how current market structures, competition, the affordability of mobile broadband access, and the lack of standards affect advances in this field. The access of new market entrants should be facilitated. Governments can also lead the way and promote increased mobile public-sector content usage such as health information, educational materials and other government-provided digital content.

- Governments have to renew efforts to put government services and government content online. E-government services and broadband applications would help organise the public sector more efficiently (also in areas such as public safety), however, these have not been developed sufficiently, even in leading OECD countries.

- Governments should move beyond plans to create access to and commercial use of public sector content information (essentially data), towards creating access to public and cultural content (*e.g.* museums). Putting the legal and technical infrastructure in place to make this happen, to allow for cross-border access and interoperability while avoiding the risk of information decay, however, will require sizeable efforts.

- It is crucial that government and business support the evolution towards more advanced broadband applications in social sectors such as tele-work, education, energy, health, and transport, where real progress is needed. Pressing societal challenges (*e.g.* pollution, ageing) persist for which effective broadband services could provide important solutions:

  – Despite early promises, these services and applications often remain in their infancy. Pilot projects need to obtain sufficient scope and scale and industry involvement in order to achieve critical mass.

  – Given the complexity of this undertaking, and considering the central role of governments in fields such as education, health and transport, a more active and swift approach is needed at this stage. Learning from existing public-private partnerships in this field across the OECD, sharing good practises and even co-operating with OECD member countries should be high on the list of policy priorities. The *2008 OECD Ministerial on the*

Future of the Internet Economy will aim at fostering these developments and raising these issues with Ministers.

Promoting competition, innovation, interoperability and choice

- For these increasingly complex broadband application markets, governments should intensify their efforts to promote competition, innovation, interoperability and choice.

- Maintaining a level-playing field and reducing anti-competitive practices in the face of high network effects and to promote consumer choice is crucial, i.e. in particular considering the increased use of walled garden approaches, as well as cross-industry mergers and acquisitions. With problems such as vertical integration, lock-in of consumers in certain standards, and poor access to certain content, an environment of contestable markets should be created where small and innovative players can compete. Further analysis of recent trends and impacts of concentration is also needed. When necessary, anti-trust and other policies have the means to restore competition.

- It will be crucial to monitor and analyse the new market structures of broadband software, service and content providers in the next few years. Governments have a lot of experience when it comes to ensuring efficient telecommunications markets. However, when it comes to broadband applications, services, software and content, this is mostly new territory. It is important in the coming years that policy makers understand the impacts of new broadband market structures and question whether current policy approaches for ensuring competition actually work.

- OECD governments need to promote interoperability at the international level and encourage open standards. It is usually not up to governments to choose standards but they can play a role in encouraging and assisting industry co-operation (*e.g.* through setting up cross-industry fora on particular standards, or through engaging in the standard-setting process). Governments can mandate a certain degree of interoperability and promote open standards.

Security, privacy and consumer protection

- Ensuring the security of information systems and networks is vital. This must continue to be a policy priority in the years to come. In particular, governments' efforts in this area should be better co-ordinated at the

international level, and should include increased law enforcement co-operation. Computer security incident response teams should be improved, and there should be greater public education on security in general.

- Broadband uptake and Internet usage are growing. This raises privacy issues that need monitoring. Existing privacy policies need to be enforced and, where updated, to reflect new challenges.

- OECD countries should continue to develop more effective policies to protect consumers online.

- Policy makers, industry and civil society also need to examine new broadband consumer protection issues that are not currently addressed in the Recommendation. In particular, consumers can be confused by misleading messages about pricing and data tariff structures as well as the quality of broadband services provided (*e.g.* discrepancies between actual and advertised speeds, unreliable connections and limited customer support). Adequate and accurate information needs to be available so that consumers can make informed choices about service providers. They also need transparent low-cost procedures in place if they wish to change service providers.

- New consumer issues have emerged in other areas of broadband services and content (*e.g.* interoperability). Governments should discourage harmful business conduct and practices such as misleading advertising and unjustifiably long consumer lock-in periods. They should encourage greater transparency about the interoperability of different broadband services and content.

Regulatory frameworks that balance the interests of suppliers and users

- Balanced regulatory frameworks in areas such as intellectual property rights (IPR) will remain a top priority – even long after other goals such as basic broadband access have been achieved. Finding the right balance in this new environment and devising schemes that promote creativity and reduce piracy will take time.

- Many of the issues related to IPR and digital piracy will play out in the market place, in courts, and without government involvement. Government intervention is required when there is evidence that the market is not working or failing to evolve in a positive direction.

- OECD governments, however, are advised to continue monitoring developments closely and to adjust the regulatory system when

necessary. Governments should encourage industry to find solutions to make rich content available over broadband networks. They may also act as facilitators of dialogue and consensus among different industry participants in the value chain. Governments should also foster the availability of public content on broadband networks.

- In addition, all stakeholders should periodically evaluate the need for greater international co-ordination and harmonisation of IPR-related matters. Regulations about technical protection measures and fair use will need reviewing, so that there is a necessary balance between content creation, innovation and fostering the participative web, as well as copyright enforcement.

- In this new technological environment, the possibilities offered by new forms of content creation and diffusion may – in certain cases – be best regulated through innovative policy approaches, provided there is evidence that existing approaches are leading to undesirable results. It is crucial that economic analysis underpins the proposed regulatory modifications in the area of IPR. It is also important that processes be open and that content creators and consumers are full stakeholders in this policy process.

R&D for the development of broadband

- Governments must intensify efforts to ensure there is sufficient R&D in the field of ICT, so that the economic, social and cultural effectiveness of broadband is guaranteed. The role of government and business in basic R&D may have to be reaffirmed. Any government neglect in this area should be monitored as well as examples of inadequate policy co-ordination, with the aim of increasing the efficiency of broadband-related R&D.

- The adequacy, effectiveness and appropriateness of existing government R&D support schemes (*e.g.* tax credits) and their role for broadband networks, services and content should be reassessed.

- Strengthening broadband research networks (grids), and facilitating international co-operation through such networks and collaborative research should be a policy priority.

- Plans to provide digital access to scientific information and research should be accelerated.

Evaluation and policy co-ordination

- OECD governments have to implement specific broadband policy assessment and evaluation procedures in order to more effectively appraise progress in achieving the goals of broadband policy.

- One clear need emerging from the monitoring exercise is for more harmonised data on broadband coverage, on actual speeds, prices and competition. Certain key indicators are not available to users, such as the actual broadband line speeds, data on how subscribers use their connections, and measures of mobile data access. This could be addressed by the OECD.

- Improved policy co-ordination among various agencies, ministries and the private sector will be essential. This is especially needed with advanced broadband applications in vital sectors such as health, transport and others areas where responsibilities are shared.

- International fora of exchange such as within the OECD should be fostered, so that good practices may be shared, and difficulties encountered may be resolved.