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Please cite this paper as:

OECD (2003-01-22), "Universal Service Obligations and Broadband", *OECD Digital Economy Papers*, No. 68, OECD Publishing, Paris.
http://dx.doi.org/10.1787/233266421685

OECD Digital Economy Papers No. 68

Universal Service Obligations and Broadband

OECD

Organisation de Coopération et de Développement Economiques
Organisation for Economic Co-operation and Development

22-Jan-2003

English - Or. English

DIRECTORATE FOR SCIENCE, TECHNOLOGY AND INDUSTRY
COMMITTEE FOR INFORMATION, COMPUTER AND COMMUNICATIONS POLICY

DSTI/ICCP/TISP(2002)4/FINAL
Unclassified

Working Party on Telecommunication and Information Services Policies

UNIVERSAL SERVICE OBLIGATIONS AND BROADBAND

JT00138039

English - Or. English

FOREWORD

In June 2002, this report was presented to the Working Party on Telecommunications and Information Services Policy (TISP). It was recommended to be made public by the Committee for Information, Computer and Communications Policy in October 2002.

The report was prepared by Prof. Patrick Xavier (Swinburne University of Technology, Melbourne, Australia). It is published on the responsibility of the Secretary-General of the OECD.

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MAIN POINTS

This paper examines the question of whether the scope of universal service should be widened to include broadband. A common concern in OECD countries is that some groups without access to high-speed broadband networks, such as those residing in rural and sparsely populated remote areas, will be unable to access the benefits expected of broadband access, from on-line services including education, health and government services. This problem is expected to grow in significance as broadband service becomes increasingly important and pervasive.

To complement earlier OECD studies that discussed in some detail various government policy initiatives being used to promote broadband deployment, the present paper conducts a more conceptual analysis of government support for broadband but in a way that seeks to be operationally useful. The paper critically examines whether broadband at this stage should be considered as coming within the scope of universal service and proposes criteria to analyse government support/subsidy policies for broadband, and explores the issue of the nature and extent of necessary government involvement. This stance has a constructive purpose: to strengthen demand that government policies be based on sound, systematic, data-based, analysis of broadband deployment problems and solutions.

The paper pays particular attention to whether the scope of universal service obligations should be widened to include broadband. The conclusion arrived at is, that at this stage of broadband development and diffusion, there is not a convincing case for broadband access to be covered by universal service type mandates. The paper proceeds, nevertheless, to explore what would be involved in a systematic review of this issue. This is because a number of OECD government reports—while also reaching the conclusion that broadband service should not be part of universal service obligations at this stage of development—have recommended that since circumstances could change significantly as broadband usage spreads, this issue should be revisited at regular intervals. In this context, a consideration of how a review of the scope of the USO could be conducted in a systematic manner promises to be useful.

What is broadband? The meaning of the term ‘broadband’ is in fact far from precise and definitions have ranged from 200 kbit/s to over 30 Mbit/s. Indeed, it is likely to continue to evolve, with what is regarded as ‘broadband’ today probably being considered ‘narrow-band’ in a few years. But speed is only one of a set of broadband performance characteristics, including the ‘always on’ characteristic and bandwidth symmetry. It seems that whatever definition is adopted, a single number (whether it be 200 kbit/s or 2 Mbit/s or higher) would not be a useful definition of broadband.

While the definition of broadband is not simple it is important, especially in the context of considering necessary government policies to diffuse broadband deployment. Too limited a definition, such as establishing too low a data transmission rate as the broadband threshold, could result in a mismatch between expectations and capabilities, while a definition that is unrealistic in terms of technological capabilities could prompt inappropriate or poorly targeted initiatives. Moreover, broadband should be defined so as to minimise the need for ongoing adjustments. Otherwise this would create difficulties in that the definition could limit the effect of any broadband policy decisions, require frequent re-definition and intervention, create regulatory uncertainty and inhibit broadband investment.

Is broadband 'essential'? Broadband service is not yet subscribed to by a "substantial majority" of residential customers. Nevertheless, there seems little doubt that broadband is important and will be increasingly important in the future. Broadband is expected in the future to facilitate access to "essential" education, public health, or public safety offerings.

A number of arguments have to be taken into account in any government initiatives, at least at this stage of embryonic broadband deployment:

- Subsidisation programmes can limit competition because potential market entrants could be discouraged if they have to compete against a subsidised broadband provider offering high capability services at prices significantly below costs. One possibility that might be worth considering could be a system of shared financing among operators to offset the net costs of universal service obligations. However, under such programmes it will often be the incumbent who will profit.
- The perceived delay in broadband deployment and concerns about a "broadband divide" is no different from other technology 'divides' with different rates of diffusion according to location, income, education, age, gender, etc. Setting up universal service obligations should, if undertaken, be done at the mature stage of development of broadband services.
- The broadband divide is symptomatic of much deeper social, economic and educational gaps that have long existed so it is difficult to make a case for special broadband subsidies for these groups exist as a separate regime outside means-tested, targeted, general welfare programmes. Policy makers would have to choose between general welfare programmes and targeted support to low income users.
- The broadband market is so embryonic that government intervention could lead to support of a particular delivery mechanism over others that could be damaging to technological and competitive neutrality. However, at a mature stage of development of broadband services, choice of appropriate technologies to provide universal service would be possible.

- The likely high cost of delivering broadband service to consumers in rural and remote areas, should be compared against the uncertain benefits of providing subsidies. A relevant criterion for deciding to set up universal service obligations is provided by network economics. At some stage of development, there appear uneconomic customers, especially in rural and remote areas, who may benefit from the network within the framework of universal service obligations.

Drawing on the wide range of questions and issues raised and criteria proposed, the paper proposes a systematic procedure for considering USO status for broadband that includes:

- Consideration of whether broadband is an essential service of significant 'social importance'.
- Estimation of the degree of expected market penetration of broadband service.
- Assessment of the nature and extent to which broadband will not be made available by the market and why.
- Identification and specification of objectives and desired outcomes clearly and specifically
- Assessment of the extent to which market demand and delivery can/will meet the specified objectives.
- Consideration of the social and economic disadvantages incurred by those without access to broadband if there is no government intervention in this expected market situation.

  - Estimation of the costs of intervention to widen broadband deployment through the use of the USO mechanism.
  - Estimation of the costs of intervention through the use of the USO mechanism compared against the use of other approaches to establish that the USO mechanism is superior.
- Establishment that the benefits of intervention through the USO exceed the costs of doing so, taking into account the incidence of such benefits and costs (especially those on unsubsidised telecommunications/Internet/broadband Internet customers); and of effects on other communications and broader policy objectives.

Governments are adopting both 'supply-side' as well as 'demand-side' policy initiatives to support broadband deployment. It is important that this be done in a coherent, consistent and cost-effective manner. The paper proposes a systematic decision-making procedure for considering the need for broadband deployment support programmes. There are no quick, generally applicable, answers. A systematic approach to the broadband deployment and diffusion issue requires that the source of any problems be first identified and then specifically addressed with tailored cost-effective measures. Among these would be the use of universal service obligation as a possible policy instrument.

UNIVERSAL SERVICE OBLIGATIONS AND BROADBAND

1. INTRODUCTION

A common concern in OECD countries is that the 'digital divide' between those with Internet access and those without will be exacerbated with the rollout of broadband. In particular the concern is that some groups *e.g.* those residing in rural and remote areas without access to high-speed broadband networks will be unable to access the benefits expected of broadband access, such as access to on-line education, health and government services. This is expected to grow in importance as broadband becomes increasingly important to the development of business, industry, shopping and trade, as well as distance learning, telemedicine, and telecommuting.

In some countries, such concerns have led to arguments that the universal service obligations (USO), now widely applied to basic telecommunications, should be upgraded to include access to broadband capability at an affordable price.

This paper is designed to complement earlier OECD work on broadband deployment and should be read in conjunction with those papers,[1] in particular:

- "Bridging the Digital Divide: Issues and Policies in OECD Countries", DSTI/ICCP(2001)9/FINAL.
- "Broadband Infrastructure Deployment: The Role of Government Assistance", DSTI/ICCP/TISP(2001)8/FINAL.

These earlier papers discussed in some detail the government policy initiatives to promote broadband infrastructure deployment in various OECD countries. To complement these studies, the present paper conducts a more conceptual analysis of government support for broadband deployment but in a way that seeks to be operationally useful. The paper also aims to propose criteria to analyse government support/subsidy policies towards broadband deployment and the nature and extent of necessary government involvement. The paper's stance is also designed to have a constructive purpose: to strengthen demand that government policies be based on sound, systematic, data-based, analysis of broadband deployment problems and solutions.

The paper pays particular attention to the question of whether the scope of universal service should be widened to include broadband. Although the conclusion arrived at is that at this stage of broadband development and diffusion, there is not a convincing case for broadband access to be covered by universal service type mandates, the paper proceeds, nevertheless, to explore what would be involved in a systematic review of this issue. This is because a number of OECD government reports—while also reaching the conclusion that broadband service should not be part of universal service obligation—have recommended that, since circumstances could change significantly as broadband usage spreads, this issue should be revisited at regular intervals. In this context, a consideration of how a review of the scope of the USO could be conducted in a systematic manner promises to be useful.

A re-definition of USO to encompass broadband is only one possible approach to widening broadband coverage. Many governments are considering, indeed, are implementing, various initiatives to promote

broadband deployment, especially in rural communities. As previous OECD documents have pointed out, there are concerns that some of these initiatives lack consistency, coherence and cost-effectiveness. This paper embarks on the task of constructing a framework for policy development that will help ensure systematic development of cost-effective broadband deployment policy within universal service obligations.

The focus of the paper is on broadband infrastructure deployment issues. But it recognises that the broadband accessibility issue is certainly not exclusively about access to infrastructure. Indeed, as earlier OECD documents have emphasised, many other factors are also involved in broadband accessibility, including computer equipment, usage facilities and skills[2]. Nevertheless, while access to broadband infrastructure is not sufficient, it is clearly a necessary starting point to broadband accessibility.

The paper is structured in the following way. Following this introduction, Section 2 focuses on the evolving definition of broadband since a clear definition is critical for policy development purposes. Section 3 explores the extent to which broadband service can be considered essential since this is another fundamental issue in considering the extent to which government involvement in broadband deployment is necessary. Then Section 4 re-examines the rationale for government support for broadband deployment, Section 5 proposes a process for reviewing whether universal service should be redefined to include broadband. Section 6 outlines a logical sequential procedure for developing policy to support diffused broadband development. Finally, Section 7 concludes the paper.

2. DEFINING BROADBAND

'Broadband' refers to the amount of capacity or 'bandwidth' (or speed of data transfer) provided on a telecommunications network.[3] At present, most users dial-up to their ISP (Internet Service Provider) using a modem over a standard PSTN connection (public switched telephone network) with a speed of 33.6 or 56 kbit/s (kilobits per second). Because of the limit on the speed at which data can be sent via this medium, it is known as 'narrowband'.

The alternative technologies to this narrowband dial-up connection are collectively known as "broadband". Broadband access with greater bandwidth is usually provided as a permanent 'always on' connection, allowing more flexibility and allowing users to access the Internet without having to repeatedly dial in to their service provider. Previous OECD work defined broadband as providing downstream access of 256 kbit/s (and upstream access to 128 kbit/s) noting that these were the most common speeds offered by Digital Subscriber Line (DSL) in OECD countries.

The term broadband is in fact far from precise and definitions have ranged from 200 kbit/s to over 30 Mbit/s. For instance, the FCC used the term "broadband" in the First 706 Report, and later "advanced telecommunications service" in the Second and Third 706 Reports to describe services and facilities with an upstream and downstream transmission speed of more than 200 kbit/s[4] The FCC used the term "advanced telecommunications capability" to refer to "high speed, switched broadband telecommunications capability that enables users to originate and receive high quality voice, data, graphics, and video telecommunications using any technology".

Over the last few years, as broadband networks based on either DSL or cable modem technology have been deployed, speeds of around 250 kbit/s and upward have been generally regarded as broadband. Oftel defines broadband as: "… higher speed access (typically faster than 500kbit/s) to the Internet (using a variety of technologies) that enables advanced services ranging from enhanced web browsing through to true broadband services such as the ability to watch and interact with video over the Internet."[5]

The views of operators have also varied. In the US, Verizon Communications proposed the following definition: "A broadband service is one that, using a packet-switched or successor technology, includes the capability of transmitting information that is generally not less than 384 kbit/s in at least one direction or 56 kbit/s in both directions"[6].

The US Telecommunications Industry Association (TIA) argues that much of the newer services being offered today, while providing improvements over the standard dial-up access at a maximum speed of 56 kbit/s, are not quite broadband and therefore should be deemed to be "high-speed Internet access services" rather than broadband. If the term 'broadband' is used generically to include essentially any capability beyond dial-up Internet access, the TIA suggests that today's high-speed access services be referred to as "current generation broadband". The TIA professes that what it suggests be referred to as "next generation broadband" is more than experiencing somewhat quicker downloading of web page images and a slight improvement in rudimentary video streaming. Rather, it is an entirely new experience of connectivity that will enable yet to be seen content-rich applications and completely new functionalities.[7]

The definition of the term 'broadband' is likely to continue to evolve with what is regarded as 'broadband' today being considered 'narrow-band' in a few years[8]. Moreover, broadband capability is a function that can be provided by different electronic platforms and can be tailored to consumer patterns and interests. On this basis, it may be sensible to think of broadband as a wide set of technologies that generate some minimum level of high-speed bandwidth interconnection.

It is important, especially in the context of discussing government policies to diffuse broadband deployment, that broadband be defined so as to minimise the need for ongoing adjustments. Otherwise difficulties could arise in that the definition could limit the effect of any broadband policy determinations, require frequent intervention and re-definition, create regulatory uncertainty and inhibit broadband investment. Recognising this, the Canadian National Broadband Task Force avoided setting a "number", or a minimum speed that would constitute broadband[9]. The Task Force's position was that broadband is defined primarily by access technologies (of which ADSL and cable modems are currently the most popular). Similarly, Italy's Task Force on Broadband Communications adopted a definition of broadband as "broadband communications refers to the technological environment that permits the use of digital technologies at maximum levels of interactivity".[10]

A further complication is that with broadband service, the location of the bottleneck limiting transmission speed is not clear. For dial-up service, the bottleneck is generally in the 'last mile' dial-up connection. For the current generation broadband service provided by cable modems, DSL, or wireless services, the location of the typical bottleneck could be in the last mile, within the local ISP network, at the upstream linkage between the cable-modem or DSL ISP and the Internet core, closer to the host, or even in the user's PC[11]. Some of these possible bottlenecks to transmission speed have to be identified, and taken into account in broadband policy, One possibility would be a universal service mandate requiring provision of a specified minimum transmission speed.

Asymmetric transmission capacity?

Speed is only one of a set of broadband performance characteristics. Along with speed is the 'always on' characteristic and bandwidth symmetry. And symmetry also has policy implications that should be recognised. Some analysts have argued that a definition specifying symmetrical transmission capacity could be overly restrictive since customers have individualised needs that sometimes can involve variable upstream and downstream capacity. For example, residential high-speed Internet access users typically download content off the web, but do not originate large amounts of information. They may not need (more expensive) symmetrical high-speed connections and may prefer a service, such as ADSL, that

provides asymmetrical downstream and upstream transmission capacity at a lower cost. For instance, a definition of symmetrical transmission capacity could exclude technologies, such as satellite broadband services, that are part of the broadband supply landscape.

Functionality rather than a minimum speed

The above considerations support an expansive definition of broadband that encompasses the full range of services and technologies. Therefore, rather than a minimum speed, an alternative approach to defining broadband could be to state a minimum level of functionality. For instance, the US Computer Science and Telecommunications Board (CSTB) has proposed definitions that place the emphasis on the capability to run applications. The CSTB's broadband Definition 1:

Local access link performance should not be the limiting factor in a user's capability for running today's applications.

The CSTB recognises, however, that this definition of broadband correlates with a given set of applications at one point in time and as new applications appear would need to be reviewed. In fact, the performance of broadband access itself is expected to be a key factor influencing the emergence of new applications (since new applications that demand higher transfer speeds will not become commercially viable until there is a critical mass of users with the access capacity to use them). To accommodate this factor, the CSTB proposed an alternative Definition 2 of broadband:

Broadband service should provide sufficient performance – and wide enough penetration of services reaching that performance level – to encourage the development of new applications.

What should be clear from the preceding discussion is that whichever definition is adopted, a single number (whether it be 200 kbit/s or 2 Mbit/s or higher) is not a useful definition of broadband (even if one focuses only on the transmission speed issue).

The definition of broadband is an issue that can have a significant effect on decision making by various groups[12], including:

- *Consumers*, who wish to be able to evaluate service offerings to see if the offerings are likely to meet their needs.
- *Service providers*, who wish to develop, invest in, and deploy services that consumers will need and want.
- *Application and content developers*, who wish to understand and track the connectivity performance options available to consumers.
- *Policy makers or regulators*, who seek to monitor broadband service deployment and measure the impact of policy or regulatory decisions on deployment, define the characteristics of services eligible for government support.
- *Public interest groups*, seeking to evaluate capabilities available to consumers and to understand the implications of alternative policy approaches that influence those capabilities.

Too limited a definition, such as establishing too low a data transmission rate as the broadband threshold, could result in a mismatch between expectations and capabilities, while a definition that is unrealistic in terms of technological capabilities, costs, or consumer demand could prompt inappropriate or poorly aimed policy interventions.

Of particular importance to this paper is that the absence of a consensus on the definition of broadband service will make it all the more difficult to establish objectives/targets for universal service (and other) policies. However, progressively upgrading the level of bandwidth and avoiding transmission bottlenecks does not seem out of reach within the framework of universal service obligations.

3. IS BROADBAND ESSENTIAL?

Broadband is characterised by high-speed, 'always on' connection and has the capability to support many applications including e-commerce, education, health care, entertainment, and e-government. Broadband can be used to stream audio and video over the Internet at a much higher quality than narrow band and it provides a platform in which service providers have the ability to develop and deliver new content, software, and technology. Not only new applications but also existing services can be accessed more quickly and conveniently through broadband technologies.

It is expected that with growing use, new content and applications requiring broadband capabilities, broadband is likely to take on increasing socio-economic importance in the future. As a result there is concern that those without an enhanced data capability will be unable to access the benefits expected, particularly in relation to education[13], health[14] and government services[15]. This concern is seen to be greatest in relation to those living and working in rural and remote areas since the lower rates for data access for these consumers places them at a disadvantage in comparison with metropolitan consumers.

But is access to broadband essential? Are there services that are necessary that cannot be accessed through dial-up Internet access? The answers to these questions are relative to the state of development and diffusion of broadband and broadband applications.

At present, broadband is for the most part a means of faster web browsing, e-mail, messaging, games, and audio download and streaming. These are possible with dial-up, although their performance and convenience are significantly improved with broadband. This does not mean that broadband is essential rather it provides an easier means for access. Broadband service is at present subscribed to by only a relatively small minority of residential customers and the point where a "substantial majority" of residential customers subscribes to broadband services seems some time off. Indeed, questions have been raised about the perceived value of broadband to residential customers. For instance, in the US, there are suggestions that residential consumers have not been subscribing to broadband access because they do not see the need for the service (at least at current prices[16]) if they use the Internet primarily for e-mail, instant-messaging, and ordering items from online retailers. In Canada, the CRTC has traditionally used the criterion in defining the scope of universal service that a new advanced service has to develop sufficiently in the market and to reach a sufficient level of ubiquitous national penetration so that the lack of service could lead to social and economic disadvantage. Using this criterion it is evident that, at present levels of market penetration, and present levels of service development, broadband access should not be considered as coming within the scope of universal service obligation definitions. However broadband access in the home is expected by most analysts to become essential to participate in society.

At downstream speeds of several tens of megabits per second, new applications are enabled, including streaming of high-quality video, or high-definition television (HDTV), download of full-length (70- to 90-minute) audiovisual files in tens of minutes (rather than hours), and rapid download of other large data files. Reaching this level of data speed would enable true television-personal computing convergence. With comparable up-stream speeds, computer-mediated multimedia communications become possible, including distance education, telecommuting, etc. With FTTH (fibre to the home), a new performance level with gigabit speeds both up- and downstream would be reached supporting the delivery of numerous new applications many yet to be developed. Broadband technology will enable users to originate and receive data, graphics, and video and in the future integrated voice services.

So there seems little doubt that broadband is important and will be increasingly important in the future. In analysing social needs, there is a time when a service reaches a threshold where it becomes useful and shows great promise and is viewed as playing a crucial role in meaningful participation in society. In such a context, enlarging broadband access through universal service obligation may become a public policy objective.

4. WHAT CONSIDERATIONS SHOULD GUIDE DECISIONS CONCERNING NECESSARY GOVERNMENT SUPPORT FOR BROADBAND DIFFUSION / DEPLOYMENT?

Constraints to market provision

Despite the emergence of new technologies and market conditions, the delivery of broadband services to regional, rural and remote areas is likely to continue to be difficult. The distinctive features of these areas, such as a low population and revenue base are a significant disadvantage for a service supply industry based on economies of scale[17]. Invariably the cost per customer of supplying terrestrial services in these areas will remain significantly higher than in more densely populated areas[18]. Not surprisingly securing market share in metropolitan and regional centres will be of higher commercial priority to operators.

Demand is even more likely to fall short of economic provisioning in areas that are very sparsely settled, or that are facing structural decline. In such areas, demand prospects will not justify the competing investment needed to generate effective competition.

In addition, rural customers can be significantly disadvantaged compared with urban customers in regard to service prices. In the early days of Internet development usage rates in some countries in regional areas were calculated on timed/distance tariffs so that rural customers paid more than the local call connection rates enjoyed by urban customers and those who can access points-of-presence. There may still be areas where dial-up Internet subscribers have to pay long distance charges but they are rapidly being converted to allow for access using local call numbers. On the other hand, ADSL is being offered across the OECD at flat rate charges which will significantly reduce payments for local call charges paid by many subscribers in countries where charges for local calls are time based.

Rural customers are being disadvantaged in terms of pricing in a number of countries because pricing for ADSL, and the underlying wholesale price for unbundled local loops or bitstream access, are being priced at cost. In many OECD countries the price for telephone subscriber lines is geographically averaged, that is, all geographic areas within a country pay the same price irrespective of whether there may be cost differences in supplying the subscriber line. With the advent of unbundling, the price for unbundled local loops is based on cost. Some regulators have maintained geographic averaging for these unbundled loops, while others have allowed the incumbent to charge for loops at cost. The result is that the system of geographic averaging of prices, as concerns access to unbundled local loops, or ADSL-enhanced loops, is being abandoned in some cases. Nevertheless many incumbent companies are maintaining a single nation-wide retail ADSL charge. Universal service obligations do not necessarily require geographical tariff averaging.[19]

Of the four categories set out in Box 1, market forces are least likely to operate adequately where a region has low density as well as low demand, and the problems of providing broadband access become most challenging. And this has led to arguments for government intervention to enable broadband deployment, lower connection and data access prices and improved quality/reliability of service, particularly in rural and remote areas. All of these considerations highlight the need to examine how to meet the needs of users in remote areas. The resort to universal service obligations is but one option.

Box 1. Density and demand factors and prospective broadband availability

	High density	Low density
High demand	Competition/market Solutions adequate	Universal service mechanisms, availability of new technology enabling declining incremental cost, demand aggregation initiatives
Low demand	Economic and community development approaches, publicising broadband benefits	Most challenging, universal service obligations, government financial support, government ownership

Source: Adapted from US Computer Science and Telecommunications Board, "Broadband: Bringing Home the Bits", November 2001, p. 154.

Some views challenging the need for government involvement in broadband deployment

There are a number of arguments against government initiatives at least at this stage of broadband deployment that warrant attention. These arguments concerning the need for government action deserve attention because they highlight the difficulties involved in determining the nature and extent of policies and programmes necessary to widen broadband accessibility. These views also strengthen demands that broadband deployment policies be based on sound systematic data-based analysis.

Discouragement of competitive entry

Subsidisation programmes can have the effect of limiting competition because potential market entrants could be discouraged if they have to compete against a subsidised broadband provider offering high capability services at prices significantly below costs. For instance, incorporating a minimum data requirement into the USO can impact adversely on the development of competition in the industry, both by an imposition of higher USO levies on an incumbent's competitors, and by further entrenching subsidisation of the incumbent's services in USO net cost areas. This development may well have the effect of dissuading innovative alternative providers from entering regional markets (since high-speed data services can be delivered through a number of different platforms, many of which are offered by new competitors).

The maintenance of a cross-subsidy based regime results in prices in more profitable areas of the market being higher than would otherwise be necessary. Such an approach runs the risk that the supply of new services to meet the real needs of regional, rural and remote areas is either further delayed or simply does not materialise. Thus subsidisation programmes may turn out to have only short run advantages if they result in adverse long run outcomes, including distortions to the nature, extent, and speed of technological innovation and investment. A shared financing among operators may seem preferable to offsetting the net costs of universal service obligations by subsidisation schemes carried out by local bodies or the State. Nevertheless, a shared financing of USO costs among operators also entails the maintenance of a cross-subsidy regime. A charge is included in the costs incurred in more profitable areas of the market to offset the net costs of uneconomic customers (principle of geographical tariff averaging).

Broadband divide or broadband delay?

There are those who argue that the perceived delay in broadband deployment and concerns about a "broadband divide" is no different from other technology divides with different rates of diffusion[20] according to household/individual by income, education, location, age, gender. For instance, they point to the fact that subscribers to cable TV include a large representation of lower-income families to support the argument that when people view broadband to be as important as cable TV, they will find a way to pay for the entertainment it provides.

With regard to the question about whether there are areas of a country or persons that are unlikely to receive broadband service through the operation of marketplace forces, they answer that it is still much too early to tell. Advanced services are new, and the technology itself is still evolving. Furthermore, they consider that market forces appear to be encouraging broadband deployment at a reasonable pace. Setting up universal service obligations, if it is necessary, has to be done at the mature stage of development of broadband services

While some accept that to an extent the broadband divide is a "broadband delay", they remain concerned that the need to wait a "few years" for technology to trickle down to rural and remote areas and other underserved groups can be a serious disadvantage. Each year of being connected is seen to be critical to economic and educational advancement and to community participation.

Symptomatic of a broader divide?

Some have pointed out that the broadband divide is a symptom of much deeper social, economic and educational gaps that has long existed and the broadband accessibility issue has simply made these issues more pronounced[21]. They ask why special programmes should be put in place for broadband Internet access? Where, for equity reasons, certain socio-demographic groups are deemed to require assistance, why should special broadband subsidies for these groups exist as a separate regime outside means-tested, targeted, general welfare programmes. But others would argue that regardless of whether it is a case of broadband divide or delay, it would be up to policy makers to choose between general welfare programmes and targeted support to low income users to overcome differences.

Why should urban dwellers subsidise rural dwellers (any more than the converse)?

There are those who question whether urban dwellers should be obliged to subsidise high-cost rural broadband Internet users, any more than rural residents should be forced to subsidise high urban rents? Because there are benefits of diffused broadband Internet access[22] does not necessarily mean that subsidies to meet those needs are necessary. They argue that as far as possible, the broadband Internet needs of rural areas can be met through market forces over the course of time, as with the diffusion of other technologies. But at some stage of development, there are likely to be uneconomic customers, especially in rural and remote areas, for whom it may be useful to enlarge access to broadband networks.

Risks to technological neutrality in the embryonic broadband market

There are fears that the broadband market is so embryonic[23] that government intervention will distort it[24]. There are potentially several competing routes to the provision of higher bandwidth services, including ADSL, cable modems, 3G mobile services and satellite. Regulatory intervention to support a particular delivery mechanism over others could be damaging[25]. For consumers to receive the full benefits from broadband, market forces that reflect consumer needs should determine what technology is appropriate for the provision of particular services. For example, a service obligation utilising ADSL alone might lead to other technologies and delivery routes not being developed thereby restricting both consumer choice and a country's e-commerce and knowledge-economy development. At the mature stage of development of broadband services, choosing the best fitted technologies to provide universal service obligations should be possible.

High cost, uncertain benefits

Another issue is the practical one of the likely high cost of delivering broadband service to consumers in rural and remote areas. A requirement on a carrier to supply, for example, ADSL to every household that reasonably demands such a service, could require a substantial upgrade of the carrier's network. In some areas the copper loops supplying some households may be too long to be reached by ADSL technology.

Thus, supplying higher bandwidth services widely, regardless of location, could necessitate construction of new infrastructure requiring considerable investment.

One estimate by the US National Exchange Carrier Association (NECA) is that the cost of upgrading rural networks to provide advanced services in the US would be approximately USD 11 billion[26]. Moreover, it has been estimated that it would cost non-common line pool companies (*i.e.* RBOCs) an estimated USD 80 billion to rehabilitate "last-mile" facilities for broadband capability.[27] Even assuming that only the rural common carrier line pool companies receive support for upgrading "last-mile" facilities, the US universal service fund would need to grow considerably.

On the other side of the cost-benefit balance sheet, the benefits of providing subsidies are uncertain and very difficult to estimate. A multi-billion dollar cost for something for which consumer demand and proven benefits are unclear warrants a prudent wait-and-see approach. The cost of broadband access may justify a step by step approach to progressively upgrade the level of bandwidth in the framework of universal service obligations.

5. UNIVERSAL SERVICE OBLIGATIONS AND BROADBAND

One way governments can support investment in broadband services to subscribers in high cost areas (usually rural and remote regions) is by redefining universal service or universal access obligations to include broadband services.

Provisions relating to the supply of "universal service obligations" (USOs) for basic telecommunications are now widespread in various countries. In essence, USOs constitute a requirement that telecommunications operators provide basic voice telephone service to all who request it at a uniform and affordable price even though there may be significant differences in the costs of supply. Applying such a traditional USO approach to broadband services would mean giving all consumers (including those in regional, rural and remote areas) the right to a broadband connection on reasonable demand at affordable prices.

By comparison, a policy of "universal access" generally refers to a situation where every person has a reasonable means of access to a publicly available broadband service. Universal access may be provided through community telecommunications centres, teleboutiques, community broadband Internet access terminals and similar means. While universal service and universal access policies can be quite different, the concepts are closely related and the terms are sometimes used interchangeably. Universal access may also be interpreted as not addressing the issue of "affordable price". In the case of ISDN many regulators, especially in Europe, required that ISDN should be available throughout the country on demand, but prices for ISDN access were left to the market.

In practice, no OECD countries have yet taken steps to include broadband access as part of universal service, although the United States included some broadband service, specifically connecting schools and libraries and advanced telecommunications services for rural health care services. Australia introduced a universal service obligation for data services in 1999. However, the so-called DDSO (Digital Data Service Obligation), while available to 96% of households in Australia, is not actually broadband as it offers only the equivalent of ISDN (64 kbit/s)[28]. However, the DDSO is aimed at ensuring that all Australians can get access to a data service that is faster than dial-up access.

Oftel, the UK regulator, has argued that the universal service regime is still an inappropriate tool for widening broadband coverage in the early stages of market development: *"...historically universal service has been founded on the basic principle that the majority of consumers who use a telephone service can afford to cross-subsidise the limited, basic needs of a small minority that might otherwise miss out. That*

principle does not translate easily to the provision of expensive new technology at affordable prices, at least in the early stages of market development."

But Oftel concluded that the issue of an extension of the USO to include higher bandwidth services should be kept under periodical review[29]. Services should have claim for categorisation as a USO if the level of penetration reaches a point at which "unacceptable social and economic disadvantage is placed on customers lacking access to those services".

In the US, the Computer Science and Telecommunications Board report recommended that a universal service policy for broadband be deferred until the nature of broadband services, the pace of deployment, distribution of access, and social significance becomes clearer[30].

Incorporating a broadband requirement into the USO is likely to require a significant investment in upgrading the operator's customer access network. This can impact adversely on the development of competition in the industry, both by any imposition of higher USO levies on an incumbent's competitors, and by further entrenching subsidisation of the incumbent's services in USO net cost areas. Such a development may well have the effect of dissuading innovative alternative providers from entering regional markets (since high-speed data services can be delivered through a number of different platforms, many of which are offered by new competitors).

The delivery of new services on a highly cross-subsidised, uniform priced, basis presents the risk of reducing or eliminating the prospect of competitive entry and could discourage the incumbent from further investment and service improvement in non-profitable or less profitable areas of the market. At the same time, the maintenance of a cross-subsidy based regime results in prices in more profitable areas of the market being higher than would otherwise be necessary. Such an approach runs the risk that the supply of new services to meet the real needs of regional, rural and remote areas is either further delayed or simply does not materialise. A requirement to provide national coverage of broadband in the context of a universal service framework could also result in strengthening the incumbent's dominance since at present it is only the incumbent that would have the ability to provide broadband on a national basis. A shared financing among operators may seem preferable to offsetting the net costs of universal service obligations by subsidisation schemes carried out by local bodies or the State. Nevertheless, a shared financing of USO costs among operators also entails the maintenance of a cross-subsidy regime. The cost could be made uniform only through substantial transfer payments within the system. A charge is included in the costs incurred in more profitable areas of the market to offset the net costs of uneconomic customers (principle of geographical tariff averaging). This approach that was possible in the simple, more static world of telephony is perhaps more difficult to carry out in the less well-defined, rapidly changing, competitive world of broadband.

One size does not fit all

Broadband is not a uniform service. Different users have different needs, and different technologies deliver different variants with different features as well as cost and performance characteristics. An expanded USO may present the risk of overlooking promising features of the new competitive marketplace: the enhanced ability to tailor the price and capability of service to specific user needs and socio-economic constraints. An expanded USO with a one size fits all approach could discourage the market from discovering and supplying the solutions that are optimal for various groups. The USO mechanism, which assumes a common set of needs and can limit competition, would be ineffective in promoting equity of choice. It would be up to policy makers to choose between general welfare programmes and targeted support to low income users to overcome the differences.

The geographical access divide is much smaller if the infrastructure access requirements are not the same across regions, and if such trade-offs as lower reliability (*e.g.* satellites are susceptible to rain fade), higher latency, lower data rates, or higher up-front and monthly costs are permitted.

Defining an appropriate universal service policy for broadband may be complicated. As technology and use will evolve, what is broadband today will not be considered so in the future. One cannot employ a simple universal definition for broadband such as "faster than 200 kbit/s". Progressively upgrading the level of bandwidth to avoid transmission bottlenecks would require a dynamic definition for broadband USOs allowing for progressive change in network offerings over time.

Questions relating to a broadband USO

In considering whether advanced services should be included in the definition of universal service, a range of questions need to be addressed. The list of questions below is not intended to be exhaustive, but rather to indicate some key issues that policymakers must endeavour to answer.

- What is the nature of broadband service and why is there concern to ensure wide access to it?
- Is broadband essential *e.g.* to education, health care, or public safety, such that its provision needs to be made mandatory? If so, in what way?
- Are advanced services being deployed in telecommunications networks? If so, to what extent?
- Are advanced services being subscribed to by a substantial majority of residential customers?
- Are certain, identifiable segments of the population not subscribing to advanced services? Why are these segments not subscribing? Price? Availability of service? Low perceived value?
- What are the market trends regarding adoption rates of advanced services? Have advanced services been adopted at a rate comparable to other technologies?
- What role should governments play in the diffusion of broadband service?
- Is a re-definition of universal service obligations to include broadband appropriate?
- What exactly is meant by extending universal service obligations in the case of broadband?
- If the government were to subsidise advanced services, what services would be subsidised? How would "advanced services" be defined for universal service purposes?
- Should a minimum data transmission capability be specified or should some other approach be used?
- If not now, at what point might it become appropriate to upgrade the level of universal service in the future? What is the nature of broadband service that would qualify it for USO status?
- What criteria are appropriate in assessing whether the level of universal service should be raised to include broadband?
- Would a USO concerning broadband cover only DSL or would substitute technologies such as satellite (the Australian case) and wireless be adequate? Is it appropriate to include narrowband ISDN or 3G broadband mobile in the universal service obligation?
- What cost implications would an upgrade of the USO to include broadband have?
- If there is a cost involved, who should pay for it - operators or government from *e.g.* general tax revenues; a part of receipts from the privatisation of a telecommunications operator or from 3G licensing?

- Should a universal service policy be adapted to include a wider variety of service providers and technologies?
- Would this suggest a 'pay or play' model in which a range of operators contribute to the provision of universal service through direct provision as well as, or instead of, contributing to a universal service fund?
- What would the direct costs of any subsidisation be? How would this affect charges to customers? Would the costs outweigh the benefits?
- What would the *indirect* costs of subsidisation be, *e.g.* would the subsidies be technologically and competitively neutral? How would subsidies affect competition?
- What funding mechanisms would need to be established?
- What changes to any existing funding mechanism would need to be made?
- What are the alternatives to the use of universal service obligations and would they produce equal or better benefits with less costs? What about greater state and local government intervention? Community-based programmes? What about grants, loans, and tax credits? Increased incentives for private investment? Market forces?
- If universal service support were provided for advanced services, how would the support levels be determined?
- To what extent can subsidies be provided in a competitively and technologically neutral broadband access[31]?

- What systems should be put in place to monitor and assess cost-effective delivery of broadband USOs?

Criteria for assessing USO status

What criteria have been proposed for assessing the need to apply a universal service provision to broadband?

In the US, the threshold legal requirement triggering a decision that a service must be supported demands that the service have characteristics that are substantially related to the four "factors" outlined in section 254(c)(1) of the 1996 Telecommunications Act: *(1)* the service is "essential" to education, public health, or public safety; *(2)* the service is subscribed to by a "substantial majority of residential customers"; *(3)* the service is being deployed in public telecommunications networks; and *(4)* the decision to support the service is in the public interest. Satisfaction of the four criteria does not necessarily trigger a decision that a service must be added to the list of supported services. Instead, before deciding whether to include or remove telecommunications services from the definition of supported services, the statute requires that the extent to which such services satisfy the four criteria be considered.

The Australian Bureau of Transport and Communications Economics suggested a five-step framework for considering a possible contender for an upgraded USO that involved[32]:

1. Adequately identifying and defining the product.
2. Determining that the product is sufficiently 'essential' to justify the major policy interventions associated with a USO designation.
3. Determining that costs are reasonable relative to benefits.
4. Finding a practical and efficient implementing mechanism.
5. Working through any likely effects on other policy goals.

In Japan, the scope of universal service is to be periodically reviewed approximately every two years taking into consideration:

- The degree of popularisation of the service.
- The social need for the service.
- Technological advances.

In Europe, the EU's Directive on Universal Service and Users' Rights[33] concludes that the scope of universal service should not be extended to include higher bandwidth services at this stage of its development. However, the Directive requires that the European Commission carry out a review of the scope of universal service obligations "within two years of 2003". This review would take account of social, economic and technological developments, including mobility and data rates in the light of the prevailing technologies used by the majority of subscribers.

EU review of the scope of USOs

In considering whether a review of the scope of universal service obligations should be undertaken, the Commission is to take into consideration the following elements:

- Social and market developments in terms of the services used by consumers.
- Social and market developments in terms of the availability and choice of services to consumers.
- Technological developments in terms of the way services are provided to consumers.

In considering whether the scope of universal service obligations be changed or re-defined, the Commission will take into consideration the following elements:

- Are the specific services available to and used by a majority of consumers and does the lack of availability of non-use by a minority of consumers result in social exclusion.
- Does the availability and use of the specific services convey a general net benefit to all consumers such that public intervention is warranted in circumstances where the specific services are not provided to the public under normal commercial circumstances?

In proposing any change or re-definition of the scope of universal service obligations, the Commission may consider the following options:

- Propose a change or re-definition of the scope of universal service obligations but require that any net costs are financed only via general government budgets.

- Propose a change or re-definition of the scope of universal service obligations and permit any net costs to be financed by mechanisms in conformity with the EU Directive.

Alternatively, the Commission may propose that specific services should become mandatory services to be provided under cost oriented obligations.

According to EC directives, connections to the public telephone network at a fixed location should be capable of supporting speech and data communications at rates sufficient for access to online services such as those provided via the public Internet. The data rate that can be supported by a single connection to the public telephone network depends on the capabilities of the subscriber's terminal equipment as well as the connection. For this reason it is considered appropriate to mandate a specific data or bit rate at Community level. Currently available voice band modems typically offer a data rate of 56 kbit/s and employ automatic data rate adaptation to cater for variable line quality, with the result that the achieved data rate may be lower than 56 kbit/s. In specific cases where the connection to the public telephony network at a fixed location is clearly insufficient to support satisfactory Internet access, member states should be able to require the connection to be brought up to the level enjoyed by the majority of subscribers so that it supports data rates sufficient for access to the Internet. Where such specific measures produce a net cost burden for those consumers concerned, the net effect may be included in any net cost calculation of universal service obligations.

The new Universal Service and Users' Rights Directive of the EU allows member states to set levels appropriate to their own circumstances thus removing the minimum data speed requirement from legislation. One reason for this is that the minimum data speed needs to reflect technical limitations of networks. For instance, where there are long connections between the exchange and the customer's premises, speeds in excess of 14.4 kbit/s may be difficult to achieve without significant network upgrades. The minimum would need to reflect such circumstances and be based on what is practicably achievable across the network. In addition to a minimum standard, the Commission considers it may be appropriate to ensure that an operator responds to all reasonable requests for non-voice services including data telephony.

In the UK, BT and Kingston are subject to an obligation to provide a minimum data speed of 2.4 kbits/s in accord with EC directives. However, since in practice most users (*e.g.* over 90% in the UK) experience much faster speeds of 28kbits/s from the end user to the Internet service provider such rates provide adequate speeds for reliable access to e-mail services and many current uses of the Internet.

While recognising that the user's modem speed and the capability of the service provider will affect the data speeds experienced by the Internet user, Oftel's position is that appropriate data speeds for networks should be set within the USO in line with the Government's goals of universal Internet access by 2005. The UK's submission to the European Commission's 1999 review of European legislation proposed that Member States should be given greater flexibility in setting minimum data speeds[34].

A systematic process for considering USO status for broadband

Drawing on the range of questions/issues raised in section 5.2 and the criteria proposed in section 5.3, Box 2 indicates a framework for systematically considering whether to re-define the USO to include broadband.

Box 2. A systematic procedure for considering USO status for broadband

A systematic process for considering the need to re-define USO should include:

1. Consideration of whether broadband is an essential service of significant 'social importance'
2. Estimation of the degree of expected market penetration of broadband service
3. Assessment of the nature and extent to which broadband will not be made available by the market and why
4. Identification and specification of objectives and desired outcomes clearly and specifically
5. Assessment of the extent to which market demand and delivery can/will meet the specified objectives.
6. Consideration of the social and economic disadvantages incurred by those without access to broadband if there is no government intervention in this expected market situation.
7. Estimation of the costs of intervention to widen broadband deployment through the use of the USO mechanism
8. Estimation of the costs of intervention through the use of the USO mechanism compared against the use of other approaches to establish that the USO mechanism is superior.
9. Establishment that the benefits of intervention through the USO exceed the costs of doing so, taking into account the incidence of such benefits and costs (especially those on unsubsidised telecommunications/Internet/broadband Internet customers); and of effects on other communications and broader policy objectives. (Intervention should only occur where overall benefits persuasively outweigh overall costs and where a substantial increase in the level of USO expenditure would not result.)

Is broadband essential?

Section 3 concluded that broadband, while not an essential service at present, could increasingly become essential. There is little doubt that broadband is a desirable and useful service, and that it is likely to be of increasing economic and social importance in the future. There is a time when a service being useful and showing great promise becomes crucial to meaningful participation in society. However, the fact that there is widespread availability of dial-up Internet access across most OECD countries may reduce any urgency in designating broadband access as essential.

High-speed, broadband access does not today provide access to any essential education, public health, or public safety offering but is expected to do so increasingly in the future. High speed broadband access will increase the interest of getting access to any essential education, public health or public safety offering. Internet access services do allow an end-user to reach the Internet and its valuable information, and that information will be more and more a necessity.

Not used by majority

Although there might be argument about what level of penetration would constitute a threshold for establishing a 'majority', there would be little argument that at present, we are far from the point where it might be claimed that a "substantial majority of residential customers" subscribes to dial-up Internet service, let alone broadband Internet services.

Clear and specific articulation of the objectives and coverage of universal service for broadband access

It is crucial to specify the intended beneficiaries clearly. The rationale behind specified goals should be clarified and explained to telecommunications providers as well as users[35]. Although a number of countries set a specific date for broadband completion, *e.g.* 2004 or 2005, the reasons for adopting this timeframe have not fully been explained and justified thus far. It should also be recognised that the timing

of broadband deployment is significant since the earlier the date, *i.e.* faster the speed of deployment, the greater the likelihood of more extensive government intervention in the market to spur investment. In deciding on the targeted speed of broadband deployment, a government should strike a balance between market development and social needs.

Estimate the cost of programmes for universal service for broadband access.

Decisions about policies and programmes to address the digital divide must of course be made in the context of programme costing and funding. The costing principles, process and outcomes should be transparent, subject to audit and regular disclosure. The cost of universal service programmes is a key factor in considering whether to introduce universal service for access to higher bandwidth services. However, the debates over the appropriate costs of providing USOs warn of significant difficulties in ascertaining the costs of programmes. Moreover, in the case of broadband, the marketplace is in its infancy and evolving in uncertain directions and this leads to significant difficulties in estimating costs in regard to per-subscriber costs and take-up rates.

Is a cross-subsidy *within* higher bandwidth services (*i.e.* economic users of such services subsidising uneconomic users) likely to be supportable (when economic users are still in a minority)? A further possibility is cross-subsidy *between* services (*i.e.* from ordinary voice telephony users to higher bandwidth users). This would involve profits from ordinary telephone services being used to subsidise access to higher bandwidth. The result would be higher telephony charges than without such a cross-subsidy. In view of the sums likely to be involved, this effect could be significant. The requirement to contribute to any universal service fund for broadband support might also create a barrier to entry for new telecommunications operators, which would be to the long-term disadvantage of all consumers.

There is also the question of costing methodology design and its practical application. For example, whether the cost methodology use historical cost data or forward looking costs that approximate the hypothetical costs of an efficient carrier in constructing and operating its network. Those costs, minus a "revenue benchmark" taking account of all of a carrier's revenues, determine the subsidy amount. But in practice forward-looking costs have proven to be notoriously difficult to determine and vary from place to place and time to time.

One estimate of the dimension of costs involved in the US is that "even with a conservative estimate of USD 1 000 as the average cost of wiring an individual residence, the total cost of building new broadband infrastructure – such as rewiring to provide FTTH (fibre to the home) to all the 100 million US households – would be about USD 100 billion. A major portion of this figure is in construction costs that are not amenable to significant cost reductions. Some broadband deployment will be accomplished as part of the conventional replacement and upgrade cycles associated with telephone and cable systems, but providing broadband also requires additional investment in infrastructure upgrades and broadband-specific equipment.[36]

In Sweden, the budget for regional network development and remote/rural broadband access which is aimed at ensuring that there is nationwide broadband access has been estimated at SEK 5.25 billion.[37] Substantial (50%) subsidies are to be paid to carriers for regional/remote broadband access development. The government will also fund SEK 3.2 billion, including SEK 1.2 billion for tax credits to end users, and SEK 1.2 billion for municipal broadband expansion.

Some governments (*e.g.* Australia) consider that the difficulties of using cost models to determine the level of subsidies for telecommunications in high-cost areas might be avoided by using a competitive tendering approach[38]. An auction could be held to decide on the universal service provider, with the lowest bidder getting the universal service subsidy. The AUD 150 million allocation is designed to leverage an

improved communications outcome for rural and remote Australia. The 'beauty contest' style tender for provision of the standard telephone service in the 'extended zones' provides the opportunity to test the competing claims of Telstra and other service providers regarding their capacity to serve rural and remote Australia. The enhanced contestability reduces barriers to entry, particularly in regional areas, and seeks to lead to increased competition and service improvement.

Net costs

Another issue is whether the *benefits* of serving underserved areas[39] should also be recognised so that the cost estimate should be of *net* costs. For instance, Oftel estimated in 1997 that the benefits to BT as the universal service provider came close to offseting the costs leading to the conclusion that *net* costs of delivering USOs were insignificant and could be borne by BT without the need to establish a universal service fund[40].

It is arguable that there are similar intangible potential benefits to being the provider of programmes relating to broadband deployment and that these benefits should be recognised in costing and funding programmes.

Consider the relative merits of alternative mechanisms for funding universal service for broadband access.

Whatever the funding mechanism chosen, it is important to ensure that it is carefully structured and targeted so as to minimise market distortions.

Arguments on behalf of uneconomic subscribers should be constrained by the need not to impose an unreasonable cost burden on other (economic) subscribers. Universal service is based on a cross-subsidy from one group of customers to another. For basic telephony, this may not be an excessive burden because:

- The infrastructure already exists.
- Most people already have a telephone.
- The numbers that need to be cross-subsidised are quite small.

But the provision of access to higher bandwidth services is an unproven market and the circumstances, at present are very different from those applying to basic telephony:

- There are high costs associated with roll-out of the product, probably running into billions of dollars.
- Because of the immature state of the market, there is little revenue to cover the cross-subsidy (and it is far from clear what future revenue streams will be).
- As a basic access package is likely to cost more than basic telephony, the numbers of people who find they can not afford it, and therefore need to be subsidised, is likely to be much higher.

Many countries have recognised that to require telecommunications operators to bear the cost of providing support for advanced services to schools, is a significant change in USO principles and practice. Even where the reasoning in favour of special support for these institutions is accepted, the requirement that telecommunication operators or consumers bear the cost of subsidised provision is open to challenge.

In the European Union, the guidelines prohibit funding of schemes outside the scope of the formal USO definition from a Universal Service Fund. This does not prohibit national governments from

designing assistance schemes for access to Information Society programmes, so long as they are funded separately (*e.g.* from general revenue).

The argument applies more generally to the funding of various broadband support initiatives. To the extent that the objectives of the programmes are identifiable, funding for these initiatives could be appropriately drawn from the various bodies concerned with, for example, education, health, the arts, information technology, etc. Programmes focused on the broader objectives of broadband Internet access and usage should be funded from broader revenue sources rather than a universal service fund financed by telecommunication operators. Governments could encourage, sponsor and co-ordinate funding programmes drawing in initiatives, support and funding from various bodies concerned.

Universal service obligation may include schemes in favour of people with low income. But, it is important to bear in mind that many governments pay for, or subsidise, the purchase of food, shelter, clothing, and education for specific socio-economic groups without imposing the cost on the suppliers or retailers. Are the reasons why things should be different in communications compelling enough? With telecommunication operators increasingly operating in competitive markets and circumstances similar to those in other industries, they should be increasingly treated in a similar way with similar obligations and rights. As the telecommunications industry converges with the broadcasting and information technology industries, this need for symmetric treatment becomes even more important.

Implementation mechanisms

The choice of implementation mechanisms should be guided by a range of criteria[41], including:

- *Sufficiency*: Does the mechanism ensure comparability of service and rates between urban and rural customers?
- *Affordability*: Does the mechanism enable providers to offer the supported services in an affordable manner?
- *Competition*: Does the mechanism encourage and facilitate competition by precisely targeting support to high cost customers?
- *Flexibility*: Is the mechanism able to evolve as new technologies are introduced, as competition develops, and as the definition of universal service changes over time?
- *Protection and advancement*: Does the mechanism prevent degradation of the existing infrastructure and the current level of service? Does the mechanism produce an investment incentive to upgrade facilities used to provide universal service?
- *Portability*: Can the mechanism provide all eligible operators with an appropriate amount of support in a competitively neutral manner?
- *Predictability*: Does the mechanism enable a competitor or incumbent carrier to determine in advance the amount of support it will receive on behalf of a customer?
- *Practicality*: Is the mechanism economically and administratively viable?
- *Transparency:* Is the mechanism transparent and open to monitoring and review?
- *Cost-effectiveness:* Does the mechanism enable objectives to be achieved at least cost?

Monitoring and periodic review

A dependence on a competitive market and the dynamic circumstances of today's unparalleled technological developments demands considerable effort to monitor and assess market effectiveness and a

preparedness to periodically revisit policies and programmes. This highlights the need for good data. Indeed, improved information is crucial for assessing the nature and scope of any problems and for developing well-targeted and cost-effective strategies for overcoming them. Monitoring the extent to which competition in broadband markets is delivering its promised benefits is a critical task.

There should be vigilance that traditional government monitoring and review processes do not become sluggish and indeed, ineffective or, worse, counter-productive and that where this has occurred, monitoring processes are re-engineered to fit the new environment.

There are signs that this is starting to happen. Policy makers are monitoring progress to determine whether there are disparities in access, quality of services, or pricing that need to be addressed. In particular, it is being recognised that the barriers to widespread broadband deployment need to be regularly measured, monitored, assessed and addressed. In some countries regulators are requiring regulatory reporting on carrier performance including carrier response times to customer requests for higher bandwidth data services, particularly in regional, rural and remote areas. In addition, measures of carrier responsiveness in the provision of broadband services and market data on narrowband Internet services and on higher bandwidth Internet services in order to increase transparency in the market and assist policymaking. Performance indicators to track progress toward reaching targets are being established.

Relationship to other policy goals

At a time of increasing competition and privatised operators, rapid technological change and convergence, it is important that equity-oriented programmes do not result in distortions to *competitive neutrality* not only among telecommunication operators but between telecommunication and other communication suppliers and, indeed, other (non-communication) suppliers as well. The principle of competitive neutrality also insists on the need for *technological neutrality* particularly at a time of accelerating convergence. This is being increasingly recognised.

6. TOWARDS COST-EFFECTIVE POLICIES TO SUPPORT BROADBAND DIFFUSION / AVAILABILITY

Governments can and are adopting both 'supply-side' as well as 'demand-side' policy initiatives to support broadband diffusion. Universal service obligations for broadband access are only a part of a wider spectrum of policies. Before choosing to set up an USO policy, policy makers have to compare the costs and benefits of such a policy with other possible ones.

Supply-side government initiatives

A rough classification of supply-side government policy initiatives[42] is as follows:

- Facilitating competition, including through pro-competitive regulation.
- Financial support, *e.g.* to telecommunications providers.
- Owning the infrastructure and leasing it to telecommunications providers or end-users.

Facilitating competition

To facilitate competition and support broadband deployment, a number of OECD governments have initiated policies (or are considering the need) to:

- Relax rules to ease market entry and stimulate investment.

- Promote facilities-based competition[43].
- Recognise that facilities-based competition will not occur in all places, and design appropriate policies to address gaps.
- Ensure appropriate radio spectrum for wireless broadband and associated capabilities.
- Reflect the convergent nature of broadband and target policy at the appropriate layer.
- Regulate a broadband-delivered service in a service rather than a technological manner.
- Establish a policy framework supportive of local initiatives that ease market entry and foster competition.
- Explore public sector initiatives that foster market entry.
- Provide financial incentives for investment in underserved and high cost areas.
- Increase local capacity to promote broadband deployment.
- Support planning grants for localities to explore options to facilitate competition and broadband deployment.
- Provide cost sharing for field trials, including local government sponsored initiatives.
- Establish a national clearinghouse to raise awareness, provide technical assistance, and disseminate best practices for local and regional efforts to accelerate broadband deployment.
- Support research and experimentation.
- Support research and development on access technologies, especially targeting the needs of non-incumbent players and other areas that are not targets of stable, private sector funding.
- Support research on economic, social, and regulatory factors.
- Support development of alternative broadband content and services.

- Move toward a more coherent, consistent policy framework for broadband.

Policy makers and regulators in OECD countries are recognising that the economic challenges facing broadband have increased. The new entrants that were expected to erode the grip of entrenched incumbent monopolies have found sustained competitive entry much harder than expected. And indeed, with the recent stock market re-assessment of the telecommunications sector, some of these new entrants are going out of business.

An important way governments can stimulate competition is by ensuring that barriers to entry are minimised. Certain forms of access – such as access to rights of way and (possibly incumbent-controlled) poles and conduits – stem from privileges granted or property controlled by governments and are not a direct product of the innovative activities of a competitive firm. Governments should devote increasing attention to this type of access so as to reduce obstacles to new facilities-based entrants. In certain cases problems, such as access to rights of way, slow down deployment of broadband and thus work against the policy goals of governments. In the United States there has been considerable activity by stakeholders to re-examine existing rights of way practices at the three levels of government (local, state federal) over the past years.[44]

Financial support to carriers, municipalities and end-users

As earlier OECD papers have pointed out, an increasing number of OECD countries seem to be providing direct financial support to telecommunications operators to develop broadband, for example, through tax incentives, low-interest loans, and subsidies.

The impact of such government initiatives needs to be carefully examined. Such government financial support to telecommunications operators can accelerate and widen the deployment of broadband, at least in the short term. However, they could distort investment and may strengthen incumbents as well as create disincentives to new market entrants. In turn this could have negative impacts on the development of private-sector competition. Such initiatives may also tend to provide a disincentive to new technological developments. In addition, such initiatives might also subsidise broadband provision that might otherwise have developed through market action. The extent to which the market mechanism will succeed in providing affordable broadband services to all regions, is at present still unclear and it seems sensible to wait until there is clearer evidence of market failure.

Where considered necessary, subsidies for broadband deployment should be transparent and it is also important to ensure that such funding is contestable and accountable. Consideration should be given to mechanisms for competitive bidding so as to guarantee that it is the best and most innovative operators and service providers that are awarded associated subsidies and funding where appropriate. Such an approach would provide the best chance for meeting broadband support requirements in a sustainable way.

Government ownership of broadband infrastructure

Some OECD countries have adopted a strong government leadership role in broadband infrastructure development viewing broadband infrastructure development as a public project. This issue is discussed in an earlier OECD paper where it was concluded that rather than build and operate broadband infrastructure, governments should seek to create the right incentives to draw private businesses into broadband deployment[45].

The separate roles of the public and private sectors

This topic has also been extensively discussed in an earlier OECD document[46]. As that document points out, most OECD countries have recognised that the key player for infrastructure deployment should be the private sector[47] and that the greater the degree of involvement of the government in broadband infrastructure development, the more likely it is to reduce private sector initiatives.

Demand-side policy initiatives

Using a demand side approach, the government can assist in broadband development. “Demand aggregation” requires businesses and organisations to pool their telecommunications traffic to provide a market incentive for private companies to set up high-speed connections across the state. Through facilitating the aggregation of public sector demand, government can help create a market sufficiently large to provide an incentive for private investment in regions where it may not be normally profitable. The government can aggregate its own needs for broadband to induce private investment in constructing the required broadband facilities. But in designing such initiatives, government has to exercise caution that it does not reinforce the market dominance of an incumbent operator. Initiatives to put together a consortium of private operators to stimulate new market entry could be effective, but this needs to be balanced against the need to have an open procurement process. The government can act as an ‘anchor tenant’ via the partnership with the private sector to trigger investment in broadband networks. Such demand aggregation activities are designed to transform otherwise marginal sources of demand into one which provides a sound base for sustainable commercial projects.

Towards a logical and sequential process for determining necessary broadband deployment initiatives

If governments are going to be involved in support for broadband deployment, it is important that they do so in a coherent, consistent and cost-effective manner. In accord with the premise that primary reliance should be placed on market provision, a systematic decision-making procedure for considering the need for broadband deployment support programmes should contain, as a starting point, the key dimensions set out below in Box 3.

Box 3. Towards a logical and sequential policy process for developing necessary broadband policy initiatives

A logical and sequential process for developing policy for widening access to broadband should include the following steps:

1. Identification and specification of objectives and desired outcomes clearly and specifically.
2. Consideration of the extent to which market demand and delivery will meet specified objectives.
3. Identification of barriers to achievement of broadband deployment objectives through market forces.
4. Identification of alternative policies for cost-effectively addressing these barriers.
5. Specification of criteria for selecting the best (mix) of these policies.
6. Identification of appropriate implementation mechanisms.
7. Estimation of the costs of such programmes.
8. Consideration of the extent to which these costs are reasonable when considered against the benefits involved.
9. Consideration of the extent to which these costs are sustainable.
10. Consideration of the extent to which programmes may need to be modified in view of the estimated costs and benefits.
11. Evaluation of the relative merits of alternative mechanisms for funding broadband programme costs.
12. Decision on appropriate implementation procedure and the timing of such implementation.
13. Determination of a procedure for regularly monitoring and reviewing progress in achieving objectives.
14. Establishment of a process for assessing, in the light of such progress, the appropriateness of policies and programmes installed to achieve the specified objectives.

All this may seem a protracted and rather pedestrian process. But while it may seem expedient to facilitate broadband access by simply obliging provision of subsidised broadband infrastructure and services, the complexity of the task involved in fostering sustainable broadband accessibility is unsuited to such simple solutions. Indeed, the requirements for widening broadband access extend well beyond infrastructure facilities. At any rate, the need for detailed analysis need not stall an enthusiasm for immediate action in the case of objectives/programmes that can be quickly and confidently identified and cost-effectively implemented.

While there will be broad agreement that in seeking to maximise the benefits of the broadband economy, it is important equity is not forgotten, the converse also applies. That is, in striving to achieve equity in broadband access, it is important that efficient and cost-effective means for doing so are sought. Arguments for assistance to 'uneconomic' subscribers can be justified by social reasons but must be constrained by the need not to impose unreasonable costs on other (economic) subscribers. If we forget this constraint, the legitimate scope of broadband assistance programmes will raise damaging uncertainty in the minds of operators and investors. To endeavour to minimise these and other potential costs and to

maximise the potential benefits derivable, it is crucial that policies and programmes be determined judiciously and systematically.

7. CONCLUSIONS

New technology and market circumstances are developing, but the impact of this on the provision of services to regional, rural and remote areas and other less commercially attractive consumers remains uncertain at this stage[48]. Concern over such uncertainty has led a number of OECD governments to try to identify technical, financial, institutional and other barriers to diffuse broadband deployment and to develop strategies to address these barriers.

Broadband technologies and applications are still at an early stage of development and at present, it is not known how broadband demand and supply will take shape over time. There is increasing recognition that governments should endeavour to understand broadband deployment issues before implementing any significant, additional broadband deployment initiatives. The targeted programmes required to bring broadband service to certain parts of the country will become increasingly evident in time.

OECD countries have thus far decided against redefining USOs to include broadband. There seems little doubt that broadband is a desirable and useful service, and that it is likely to be of increased economic and social importance in the future. At present we are far from the point where a "substantial majority of residential customers" subscribe to broadband service. Lower-speed dial-up Internet places limitations on getting access to rich sources of information and essential services. But there is a time when a service may become crucial to "meaningful participation in society". High-speed, broadband access is expected increasingly to provide access to essential education, public health, or public safety offerings.

An expanded USO to include broadband assumes a common set of needs and would overlook the most promising feature of a competitive broadband market: The market has an enhanced ability and incentives to tailor the price and capability of service to specific user needs and socio-economic constraints. If steps are taken to supply broadband as a universal service and to ensure access to special groups (such as people living in remote areas or with low income), then it is important that the USO framework is tailored to avoid distorting competition or reducing customer choice. Broadband technologies can be made available to end consumers by means of various technologies and none of the access technologies currently available, or about to be commercialised, has a clear advantage over others, indeed each technology is more appropriate for specific customer groups and applications. As a result it will be difficult to include broadband Internet access in universal service obligations in order to satisfy the specific needs of various population groups without favouring the development of one technology to the detriment of others.

Arguments for assistance to uneconomic subscribers must be constrained by the need not to impose unreasonable costs on other telecommunication subscribers. To the extent that market forces serve to diffuse broadband, the burden of any special programmes and subsidies that may be required is reduced as much as possible. Operators and investors should be aware that the future scope of universal service will increase along with the social needs of the information society.

There are no quick, generally applicable, answers. A systematic approach to the broadband deployment and diffusion issue requires that the source of any problems be first identified and then specifically addressed with tailored cost-effective measures. Among these, the universal service obligation is a possible policy instrument.

NOTES

1 See *e.g.* OECD, *Understanding the Digital Divide*, OECD/DSTI, Paris 2001; OECD, "The Digital Divide: Diffusion and Use of ICTs", DSTI/ICCP/IE(2000)9, 5 December 2000; "The Role of Telecommunications and Information Infrastructures in Advancing Electronic Commerce", DSTI/ICCP/TISP(98)8/FINAL; *Universal Service and Public Access in the Networked Society*, OECD, Paris 1997; *Universal Service Obligations in a Competitive Telecommunications Environment*, OECD, Paris 1995; "Universal Service and Rate Restructuring in Telecommunications", ICCP, Number 23, Paris 1991.

2 "Bridging the Digital Divide: Issues and Policies in OECD Countries", DSTI/ICCP(2001)9, Paris, 22-23 February 2001. This point is also emphasised in many other reports, for example, bridges.org: "Spanning the Digital Divide – Understanding and Tackling the Issues" (June 2001), http://www.bridges.org.

3 The Canadian Radio & Telecommunications Communications Industry Survey (2001) explains bandwidth as follows: "Narrowband" two-way capabilities with speeds in either direction not exceeding 64 Kbit/s; "Wideband" – two-way capabilities with speed in either direction of greater than 64 Kbit/s up to and including 1.544 Mbit/s and "Broadband" – two-way capabilities with speed at least one direction exceeding 1.544 Mbit/s.

4 Inquiry Concerning the Deployment of Advanced Telecommunications Capabilities, CC Docket No. 98-146, Report 14 FCCRcd2398,2406(1999).

5 Oftel, "Access to Bandwidth: Delivering Competition for the Information Age", A statement issued by the Director General of Telecommunications, November 1999.

6 Verizon points out that examples of services that fall under this definition of broadband include: digital subscriber line ("DSL") services and frame relay services or asynchronous transfer mode ("ATM") services, which may be accessed with speeds of at least 56 kbit/s. Available at http://www.ntia.doc.gov/ntiahome/broadband/comments.

7 http://www.ntia.doc.gov/ntiahome/broadband/comments4/tia/TIA.htm.

8 For instance, the US Telecommunications Industry Association (TIA) has argued that "In order for a communications technology platform to be considered as supporting 'broadband services' in the truest sense, the user should have the capability to transmit and receive high-quality video, high speed Internet access, and voice telephony. The precise converged services will evolve over time, and so will the conception of broadband. Today, however, the fact that the user should be empowered to originate and receive high-quality video signals could suggest a minimum transmission speed of 4 Mbit/s (a standard compressed television signal currently requires 4 to 6 Mbit/s of transmission capacity), although improvements in compression technology may change this). Others suggest 6 Mbit/s. TIA suggested 10 Mbit/s in comments to the FCC's cable open access proceeding and has also expressed support for a goal of widespread availability of 100 Mbit/s connections by the year 2010." Available at http://www.ntia.doc.gov/ntiahome/broadband/comments4/tia/TIA.htm, page 4.

9 "The New National Dream: Networking the Nation for Broadband Access", Report of the National Broadband Task Force, Industry Canada, 2001. Available at http://broadband.gc.ca

10 Italian Task Force on Broadband Communications, Interministerial Committee established by the Minister of Communications and the Minister of Innovation and Technology, 14 September 2001.

11 Computer Science and Telecommunications Board, US National Research Council, Broadband: Bringing Home the Bits, November 2001. p. 66. http://www.cstb.org.

12 The following draws on the useful discussion of the broadband definitional issue in Chapter 2 of Computer Science and Telecommunications Board, US National Research Council, "Broadband: Bringing Home the Bits", November 2001. http://www.cstb.org.

13 The importance of an enhanced data capability in the delivery of education is said to include: an improvement in the quality of education service delivery particularly to rural and remote areas thus promoting equity between country and city students and increasing participation rates of rural and remote students in secondary and tertiary education; enabling the effective delivery of an improved quality of professional development to education staff in remote areas through video linked training, in services and information dissemination; and providing a more direct means of communication for schools. This was seen as having the potential to improve the quality of school administration and to promote the flexible delivery of distance based education. An enhanced data capability would enable cost-effective provision of distance based education. In addition, data capability can complement traditional education delivery platforms as was noted by a number of state governments and education-specific organisations.

14 Health was identified as another area that has much to gain from an enhanced data capability. Telehealth and video conferencing are said to enable efficient and effective modes of health service delivery. Telehealth networks would promote equity in health service delivery by improving access to health services and information, particularly in rural and remote areas. The ability of video conferencing would encourage the relocation of medical practitioners and other professionals thus increasing the number and availability of services to small regional centres. Improved client health outcomes through decreasing patient travel time and improved speed of access to health services is cited. An enhanced data capability can supplement existing health programmes in rural areas and capitalise on the expertise of heath care providers.

15 e-Government. E-government presents a tremendous opportunity for the use of information and communications technology in the provision of government services. It can significantly improve efficiency in service delivery and reduce costs and can also serve to educate people in the use of information and communications technology. Government must drive initiatives to ensure that information and communications technology offer opportunities for electronic citizenship. Delivering public services electronically will be critical to making information and communications technology more relevant to the life of every individual. In addition, if consumers are not educated and equipped to do business electronically then this could represent a serious impediment to the growth of e-commerce.

16 Staff of the Florida Public Service Commission conducted a survey on Internet use in the first and second quarters of 2001, and found that approximately 72% of the respondents were not willing to pay for high-speed Internet access. The Florida Report also concludes that dial-up Internet access is sufficient to meet the needs of most Internet users, with the exception of those individuals desiring entertainment applications. The report cites research by Forrester Research, Inc. that found that today's high-speed customers tend to be mostly "tech-savvy" individuals.

17 Nancy J. Victory, "Removing Roadblocks to Broadband Deployment", US Department of Commerce, before the Competition Policy Institute's Conference "Keeping Telecom Competition on Track" 6 December 2001.

18 National Telecommunications and Information Administration and the Rural Utilities Service, "Advanced Telecommunications in Rural America: The Challenge of Bringing Broadband Service to All Americans", April 2000. http://www.ntia.doc.gov/reports/rural/ruralbb42600.pdf.

19 For example, in Canada access to telephone service is subject to different rates in different geographic locations.

20 Robert J. Samuelson, Debunking the Digital Divide, Newsweek 25 March 2002, available at http://www.msnbc.com/news/725345.asp?cp1=1.

21 For instance, Sawhney (2000) argues: "We live in a world fraught with inequalities. We have long accepted disparities between the "haves" and the "have nots" in all (many?) spheres of life. However, for some reason, we find the idea of a society stratified into the "information rich" and "information poor" particularly disturbing. What is special about information?" (p. 161) Sawhney, H, "Universal Service: Separating the Grain of Truth from the Proverbial Chaff", The Information Society, 16, 161-164, 2000.

22 The existence of 'spillover benefits' has been put forward in favour of a government fostering widespread geographic broadband deployment. The argument is articulated as follows. Broadband can support many

different types of applications and services, its full potential is unlikely to be apparent from an examination of any one category. What broadband promises, because of its capacity and general-purpose nature, is the chance to try multiple applications of different types and to provide various mixes that can be valuable to different users. The economic and social benefits in the aggregate will, therefore, exceed those of one application, giving rise to spillover benefits not readily captured by any one stakeholder. For example, broadband deployed for mass entertainment can also carry non-commercial content. To the extent that broadband providers themselves are not able to fully capture the benefits of investment in performance, a broader societal interest in promoting broadband performance improvement arises from these spillover benefits. For a detailed discussion of this issue see *e.g.* WIK, Study on the re-examination of the scope of universal service in the telecommunications sector of the European Union, in the context of the 1999 Review, Study for the European Commission, DG Information Society, Bad Honnef, April 2000.

23 That the development of broadband and its diffusion to residential subscribers is still in the early stages of development is evidenced by the following comparison. On average in OECD countries only two people per 100 inhabitants subscribed to high speed Internet service by mid-2001, and Korea, by far the leading country in terms of broadband penetration, had 14 subscribers per 100 inhabitants at that time. OECD data indicate that by June 2001 there were 22 million broadband subscribers using DSL or cable modems in the OECD area. Contrasting this number with the approximately 400 million mobile cellular subscribers in the OECD, the over 500 million standard subscriber lines in the OECD, and the approximately 150 million dial-up Internet subscribers, testifies to the fact that broadband is in the early days of diffusion.

24 Wayne A. Leighton, "Broadband Deployment and the Digital Divide", Policy Analysis (Washington DC: Cato Institute, 2001), No. 410, 7 August 2001.

25 For example, in the US, providing universal service subsidies for advanced services potentially benefits only carriers offering certain types of services. Under section 254(e) of the Act, universal service support is provided only to those carriers that have been deemed "eligible telecommunications carriers (ETCs)." To be deemed "eligible," a telecommunications carrier must offer all the services that are supported by the universal service support mechanism. If advanced services were added to the universal service definition, some carriers that are technologically incapable of providing advanced services would be ineligible for any federal universal service support. In addition, there may be providers of advanced services that are unable to provide the complete list of services currently supported by universal service or that provide services in a way not contemplated by the rules governing the designation of ETCs. These might include wireless carriers or cable television companies. These carriers would be rendered ineligible for federal universal service support destined for advanced services. Policymakers must be careful not to implement policies that are not competitively and technology neutral.

26 NECA Rural Broadband Cost Study: Summary of Results.

27 "Facilitating the Business Case for Rural Upgrades: Presentation to Broadband Summit", Michael Balhoff, Legg Mason, October 26, 2001. See www.adminmonitor.com.

28 Minister for Communication, Information, Technology and the Arts, National Bandwidth Inquiry Discussion Paper, http://www.noie.gov.au/projects/information_economy/bandwidth/papers/discpaper_full.htm

29 Oftel, Universal Service Obligations, A statement issued by the Director General of Telecommunications, 30 August 2001.

30 US Computer Science and Telecommunications Board, "Broadband: Bringing Home the Bits", November 2001

31 ANACOM, Comments submitted to OECD on TISP/RD(2001)2-Broadband Infrastructure and Universal Service, January 2002.

32 The Bureau of Transport and Communications Economics (Australia), Communications Futures – Final Report, Report 89, Australian Government Publishing Service, Canberra, 1995.

33 Directive of the European Parliament and of the Council on universal service and users' rights relating to electronic communication networks and services, Brussels, 12.7.2000. COM(2000)392final, 2000/0183 (COD).

34 One question that has been raised is whether there is need for an upper ceiling for national minimum data speeds to ensure that regulators do not impose undue burdens on industry.

35 OFCOM, Analyse du contenu du service universel en Suisse, revision legale et procedure d'attribution de la nouvelle concession de service universel, OFCOM/TC/30.01.01/scn. Available at http://www.ofcom.ch

36 US Computer Science and Telecommunications Board, "Broadband: Bringiing Home the Bits", November 2001, p.15, www.cstb.org.

37 Swedish Ministry of Industry, Employment and Communications, An Information Society for All, N.2000.018, March 2000.

38 Australian Information Economy Advisory Council (AIEAC), National Bandwidth Inquiry Report, Canberra, 1999.

39 Ovum, "Calculation of the Intangible Potential Benefits of Being the Universal Service Provider", Discussion Paper, November 1999.

40 OFTEL, Universal Telecommunication Services, A consultative document issued by the Director General of Telecommunications, July 1999.

41 For further discussion, see Rural Utilities Service, New Broadband Funding Opportunity, http://www.usda.gov/rus/telecom/dlt/broadbanddlt.htm

42 For a detailed discussion of supply-side policy initiatives see "Broadband Infrastructure Deployment: The Role of Government Assistance" DSTI/ICCP/TISP(2001)8 OECD, Paris, 3-4 December 2001.

43 Facilities-based competition: reduces the need for persistent regulatory intervention; permits the natural (*i.e.* competition-shaped) character of broadband service and industry structure to be discerned; promotes diversity of suppliers; avoids deterring competitors from investing in their own infrastructure; removes a disincentive to new investment by incumbents; avoids costs and organizational complications associated with the need for coordination between incumbents; and competitors facilitates technical optimization of total bandwidth.

44 See e.g., National Association of Regulatory Utility Commissioners, Promoting Broadband Access Through Public-Rights-of-Way and Public Lands, July 31,, 2002; and remarks by Assistant Secretary Nancy J. Victory as prepared for delivery to the NARUC Telecommunication Committee, summer Meetings, Portland, Oregon, Monday, July 29, 2002.

45 "Broadband Infrastructure Deployment: The Role of Government Assistance" DSTI/ICCP/TISP(2001)8 OECD, Paris, 3-4 December 2001

46 "Broadband Infrastructure Deployment: The Role of Government Assistance" DSTI/ICCP/TISP(2001)8 OECD, Paris, 3-4 December 2001

47 Clearly, to the extent that the private sector diffuses broadband successfully, the burden of any special programmes and subsidies is reduced.

48 For instance the extent to which the use of satellites or 3G mobile service can provide broadband cost-effectively to rural and remote areas remains to be seen. Significant technical and cost issues have reduced the field of satellite broadband providers to a "few remaining survivors"; see Doug Mohney, "Sky Falling on Satellite Broadband", ISP World, October 10, 2002 (Special Report).