

The Broadband Paper

A question of pace and better utilisation



Ministry of Economic Affairs

Directorate-General Telecommunications and Post

The Broadband Paper

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1 Introduction

1.1 Rationale

In Lisbon (2000), the European Council announced the ambition to develop the European Union, within ten years, into 'the most competitive and dynamic knowledge economy in the world, capable of sustainable economic growth with more and better jobs and closer social cohesion'. The Dutch government's ambition is to place the Netherlands among the European leaders in this respect¹. A European agenda for the development of broadband was drawn up as part of the general Lisbon strategy. European broadband policy has two clear priorities:

- 1 To ensure the rollout of broadband infrastructure throughout the Union
- 2 To stimulate development and use of broadband services.

Various targets were linked to these priorities within the e-Europe 2005 Action Plan (spring of 2002). The Member States themselves are responsible for achieving these targets. To this end, they have agreed that each Member State will draw up its own national broadband strategy. This Broadband Paper should be regarded as the Dutch version of a national strategy.

With the Broadband Paper, the Cabinet also meets promises made to the Second Chamber of Parliament during the general debate on broadband and cable on 24 September 2003. On that occasion, the Cabinet promised to present its own ambitions and a revision of the Broadband Action Programme in a Broadband Paper, including consideration of the role of municipal authorities².

1.2 Problem definition

In the broadband policy, 'broadband' is defined in terms of its functionality, not in terms of capacity or technology:

Broadband is a continuously available connection suitable for good quality audio-visual applications and the exchange of large data files.

With narrowband, one user at a time can use one service only. (Super-)broadband allows multiple users to use different services at the same time, via different platforms.

Broadband is currently the fastest-growing segment of the ICT market. ADSL and cable are growing even faster than mobile telephony. These developments are largely due to market forces and extensive forms of competition, which have resulted in more providers, lower costs and better quality for end-users.

Within this context, both market parties and government authorities are taking initiatives to introduce 'new generation' broadband infrastructures and services in the Netherlands. KPN's 'Deltaplan Glass', the cable sector's 'Netherlands Broad' vision, and municipal initiatives all emphasise the importance of broadband, but present different perspectives of the rate and method of market development towards the next generation of networks. These differences in perceptions and approach could lead to unwanted fragmentation and so form a current and serious threat to the further development of broadband in the Netherlands.

The government also emphasises the importance of broadband. Broadband can make a substantial contribution to strengthening the economy and solving social problems. The question is whether the market trends provide enough assurance that the Netherlands can win and maintain a leading position in the future, and can make use of the opportunities that broadband offers. For the government, permanent network innovation and service development take priority. The government therefore wants to prevent existing interests and differences of view from having a restrictive effect on the further development of broadband.

¹ Ministry of Economic Affairs, 'The Knowledge Economy in View: Dutch development of the Lisbon agenda for 2001' (2000).

² Report on the General Debate with the Standing Economic Affairs Committee and the Standing Education, Culture and Science Committee with Economic Affairs Minister Laurens-Jan Brinkhorst and State Secretary of Education, Culture and Sciences Medy van der Laan, No. 44, approved on 16 October 2003, Nos. 27088 and 26643, pg.13.

1.3 Scope of the paper

The paper describes the government's ambition and vision for broadband development on the basis of the drive for structural economic growth. The key issue is how broadband can make an optimal contribution to the growth capacity of the Dutch economy, productivity growth, innovative capacity, competitiveness and to solving social issues.

This paper focuses on the government role, which involves market regulation and stimulation of service development, specifically in the semi-public sphere. The government fulfils this role by formulating a clear line of policy, creating the right conditions and where necessary, taking specific initiatives to promote the development of broadband by the market, taking account of the rights of existing providers and desirability of promoting competition.

In this paper, the government provides a framework for government intervention, in order to break through impasses. The paper describes choices that have already been made, wherever possible. This results in a policy agenda. However, some issues are so complex that answers cannot be provided at this moment. In order to find solutions, a process has been started through the formation of the Broadband Impulse Committee³. This paper serves as a framework for the work of this committee. The aim is to concretise the outstanding points in the policy in the autumn, on the basis of the committee's findings.

This paper makes no choices relating to competition, or between infrastructures or visions of interested parties. Furthermore, it expresses no preference for a specific technology. The choice of technologies is the domain of the market parties. The paper does not offer simple answers to questions about the rollout rate for broadband-type infrastructures and services and the required levels of penetration. The government does emphasise the importance of keeping up the pace in the broadband field in this paper, but the market is too dynamic for government statements on exactly how and how quickly developments should take place. That is also the domain of the market parties.

1.4 Positioning of the Broadband Paper

The development and application of broadband infrastructure and services is consistent with the transition towards a knowledge-based information society. This paper must not, therefore, be seen as either a start or a final stage, but more as a milestone in a process towards 'Holland Broadband Land'.

In recent years, various governments have already taken a series of policy steps aimed at further development of new generation networks and the accompanying services. The Digital Delta paper dating from 1999 expressed the ambition to ensure that the Netherlands remains among the leaders in the field of ICT⁴. The 'Broadband Building Blocks Paper'⁵ of mid-2001 once again emphasised the social importance of broadband and expressed a desire to make extra efforts to facilitate market developments (including the excavation problem, access to newbuild locations, bundling of demand and other stimuli). This led to the installation of the Broadband Expert Group in December 2001. The group's advisory report, entitled 'Holland Broadband Land', contains a shared market view of realistic development models for broadband in the Netherlands, a description of the level of ambition with the accompanying targets for the rollout of broadband and concrete recommendations for policy measures by the government and the market. In the Cabinet Position on Broadband, published in early 2003, the first Balkenende government confirmed the main points of the recommendations and findings of the Broadband Expert Group.⁶ The Cabinet Position includes the Broadband Action Programme, which

³ Installed by the Minister of Economic Affairs on 19 March 2004 (State Gazette of 22 March 2004, No. 55, pg. 10). Members: Messrs. W.J. Deetman (Chairman), R. Pieper and W.C.J. Zegveld and Ms. C.J.G. Zuiderwijk.

⁴ Letter from the Ministers of Economic Affairs, of Urban and Integration Policy and of Justice and the State Secretaries of Transport and Public Works, of Education, Culture and Sciences and of Finance, dated 9 July 1999, Second Chamber Documents, 26643, No. 1

⁵ Letter from the Minister of Economic Affairs, of Urban and Integration Policy and of Justice and the State Secretaries of Transport and Public Work, of Education, Culture and Sciences and of Finance, dated 17 October 2001, Second Chamber Documents, 26643, No. 32

⁶ Letter from the State Secretary of Economic Affairs of 10 January 2003, Second Chamber Documents, 26643 No. 38.

focuses mainly on stimulation, knowledge diffusion and the removal of obstacles in legislation and regulations through 'no-regret actions' aimed at realising 'Holland Broadband Land'. In view of the political situation at the time (an outgoing Cabinet), the Broadband Cabinet Position also placed a number of fundamental policy issues on the agenda, to be handled by a new government at a later time:

- New market order in relation to regulation and supervision
- Potential use of financial instruments
- Access in non-profitable areas
- Role of local authorities.

With this paper, the current government lays down its own ambition and direction for the development of broadband. The actions develop the next step towards 'Holland Broadband Land', with a more structured and controlled approach.

The Broadband Paper cannot be considered in isolation from policy initiatives that the government has laid down in other policy papers. The Government-wide ICT Agenda is aimed at the application of ICT services by companies and the government⁷. The Broadband Paper contains the further development of the efforts formulated in the ICT Agenda. The Cable Letter of 18 March 2004 discusses recent developments and ambitions in the field of cable TV and radio and TV. In the Broadband Paper, the government discusses the role of cable in the light of the overall broadband policy.

1.5 Structure of the paper

Section 2 makes the government's ambition in the field of broadband more concrete. Section 3 then explains the obstacles and Section 4 the policy principles. The paper closes with the actions aimed at removing the obstacles.

The Broadband Paper sets out the scope and character of the paper and expresses the government's ambition and policy lines for the future. The 'Analysis and Support' annex, discussing the issues in more depth, covers various aspects of broadband, the obstacles and the trends.

⁷ Second Chamber Documents, 2003-2004, 26643, No. 47.

2 The ambition

As part of the Lisbon strategy, the government aims to be among the leaders in the field of broadband Europe and world-wide by 2010. The situation regarding the use of services is not bright. The Netherlands scores below the European average in this regard. This is serious, because the economy and society benefit most from broad use of applications. Excellent networks without usable and relevant services for consumers have no value (see the In-Depth Annex, Section 2). This is why new policy initiatives are needed on this point.

The Netherlands holds a leading position in terms of the availability, quality and use of the networks for electronic communications. This is largely thanks to competition between the infrastructures. For the broadband infrastructure, the ambition therefore means that the Netherlands should retain its leading position within Europe in 2010.

This is no reason for self-satisfaction. Permanent innovation of networks remains necessary. Growing utilisation and the associated growth in capacity demand calls for the step to a new generation of networks. In order to achieve this ambition, the government aims to create the necessary conditions, so that the Netherlands can be among the leaders in the broadband field.

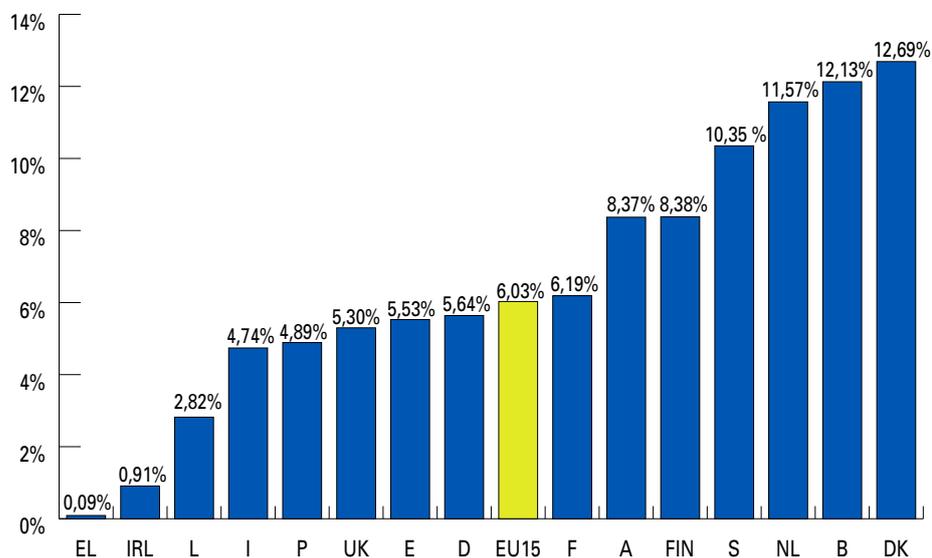


Figure 1 Broadband penetration in the EU. Source: European Commission, January 2004

In summary, the government's ambition is:

The Netherlands will hold a leading position in the field of broadband development in Europe and world-wide in 2010.

In order to achieve this ambition, the government aims to give a strong impulse to:

- The development and application of services and high-potential broadband applications in the private and public domain
- The development of (a) high capacity connection network(s) with substantial national coverage in 2010.

This will allow the Netherlands to benefit to the maximum from broadband-type services, helping to strengthen its growth potential and to solve social problems, which will increase its welfare and prosperity.

3 Problems and dilemmas

Given the government's ambitions, this Section discusses the problems identified, which could hamper further development and application of broadband. A distinction is made here between obstacles to the development and application of broadband-type services and obstacles to the infrastructure. Other issues include the regulation of these markets and a number of dilemmas mentioned in this Section.

3.1 Services

Service development and the use of such services by companies and the government leave something to be desired in the Netherlands. The Netherlands only complies with the e-Europe criteria for simple provision of information. In the field of on-line services – which are distinguished by interactivity – the exchange of (confidential) information and (financial) transactions, the Netherlands scores below the European average. This is the picture that emerges from the provisional interim results of the European benchmark⁸. Different actions are being undertaken as part of the ICT Agenda and the Other Government programme in order to improve on-line services and so comply with the e-Europe targets.

The main obstacles and risks in the field of service development are:

- **Lack of scale:**

Technological and organisational fragmentation lead to extra costs that substantially reduce the prospects of returns. As a result, the application of new services undergoes unnecessary delays and there is often a gap of years between the time at which a service becomes available and the time and when it can be used on a large scale. Particularly for commercial services, scale is an important criterion for realising profitable products. Local initiatives increase the risk of fragmentation, resulting in lack of scale.

- **Copyright aspects:**

Providers and producers of content are dependent on copyright and performing rights. On the basis of these rights, they can give their activities an economic basis. Copyright thus lays a foundation for the continual production of content⁹. Broadband offers new opportunities for publishing material protected by copyright. This raises a number of issues relating to the development and application of innovative broadband-type services. Recent research has shown that in general, copyright does not hamper innovation. However, in various sectors, specific copyright issues were found that do influence innovation and competition¹⁰. It is important that transparent and non-discriminatory tariff structures are used for payments for the use of material protected by copyright. In that respect, it is relevant that the European Commission issued a notice on 16 April 2004 concerning the implementation of copyright and announced a proposal for a Regulation on collective management. Very probably, this will also consider the transparency of tariffs.

Progressive development of services in the semi-public sphere, in particular, will also benefit from:

- **Good basic facilities:**

Many services depend on good basic facilities for (large-scale) application. At present, properly secured individual service-numbers, electronic patient-identification numbers and other authentication facilities are in development. The government is also working on a basic registration

⁸ See the study entitled 'Online Availability of Public Services' by Cap Gemini, Ernst & Young, on assignment for the European Commission (March 2004).

⁹ See also the study entitled 'Cultural Politics, Copyright and Digitisation', TNO-STB (September 2003, on assignment for the Ministry of Education, Culture and Sciences).

¹⁰ See the study entitled 'Copyright: Economic Benefit or Burden?', Dialogic and SEO, August 2003, commissioned by the Ministry of Economic Affairs.

system, government counters and transaction ports and other authentication facilities for citizens and companies.

- **Reorganisation of administrative working processes:**

More effective and efficient service provision in the semi-public sector requires a thorough reorganisation of our administrative, social and organisational model, with changes in working methods. In the information society, production, experience, power and culture are determined by the logic of information networks¹¹. The transition to an information society will not be achieved solely by adding more Internet and ICT to existing administrative relations, organisational contexts and production processes. Research shows that this, in itself, does not lead to an increase in productivity¹². A publication such as 'The Belgians Do It Better' reveals that such an approach is too one-sided to solve urgent social problems that the government is facing. More is needed for this: a radical restructuring of working methods, production processes, organisational structures and administrative models. This involves thinking and working in terms of chain concepts, to break down rigid structures and barriers. It is also crucially important for the development of services in the semi-public sphere. Better use of broadband can be of assistance here.

3.2 Infrastructure

The Netherlands is expected to succeed in complying with the Lisbon targets in terms of infrastructure. The country is in the leading group for the penetration and rollout of broadband, along with Denmark, Belgium and Sweden, and scores well above the European average. In time, recent years, capacity demand has grown by 60% per year. This growing demand is expected to create problems in terms of the total volume of traffic per network connection (the 'first mile' or the 'last mile'). When this will depend partly on further technological developments. The capacity of the main network (the 'backbone') of the various providers is not expected to present problems. The present main networks are glass fibre networks and provide enough capacity for the time being. This is discussed in more detail in the In-Depth Annex.

The main restraints and potential risks in the field of infrastructural development are:

- **Exploitation of existing networks:**

Investments in the new generation of infrastructures involves 'cannibalisation' of existing networks. Existing parties first exploit investments already made in copper and coax networks as far as possible. This limits the incentive to invest in new technologies.

- **Relatively weak equity position of telecom and cable companies:**

When the 'Internet bubble' burst, the financial position of telecom and cable companies deteriorated. As a result, their opportunities to invest in network innovation are limited. Despite the fact that their position has recently improved, they are still heavily dependent on borrowed capital for major investments.

- **Poor investment climate**

Financiers have become less willing to invest in network innovation. This is partly the result of the 'Internet bubble' bursting, and partly because uncertainties for investors are fed by the expectation that there will ultimately be a single market for electronic communication, in which all forms of electronic services are provided via a single infrastructure. The telecom companies are already losing their monopoly in telephony and the cable companies theirs in television. As a result, the margins for earnings from basic services are shrinking and investment propensity is diminishing.

¹¹ Manuel Castells, 'The rise of the network society', Volume I of The Information Age: Economy, Society and Culture, 1999, Oxford, pg. 469

¹² Brynjolfsson, Erik and Hitt, Lorin M., 'Computing Productivity: Firm-Level Evidence' (June 2003). MIT Sloan Working Paper No. 4210-01. <http://ssrn.com/abstract=290325> and Erik Brynjolfsson, 'The IT Productivity Gap' (July 2003). Optimize, Issue 21.

- **Obstructive market relations:**

Investments in new networks constitute a potential threat to the existing market shares of cable and telecom companies. The companies tend to aim for vertical market integration, which limits access to services and competition between services. This means it is not attractive for an infrastructure company to also offer services via the infrastructure of rival companies. This prevents the creation of a single market for electronic service provision, reducing the profitability of the infrastructure and consequently, the propensity to invest in infrastructure.

In view of the major investments needed to upgrade or modernise networks, co-operation between different parties seems desirable; in order to share investment costs. Such co-operation will require companies to abandon their vertical integration strategies and seek horizontal alliances. This will lead to a shift in the balance of power between the parties. Excessive dominance by a single specific party threatens alliances.

- **Regulation of the expected connection network monopoly:**

In the development of the next generation of networks, the possibilities for competition in the connection network (the 'last mile') are limited. A monopoly is expected to arise here. In business economic terms, duplication of the connection network alone is probably unattractive. Furthermore, there is no incentive in the existing regulation. After all, the owner of a monopoly must offer other parties open access at reasonable rates, which makes it highly unattractive for new companies/consortia to install their own rival broadband network.¹³ If every party waits for the others to take the first step, an impasse could occur. At the same time, the existing regulatory framework creates uncertainty for investors about the extent to which their investments can be recovered. At present, the prices and conditions on which network owners should give other parties access to their networks are unclear.

3.3 Dilemmas

A number of regulatory dilemmas arise in stimulating the development and application of broadband. These dilemmas are:

- **Competition versus innovation**

Competition is both a stimulus and a risk to infrastructural innovation. The question is how and in which markets the government should promote competition without creating a risk to infrastructural innovation. Price competition promotes broadband penetration in the short term, but in the long term can hamper the required permanent innovation of the networks.

- **Fragmentation versus differentiation**

Fragmentation in the administrative and technological fields is a serious obstacle to the development of broadband. However, addressing fragmentation through co-ordination and standardisation can lead to delays and could restrict the development of the desired differentiation and freedom of choice. The aim is to anticipate and remove the negative effects of fragmentation in good time, without obstructing differentiation.

- **Security of supply, delivery and continuity versus the efficient operation of market's**

Broadband is expected to become an essential service for which the government will probably have to ensure security of supply, delivery and continuity. The question is how this public interest can be protected as efficiently as possible, without unnecessary restrictions on broadband innovation. For example, it is necessary to avoid companies being forced to invest in the quality of existing networks in order to secure continuity of service, when investments in new networks would be preferable from an economic point of view.

¹³ An example of this is provided by the PPPs for the installation of glass fibre connection networks. Other parties can obtain access to these glass-fibre networks for payment.

4 Policy principles

The government takes the view that prompt action and policy steps must be taken in order to remove the (future) obstacles identified and to anticipate the expected capacity growth and market trends. Only in this way can the Netherlands maintain its international lead in the field of broadband and continue to hold a strong international competitive position in this regard. On the basis of this view, and assuming existing market developments and the ambition to remain among the leaders in Europe, the government's broadband policy contains the following principles.

- 1 The government regards broadband as a strategic condition for structural economic growth. The government sees further development of broadband in the Netherlands as essential: the momentum must be maintained in order to sustain a stable leading global position in the field of broadband.
- 2 The government therefore regards broadband primarily as an important factor for the growth capacity of the Dutch economy. This means that the growth policy includes policy aimed at stimulating the development of broadband and at addressing the problems described above.
- 3 The government gives priority to the interests of consumers in regulating the broadband market.
- 4 The government takes the view that the market holds primary responsibility for investments in further development of the new generation of broadband-type infrastructures and development of accompanying services.
- 5 It follows from this that government policy is aimed at creating the right conditions and improving the functioning of broadband markets. The government also aims for efficient application of broadband in the (semi-)public field, in order to improve the government's own service-provision. The government takes the view that the development of broadband requires simultaneous development of infrastructure and services.
- 6 In line with the foregoing, the government pursues a technology-independent broadband policy. It leaves the choice of technology to market parties.
- 7 The government uses the new Telecommunications Act and the Open Network Provision regime as a framework for regulating the broadband market. It is aware that further development of new broadband infrastructures may raise new regulatory issues. In view of this, the government takes account of market developments that could lead to natural (regional) monopolies of new broadband-type connection networks.
- 8 The government takes the view that municipal and provincial authorities and housing corporations can play an important and useful role in the development of broadband, in partnership with market parties. Market distortions must be avoided here. Uniform government action is required.
- 9 The government believes that in time, networks will operate far less in competition with each other and more as complementary activities, as a result of convergence and horizontalisation. The government therefore takes the view that promotion of competition, with the aim of stimulating broadband development, will have the greatest effect at the service level.
- 10 The government appreciates that the installation of connection networks for the new generation of broadband-type infrastructures will take place gradually, in a fragmented way, which could lead to administrative and technological fragmentation. This may require some central government intervention and central government direction in order to minimise any negative consequences of fragmentation as far as possible.

5 Policy actions

5.1 Four tracks

If the problems and dilemmas identified in paragraph 3 are assessed in terms of the policy principles in paragraph 4, this leads to 14 policy actions, on four tracks:

- 1 Market dialogue and research: provision for optimal regulation of the broadband market, so that services can develop effectively and so allow maximum use of the economic and social returns.
- 2 Co-ordination: intensifying co-ordination between government agencies, in order to avoid market distortions and to minimise administrative fragmentation.
- 3 Stimulation: Organisation of, and financial support for public-private partnerships (PPPs) aimed at the development and implementation of a set of socially desirable services and products that enable different, more efficient working methods (chain concepts). Promotion of access to public services.
- 4 Regulation and rules of play: removing any restraints in terms of legislation and regulations, with a view to promoting the necessary permanent innovation of networks and services.

The government's role is therefore aimed at creating the right conditions to stimulate the development of broadband by market parties. This requires limited financial resources. These policy lines should be regarded as a follow-up to, and intensification of the various initiatives taken by the government and other parties to date, in order to advance broadband development in the Netherlands. Together, the market and the government can keep the following broadband cog turning, with the simultaneous but unbundled development of applications and further development of infrastructures reinforcing each other.

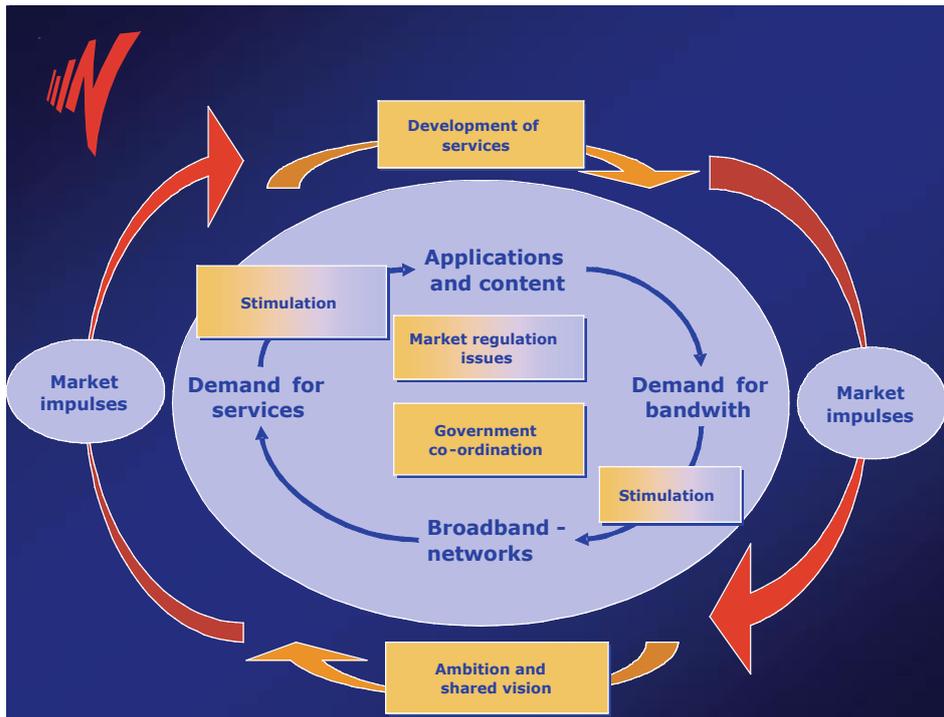


Figure 2. Movements in demand for services and bandwidth in response to market and government impulses

5.2 Broadband Impulse Committee

The Minister of Economic Affairs installed the Broadband Impulse Committee in order to steer the development of broadband policy. The Committee has a mandate to mobilise the market parties involved and government agencies to reach sustainable, durable choices for broadband. On the basis of a dialogue with interested parties in the market and government, the Committee will

advise the Minister on the necessary choices, in order to make optimal use of the opportunities that broadband affords. The subject of the dialogue is the regulation of the market for the infrastructure needed to enable optimal development of broadband-type services. The Committee will consider the problems and dilemmas outlined above. It will also focus specifically on the development of services in the semi-public sphere. Finally, the Committee will advise on strengthening co-ordination between central and lower tiers of government, by agreement with the ICT and Government Regional Committee. The Impulse Committee will base its work on the policy principles described above. It will report on its findings in September 2004.

5.3 Actions

5.3.1 Track 1: Market dialogue and research

The government notes that the growth of capacity demand will necessitate further development to the next generation of broadband-type networks and services. This will raise a number of regulation issues to which adequate solutions cannot be provided at present. These are issues related to the duplication of networks, how access can be assured and how consumer freedom of choice can be guaranteed. Another issue is the required pace of the transition in the market. The government aims to solve these issues actively and constructively, together with interested parties. The following additional principles apply for this:

- The choice still to be made regarding regulation of the infrastructure should be determined by the extent to which these support the development of services and thus the capitalisation of economic profit and social benefits.
- The fact that the connection network can show features of a natural monopoly must be taken into account here.
- Existing interests of market parties must also be taken into account, but these may not restrict further development.
- The organisation method must stimulate propensity to invest in the sector.
- The initiatives of government agencies and housing corporations must be matched with market trends as closely as possible, so that they reinforce each other. Uniform government action, including at the municipal and provincial level, is needed here (see also Action 3).

Action 1. Dialogue

The government will organise a dialogue between market parties, municipal authorities and provincial authorities in order to reach sustainable choices regarding the required market regulation and the accompanying institutional design for administrative and operational issues in the future connection network, taking account of the recently-published different views of market parties and government agencies (for a summary, see Section 3 of the In-Depth Annex).

Action 2. Research

In order to support the above dialogue, research regarded as necessary will be conducted into:

- a) Potential new institutional forms for administrative and operational activities and the protection of public interests.
- b) Costs and benefits according to the OEI system of different regulation methods. This research is needed in view of the fact that costs and benefits are often not realised in the same place and benefits, in particular, are not yet sufficiently well-defined.

The government has promised to present the results of the dialogue and the studies to the Second Chamber of Parliament in the autumn of 2004.

5.3.2 Track 2: Co-ordination

The development of broadband is taking place in a fragmented manner, on the basis of local initiatives. This could cause market distortions and also carries the risk of integration problems between networks. This is most likely to become a problem if the initiatives are too small-scale. Furthermore, different initiatives often mean a range of different organisational structures. This tends to be inefficient and restricts the development of broadband services. The government will therefore take steps to prevent local initiatives from having disruptive effects and leading to fragmentation. The following additional principles apply for this:

- Administrative and technological fragmentation will be avoided.
- Optimal use will be made of existing initiatives that contribute towards the desired developments.
- The role of municipal authorities in the co-ordination of installing facilities such as cables etc. should be strengthened in order to minimise disruption and loss of capital.
- Optimal use will be made of European funds to stimulate the new generation of networks and services.
- Consistency with urban and regional policy will be sought.

Action 3. Development guidelines for municipal and provincial authorities and housing corporations

With a view to healthy market-government relations, the Inter-departmental Market Regulation Committee (ICM) will develop guidelines on the role of lower tiers of government and housing corporations in the development of broadband, in co-operation with the "Holland Broadband Land Foundation" in formation, among others. As a supplement to legislation and regulation, this guide will provide concrete details of the desirability of action by municipal authorities and housing corporations in compliance with the policy principles formulated in Section 4. This guide will be completed in the autumn of 2004. The government will call on lower tiers of government to base their actions on the policy principles formulated in Section 4 and the guidelines to be developed, in order to achieve a consistent government policy that will not further burden the government's EMU balance.

Action 4. Regular formal administrative talks

The regular formal administrative talks (IPO/VNG/G4/Stedenlink) have already begun and focus on:

- Reaching agreements to prevent unwanted administrative and technological fragmentation
- Intensifying the co-ordination of the various local initiatives
- Reaching clear administrative agreements aimed at uniform action by municipal authorities in the field of excavation work
- Structured central co-ordination of applications for resources from European funds.

5.3.3 Track 3: Stimulation

The development of broadband-type services and the realisation of their broad application are currently trailing the possibilities of a broadband-type infrastructure. The government itself attaches major importance to better service provision in the public sector, which is made possible partly through the use of broadband. The government wants to make a different, more efficient way of working possible by stimulating, organising and financially supporting PPPs aimed at developing and implementing a set of socially desirable products and services (chain concepts).

Various initiatives regarding the next-generation networks have been taken in recent years to promote the rollout of broadband in the Netherlands. The experiments that resulted, such as the broadband trials and the Kenniswijk project, have had a major impact on the awareness of both market parties and government agencies of the possibilities of broadband. The experience gained will serve as input for the dialogue discussed in Track 1. The outcomes of the dialogue will also be determined by further development of the policy drive to stimulate the new generation of networks.

The following additional principles apply for stimulation of the development of services and networks:

- The government's stimulation policy focuses on the development of services in the semi-public sphere, concentrating attention and resources on a limited number of socially relevant sectors.
- Co-operation between government and the private sector is needed in a structured approach in order to advance the development of services, and will be intensified.
- Scale is essential for the development of services and provides a stimulus for permanent network innovation.
- The use of open standards should be promoted, to allow progressive development of multi-platform use without network integration problems.
- A specific government policy on the access of less profitable areas to broadband-type services is not necessary. One exception to this is education. It is desirable for every school to have broadband access.

- With regard to infrastructure, the government will focus primarily on access to public buildings.
- The government believes that there is no further need to start new infrastructure experiments in the current phase of development.
- The available knowledge will be utilised, bundled and made easily accessible as effectively as possible

Action 5. “The Holland Broadband Land Foundation” in formation: public-private partnership

The partnership between the government and the main interested companies and sectoral organisations will be continued and intensified via “the Holland Broadband Land Foundation” in formation. Efficient and effective dissemination of learning experience and other knowledge to market parties and government agencies will promote dynamism in the broadband cog. The purpose of this action is to increase transparency, to identify directions and to reduce risks in investment decisions. In addition to its role in knowledge dissemination, this centre of expertise to support broadband initiatives will also play a role in service development, aimed specifically at the semi-public sector. The government will therefore intensify its partnership with the private sector through the “Holland Broadband Land Foundation” in formation. This PPP will develop new multi-disciplinary services and chain concepts and select viable business plans, which will be followed by implementation and upscaling. The implementation of new services will therefore take place in a structured manner and the prospects of returns for businesses will be increased. The interim evaluation of the Kenniswijk project calls for reorganisation of the deployment of government resources for service development, to make these nationally available to support this initiative.

Action 6. Development of an action plan for four social sectors

The government will focus on the development of semi-public services. The government considers it desirable and necessary to confine itself initially to four fields: education, care, security and transport. Together with the relevant sectors, companies and government departments, an action plan for large-scale implementation will be drawn up before the end of this year.

In the long term, the aim of this is to achieve the following:

- 1 Excellent broadband-type services and networks for education
- 2 Working chain concepts for effective, high quality medical and social care that will remain affordable and accessible in the future
- 3 A safe social living environment, supported by ICT and networks
- 4 Availability of a set of digital facilities that contributes towards improved access and avoids unnecessary mobility.

Action 7. Conditions for use

In the recently-published Government-wide ICT Agenda, the government identifies six priorities aimed at creating the necessary conditions for optimal use of ICT. It has drawn up an action plan involving the following actions:

- 1 Once-only supply of data: certain particulars, once known to the government, may not be requested again. Basis registers will be created for this purpose.
- 2 Electronic authentication: a system will be created, enabling companies and persons to identify themselves electronically to the government.
- 3 Open standards for the government: a programme for the use of open standards.
- 4 Security and reliability: the government will promote the security and reliability of ICT and confidence in its use.

Action 7a. Electronic payment

The possibility of making payments via the new media is important for the development of electronic services. The Netherlands is trailing other countries in terms of trade via electronic platforms. There appears to be a conflict between demand (confidence, convenience and market penetration) and the supply of payment services (multitude of small-scale initiatives). In order to resolve this conflict, the Ministry of Economic Affairs will work to increase the transparency of electronic payments. In concrete terms, this means that the Ministry will conduct a cost-benefit analysis of the infrastructure for payment via the new media, together with market parties. This process will be completed by the end of 2004.

Action 8. Kenniswijk: 'Connecting the dots'

On the basis of the evaluation of the Kenniswijk project, this will be continued in a different form as an experimental environment for the new generation of networks. Kenniswijk Eindhoven will be connected at a national level with broadband initiatives in other cities. In terms of service development, efforts will focus explicitly on supporting the relevant course set out in this paper. Service and product development can be advanced in the Holland Broadband Land Foundation in formation. Under the motto 'Connecting the dots', broader identification of the Dutch 'knowledge districts' will take place. If this reveals products and services that require substantial bandwidth, and Kenniswijk has access to the necessary broadband infrastructure, experiments can be conducted there. The government sees opportunities and interest among market parties for realising broadband infrastructure in Kenniswijk, but on a more limited scale than was expected at the time.

Action 9. The broadband circle: bundling broadband initiatives

The Netherlands has various programmes and alliances that develop knowledge in the broadband field. Section 6 of the In-Depth Annex outlines these activities and institutes, including Freeband, Next Generation Infrastructures, Gigaport, Surfnet, Public Broadcasting Services, Lofar, the Telematics Institute and TNO. It would be valuable to co-ordinate these activities and institutes more closely and to position them clearly in relation to each other, to avoid duplication, improve knowledge dissemination and make better use of the available resources. Plans will be developed with the parties concerned, in order to create a strong 'network' in which these activities can reinforce each other.

Action 10. Broadband in urban policy

The government wishes to stimulate an increase in the number of urban broadband connections. The Economy pillar of urban policy offers cities the opportunity to contract agreements and deploy resources for the connection of public institutions to broadband in the next covenant period (2005 to 2009). These agreements will enable the government to make an active contribution to the connection of residents and private companies

Action 11. Access to government buildings

Central government aims to achieve effective bundling of its network infrastructure, partly to reduce the costs of data exchanges. The option of broadband connections for all government buildings is being investigated, starting in The Hague region¹⁴.

5.3.4 Track 4: Regulation and rules of play

Broadband involves various areas of legislation and regulations. In the past year, various restraints and unclear points that could hamper the development of innovative broadband services and infrastructures have been identified. These problems will be considered in connection with potential legal amendments.

With a view to permanent innovation of networks and services, two additional principles apply for the rules of play:

- Removal of any restraints in legislation and regulations
- Further development of potential stimulation measures in legislation and regulations.

Action 12. Implementation of the Electronic Communications Act

After the parliamentary debates on the Electronic Communications Bill, the supervisory authorities (Opta/NMa) will be given a clear policy framework, by means of policy rules (a General Administrative Order), for the application of the new regulatory framework. Creating scope for innovation in networks and services will be an important theme. Attention will also be devoted to the limits of regulations. Investment in new developments must remain an attractive option, including for regulated parties. This will only be possible if the return on such investments is sufficiently attractive to financiers and investors.

¹⁴ A study by Sogeti and Arcadis, commissioned by the Ministries of the Interior and Kingdom Relations and of Economic Affairs (2003), into a joint central government network in The Hague, identified short and long-term benefits. Within a few years, a joint glass-fibre network would provide more financial benefits than individual purchases of network capacity. A joint network would also offer better opportunities for shared services that the government will develop in the future.

Action 13. Rights of way

Providers note that some municipal authorities are taking on the role of market parties and laying their own glass-fibre networks within the municipal boundaries. They also note that a problem of 'who wears which hat' arises within such municipal authorities, due to the municipal co-ordination task. Potential market activities by municipal authorities may not distort markets, but a general rule for municipal commercial activities falls beyond the scope of the amendment of Chapter 5 of the Telecommunications Act. Proper limitation of the municipal co-ordination role – in line with the 2002/21/EC Framework Directive – through structural segregation of the municipal authority's responsibility for issuing consent decisions and potential activities relating to the ownership or control over the networks laid will be considered.

Action 14: Copyright

Broadband offers new opportunities to publish material protected by copyright. This raises a number of issues concerning innovation and competition. This often involves issues that go beyond the question of broadband alone, and should therefore be considered in relation to other developments, usually with an international dimension. Recent research showed that in general terms, innovation does not restrict copyright. However, specific copyright issues were identified in various sectors that do influence innovation and competition. As a principle, all publications protected by copyright require consent or payment. This statutory framework is established in European and international law. In practice, consent is often granted via collective managers (voluntarily and in one case, by law). Consent is often granted subject to the condition of a reasonable payment. The parameters for the determination of the amount of such payments must be transparent. As already stated in last year's letter to the Second Chamber on copyright issues in digital radio and TV, it is up to the parties themselves to reach agreement on the level of payments¹⁵. The more that the number of viewers and listeners becomes more effectively measurable, the more that the use of the 'actual audience principle' as an important factor for the determination of fair payment becomes an obvious choice. Similar cases must receive equal treatment. No abuse of dominant positions must occur in the exercise of copyrights. On 16 April 2004, the European Commission issued a notice on the exercise of copyrights, and announced plans for a draft Directive on collective management. The draft Directive will probably be issued before the end of this year. The government is monitoring developments in the fields of copyright and broadband closely, and has formulated the following approach:

- Market transparency: The government aims to increase transparency and non-discrimination in the market for material protected by copyright. This is expected to come up in the Directive.
- Historical material: The government wants to provide a further stimulus by increasingly offering content via broadband, for example historical audio-visual materials. It is already working on systems to support this.
- New forms of publication: new technological developments lead to new forms of publication, including for material protected by copyright. It is in the interests of innovation in technology and services that enough opportunities are provided to experiment with new forms of publication of work protected by copyright. It is important in this respect that market parties reach agreements on introductory schemes for the use of the material. Such agreements can be mutually beneficial. The 1912 Copyright Act also assumes that users and copyright owners have their own responsibilities in this regard (self-regulation). The parties concerned have already taken some steps in this regard.
- Actual versus potential audience: As the number of viewers and listeners becomes easier to measure, the choice of the 'actual audience principle' as a key factor in the determination of fair recompense becomes more obvious. If the payment for the use of protected material can indeed be related to individual use in the future, i.e. to the cultural and media behaviour of private citizens, this will avoid tariff stacking and double levies. Further research into the right balance for the relevant pricing structures is needed. The ruling on a case currently before the Supreme Court, concerning the parameters for determining the level of payments (Sena/NOS) must also be awaited.

¹⁵ Letter from the State Secretary of Culture, the Minister of Justice and the Minister of Economic Affairs dated 4 December 2003, Second Chamber Documents 2003/04, 27 088, No. 32.

- Digital rights management (DRM): The government aims to promote the development and use of DRM systems. The systems enable direct transactions between users and copyright owners, reduce transaction costs and control illegal dissemination of protected material.

The government is currently conducting talks with interested parties on the above issues (see Section 7 of the In-Depth Annex). The Ministry of Justice plays a leading role in these talks. If further developments give reason to do so, the government will consider whether additional measures are necessary.

5.4 Financial paragraph

Because a choice has been made for effective instruments that do not require major investments, expenditure on the above policy actions can be financed through reallocation of existing resources.

In 2004, some € 3.4 million of the resources of the National Electronic Superhighways Action Programme (NAP) will be used to co-finance the Holland Broadband Land Foundation in formation and to support high-potential broadband initiatives in four public sectors. A sum of € 900,000 will also be released from the Ministry of Economic Affairs budget for 2004 for the Broadband Action Programme and to conduct research relating to the dialogue with the private sector and other government agencies.

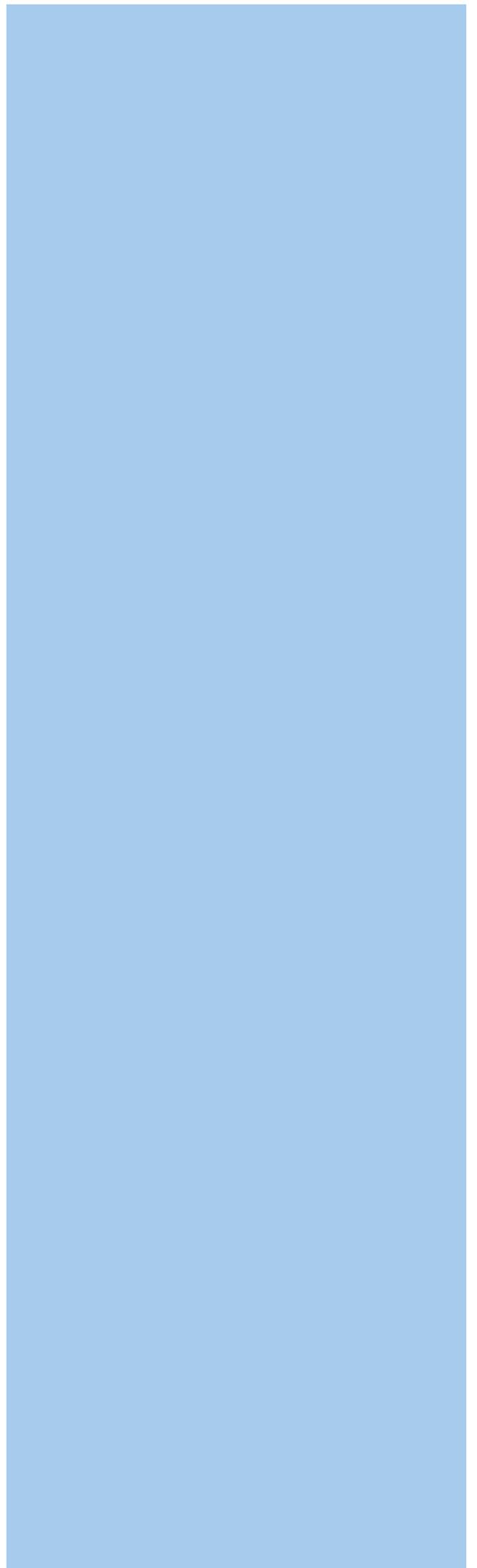
In view of the structural character of the broadband activities, € 3.7 million will be released from the Ministry of Economic Affairs budgets for 2005, 2006 and 2007 for the Broadband Action Programme. Until 2006, € 850,000 will be allocated from NAP resources for the central government contribution to the Holland Broadband Land Foundation in formation.

Finally, the government wishes to give a strong impetus to the development of services in (semi-)public sectors. Under the heading of 'Kenniswijk: Connecting the Dots', the Kenniswijk project will undergo a transition to give it a more national character. The existing service scheme (€ 6 million) will be modified so that it becomes available nation-wide. The government is also working on clusters of services, via PPPs, in order to provide for implementation in a limited number of sectors. € 12 million is available for this in 2004 and 2005. The transition from Kenniswijk implies a reallocation of the resources for Kenniswijk. As Kenniswijk is financed from FES resources, the reallocation must be consistent with the agreements made with the FES.

The total estimated expenditure in 2004 for the formulated policy actions is € 13,300,000. The table below shows the guaranteed expenditure for each action

Estimated expenditure	Notes	2004	2005	2006
Track 1 Market dialogue and research				
Action I Dialogue and Broadband Impulse Committee	Communication, supervision, meeting and travel expenses	€ 70,000	€ 20,000	€ -
Action II Research	Outsourcing of research	€ 300,000	€ 100,000	€ -
Track 2 Co-ordination				
Action III Development of guidelines	Communication, external experts, drawing up guidelines	€ 150,000	€ 150,000	€ 150,000
Action IV Regular formal administrative talks	No additional costs	€ -	€ -	€ -

Track 3 Stimulation Services				
Action V Holland Broadband Land	Central government co-financing of Holland Broadband Land Foundation	€ 850,000	€ 850,000	€ 850,000
Action VI Broadband in four social sectors	Support for high-potential initiatives	€ 2,400,000	€ 2,400,000	€ 2,400,000
Action VII Conditions for use	No additional costs	€ -	€ -	€ -
Action VIII Kenniswijk 'Connecting the dots'	National Kenniswijk Service Scheme	€ 3,000,000	€ 3,000,000	€ -
	Kenniswijk mega-clusters	€ 6,000,000	€ 6,000,000	€ -
Infrastructure				
Action IX The Broadband Circle	Communication, planning, supervision	€ 100,000	€ 100,000	€ 100,000
Action X Broadband in urban policy	Communication, monitoring, exchange of knowledge	€ 30,000	€ 30,000	€ 30,000
Action XI Access to government buildings	Financing from existing ICT budgets	€ -	€ -	€ -
Track 4 Regulation and rules of play				
Action XII Implementation of the Electronic Communications Act	No additional costs	€ -	€ -	€ -
Action XIII Excavation rights	No additional costs	€ -	€ -	€ -
Action XIV Copyright	No additional costs	€ -	€ -	€ -
Other general costs Broadband Action Programme		€ 400,000	€ 750,000	€ 870,000
	Total expenditure	€ 13,300,000	€ 13,400,000	€ 4,400,000
Cover				
Economic Affairs budget	Actions I, II, IV, VIII, IX, X, XI and XII	€ 900,000	€ 3,700,000	€ 3,700,000
National Electronic Super-highways Action Programme Kenniswijk: 'Connecting the Dots'	Actions III, V and VI	€ 3,400,000	€ 850,000 -	€ 850,000
	Action VII	€ 9,000,000	€ 9,000,000	€ -
	Total cover	€ 13,300,000	€ 13,400,000	€ 4,400,000





The Broadband Paper

A question of pace and better utilisation

In-depth Annex

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1 Broadband: what is it?

1.1 Bandwidth

Broadband is the collective term for ICT infrastructures with very high capacity: i.e. networks that can transmit large volumes of data at high speeds, both to the user and between users¹. The capacity is also referred to as the 'bandwidth': the greater the bandwidth in an infrastructure, the greater its capacity. This is why it these infrastructures are known as 'broadband'.

Instead of a definition in terms of capacity, this paper defines broadband in terms of functionality. The following definition, as formulated by the Broadband Expert Group, is used here:

'Broadband is a high quality, continuously available connection suitable for audiovisual applications and for the exchange of large data files'².

In this paper, the term 'broadband' is sub-divided further into 'medium broadband' and 'super-broadband'.

Narrowband Bit rate <+ 128 kbit/s	Medium-broadband 128 kbit/s < bit rate < 10 Mbit/s	Super-broadband Bit rate > = 10 Mbit/s
<i>Single user</i> <i>Singe service (Internet or telephony)</i> <i>Basic e-mail, basic web-browser</i> <i>Basic information exchange/ e-commerce</i> <i>Highly a-symmetrical (light use)</i>	<i>Multiple user</i> <i>Dual service (Internet + telephone)</i> <i>Graphical e-mail and web-browser</i> <i>Rich information exchange / e-commerce</i> <i>Asymmetrical (intensive use)</i>	<i>Multiple user and multiple platforms</i> <i>Multiple services (Internet + telephone + Video/TV +...)</i> <i>Multimedia applications and applications</i> <i>Multi-mode interaction</i> <i>Symmetrical (intensive producer/user)</i>

Source: Allen Consulting Group/Ericsson 2004.

An example of narrowband is a data connection via a normal telephone or ISDN line. An important property of narrowband is that it is necessary to call in to create the data connection, so that the telephone line remains engaged and is not available for normal calls. In the interests of accessibility, and in view of the costs, the user will not keep the connection open continuously. Narrowband data communication is also possible via the existing mobile telephony networks.

A medium-broadband data connection can be created by many different technologies, which use different infrastructures. ADSL and most of the cable Internet technologies used in the Netherlands can be classed as medium-broadband. In the near future, the success of the existing mobile telephony networks, UMTS, will be able to provide medium-broadband data connections.

Existing infrastructures such as the telephony network or the cable television network can be upgraded further in the future, including through further installation of glass fibre networks. In combination with newer DSL or cable Internet technologies, these networks can support super-broadband data speeds. At the same time, new glass fibre infrastructures, with their very high data speeds, comply with the above definition of super-broadband.

1 Existing ICT infrastructures are e.g. the telephony networks (including KPN, Versatel and Colt-Telecom), the cable networks (including UPC, Casema and Essent) and the mobile networks (including Vodafone, KPN, Telfort and Orange).

2 See the 'Netherlands Broadband Land' report, The Hague, 30 May 2002, pg. 9.

1.2 The switch from narrowband to broadband

Users switch from narrowband connections to medium or super-broadband connections for two reasons. The first is that a medium or super-broadband connection is often provided for a fixed monthly amount (a 'flat fee'), in combination with the network property that the connection can remain open continuously. This means that there are no variable costs and the Internet can be used at all times without extra costs³. A second obvious motive for the switch is the greater bandwidth and the associated faster processing of e-mail and Internet traffic. Furthermore, the extra bandwidth offers users better quality for existing or new multimedia services.

It is assumed that, above a certain bandwidth, there are no further gains for users in terms of convenience for e-mail and web browsing. As a rule, the speed of switching between web pages is compared with the speed of leafing through a book. There is no added value in higher speeds. The added value of broadband connections lies mainly in the better quality of multimedia services and the number of services that can be used by more than one user in a household at the same time ('multi-service multi-user'). The ability to send and receive the same volumes ('symmetry') is also important for videophony and for 'peer-to-peer' and other interactive services.

1.3 Technologies and infrastructures

The existing medium broadband technologies (ADSL and cable Internet) use the copper or 'coax' infrastructure of the telephony network or the cable television network. KPN and the cable operators have an underground infrastructure duopoly (cables) for the supply of a (fixed) connection network for broadband. Unbundling has made competition possible in the provision of the actual broadband connections. When these technologies no longer comply with the bandwidth, there are new DSL and cable Internet technologies that can achieve super-broadband data speeds. The telephony or cable network has to be upgraded for this purpose, including by bringing the glass fibre network closer to the end-user. This entails additional costs. Many glass fibre infrastructures have already been installed in recent years. However, these were aimed mainly realising the national and urban backbone network connections ('city rings').

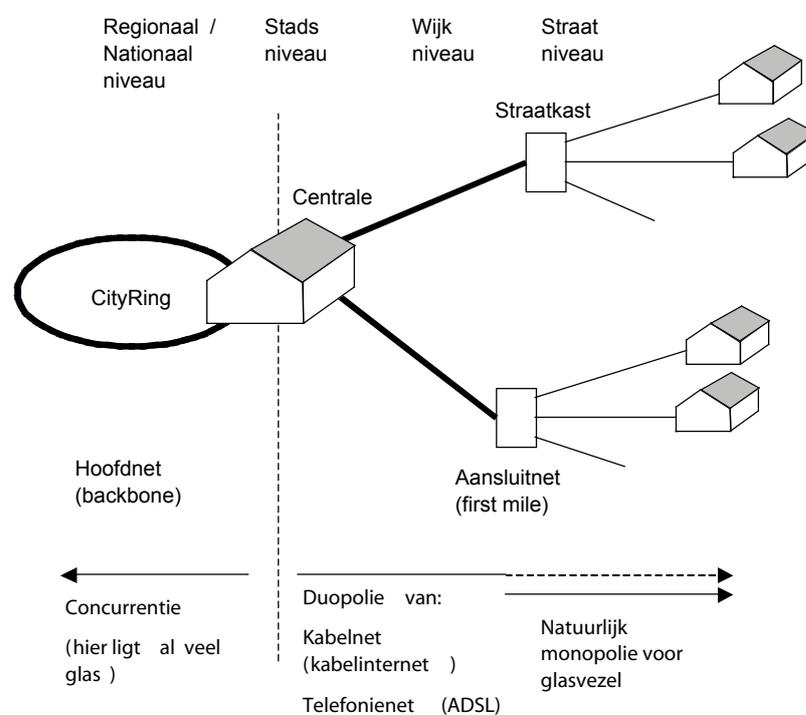


Figure 1. Competition levels in the backbone network and connection network

³ It should be noted that connections with volume-based charges are also provided. When the total number of data packages received and sent exceeds a certain maximum, a per unit charge is made for additional traffic.

(Translation of the concepts in figure 1:

regioaal/nationaal niveau: regional/national level

stadsniveau: urban level

wijkniveau: district level

straatniveau: street level

centrale: switchboard

straatkast: street box

main network (backbone)

aansluitnetwerk: connection network ('first mile')

concurrentie: competition (there is already a great deal of glass fibre here

duopolie van kabelnet en telefonienet: duopoly of cable Internet and Telephony

natuurlijk monopolie voor glasvezel: natural monopoly for glass fibre)

Various municipal authorities are also active in preparing small-scale rollouts of super-broadband (glass fibre-based) connection networks. These can be regarded as a third competing (fixed) broadband infrastructure. The costs of installing a complete new glass fibre-based infrastructure are high. It is conceivable that alliances between parties (KPN, cable operators, municipal authorities and others) will arise in due course, resulting in a potential 'natural monopoly' for the provision of a super-broadband glass fibre infrastructure in the connection network.

The group of broadband wireless technologies includes 'Wireless Local Loop' technologies and 'Wireless LAN/WiFi'. These technologies have the potential to realise medium to super-broadband connections. In view of the recent auction of frequencies for Wireless Local Loop, this technology has not yet been deployed on a large scale in the Netherlands. The Wireless LAN technology, originally intended for use in office buildings, has been introduced on a large scale, mainly at public locations such as airports, hotels, universities and industrial estates (the 'hotspots'), where, for example, fast wireless communication is possible with a laptop. UMTS will also become available as a mobile wireless technology for medium broadband data connections.

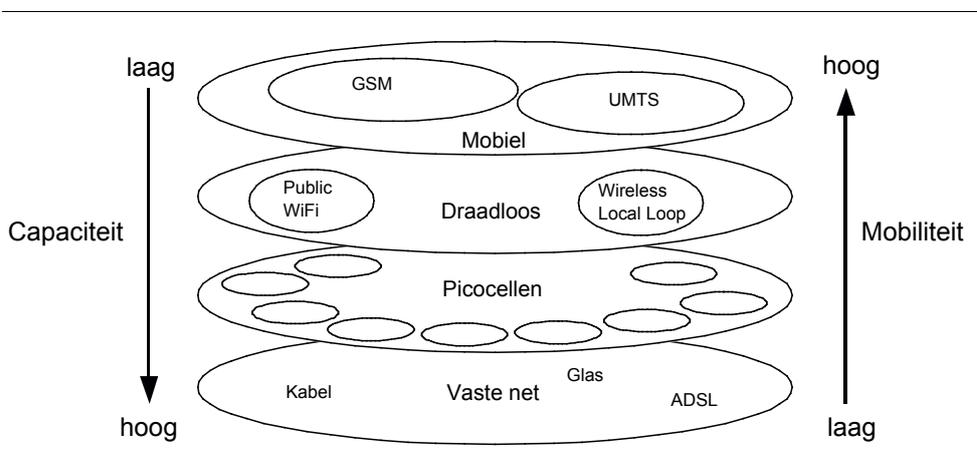


Figure 2. Capacity versus mobility

(Translation of the concepts in figure 2:

capaciteit: capacity

hoog-laag: high-low

draadloos: wireless

mobiliteit: mobility

picocellen: pico cells

kabel: cable

vaste net: fixed network

glas: glass)

1.4 Complementary technologies

On the basis of functionality, broadband covers fixed, wireless and mobile technologies. This means that the various technologies should be regarded as complementary rather than competing. They derive their continuity from the added value that they offer in terms of specific functionality: fixed

infrastructures have the advantage of high capacity and stability, wireless infrastructures are unique in terms of their flexibility and convenience in regional areas and mobile technologies have the advantage of portability and mobility. However, wireless and mobile infrastructures will not easily be able to match the capacity of glass fibre. A clear complementarity is also already evident in the wireless and mobile facilities, in which the 'mobility' functionality increases as the available 'capacity' diminishes.

Layer 1: Fixed network (fixed line connections coax, copper, glass: including telephony, Internet via desktop computer and television)

Layer 2: Pico cells (wireless communication of products and devices: including wireless telephone at home or 'blue tooth' communication between electronic agendas, telephones and computers)

Layer 3: Public Wireless LAN/WiFi (wireless communication at hotspots: including Internet with laptop out of doors, in a hotel or airport)

Layer 4: GSM/UMTS (wireless mobile communication: including telephony, Internet with electronic agenda or laptop in a train)

1.5 The trends: evolution towards a new market

Convergence

Ultimately there will be a single market for electronic communication, because the players will offer the same basic services ('triple play'). The PC, television and telephone will increasingly be integrated. This means that the competition for the three basic services, telephony, Internet access and television, will drastically increase and that consequently, the available margins for the parties will shrink. The parties will therefore aim to increase and diversify those services with which they can distinguish themselves.

Richer forms and variants of the 'triple play' basic services will therefore develop, such as high quality videotelephony, interactive television that can be paused individually, and more personalised Internet. Cameras will also be used increasingly in services, for example to send photographs taken by built-in cameras in mobile telephones, or the inclusion of personal films made with web cams on computers or separate digital cameras. Services using cameras for security purposes, access control, traffic monitoring or distance consultation (care) and tele-learning (education) will also increase.

Horizontalisation

It was customary for the owners/operators of the infrastructure to also offer the services provided via that infrastructure. As a result of the need to share investment costs, and through regulation on access to communication networks for the providers of communication services, this strategy has become less attractive and new types of alliance will now develop. The more horizontal market regulation developing as a result leads to segregation of market parties involved in the management of the infrastructure, in its operation and in the provision of communication services. This creates a far more flexible market order, in which companies focus on market segments and work together flexibly, in line with market demand. The advantage is the variety of providers and, of course, more competition – particularly between services. However, this diversity and flexibility has a price, in the form of growing complexity, which also has explicit consequences for supervision and regulation.

2 *Further development of new broadband services*

With regard to the use of services, there are two crucial developments that place heavy demands on the network. The first is the development of the multi-service platforms, which must be suitable for simultaneous service delivery. Secondly, we see developments towards a multi-user environment. This means that several different users in a property can take up the same type of service simultaneously. The mutual dependence of network and service development plays a role here. The availability of bandwidth is a determining factor for the use of services, which, in turn, is a determining factor for demand for bandwidth⁴.

Demand for bandwidth is expected to grow rapidly. The addition of video, sound, interactive aspects and, for example, online payment opportunities makes services increasingly accessible, user-friendly and customer-oriented. As the multimedia content, the audio-visual content or the interactivity of services or applications grows, the average user will need more bandwidth. The broadband communication infrastructure required for this must offer enough capacity to keep pace with the development of services.

Growing demand for bandwidth and capacity reflects public requirements and the resulting demand for permanent innovation of the communication infrastructure. The government must ensure that the best possible use can be made of the available technologies.

2.1 **Electronic superhighways**

A motorway is installed to ensure that people and goods can be transported from A to B in a short space of time. The motorway is the infrastructure, the transport the accompanying service. The situation is no different with broadband: the electronic networks form the infrastructure needed for the supply of broadband services. If the electronic superhighways are available, the services will ultimately provide the social and economic returns.

The following questions are relevant for the further development of broadband services:

- 1 What are these new services and how do they differ from existing services?
- 2 To what extent do broadband users vary?
3. What requirements will broadband users impose for the infrastructure in the future, and to what extent will the infrastructures suffice?
- 4 To what extent is the development of new services trailing that of the infrastructure, and to what extent should the government stimulate development of these services?

The answers to the above questions are summarised below. Much of the following information is taken from a TNO-report on the relationship between infrastructure and broadband services⁵.

2.2 **What are the new broadband services?**

The services can be classified in 8 domains. Several examples of services are given for each domain, starting with consumers or professionals in the home environment.

- 1 Home: Services intended for the home environment may involve convenience, security and leisure. One example is television and video on call. With broadband, users can receive every TV channel in the world, which is an interesting option for minority groups wishing to maintain contact with their country and culture of origin. Other examples include viewing personal (digital) photographs and films at home or at the homes of family members, or watching a football match with personal

4 See 'Broadband Services: The user and network requirements. Realism in Broadband Project', TNO-report commissioned by The Hague municipal authority, February 2003, pg. 61.

5 TNO Report FEL-03-C013, 'Broadband Services: User and network requirements' (February 2003)

control of the images (camera shots, repeat shots or information on particular players). Security can be provided through camera control, in which cameras are connected via broadband to a particular security service.

- 2 **Work:** The possibility of working at any location, without needing to travel to the office. The ability to access all the applications available at the office from home or from a client's location. The possibility of contact with colleagues at the coffee machine or in a meeting at a distant location via a live video connection at home or at an individual office.
- 3 **Health and care:** Broadband services for care clients or care professionals. Via live video connections, young parents can view their baby in an incubator at the hospital, those caring for an sick elderly person at home can contact health care professionals daily for advice or medical specialists can consult each other at a distance, viewing the same patient X-ray.
- 4 **Government:** The government wishes to increasingly make its services available electronically ('e-government'). These can range from electronic licence applications to home voting in an election or referendum, or following political debates via live video connections ('e-democracy').
- 5 **Shopping:** The ability to search for, view, order and pay for products from any location. With broadband, many products (news, music, films) can be supplied electronically.
- 6 **Education:** Learning requires both interactive information transfer and contacts with teachers and fellow students. Broadband can support both of these aspects. Examples include professionals who can follow an Open University lecture in the evenings from home, or groups of students who can work together on a thesis at a distance. Active training at a distance is also possible with a 'virtual reality', in which people can practice in simulated three-dimensional environments. The culture and media sectors can make a clear contribution to the development of new applications for education, for example by including audio-visual materials in multimedia teaching applications. The Netherlands Audio-Visual Institute, together with broadcasters and publishers, is developing plans to give schools access to current and historical materials in its collection.
- 7 **Culture.** Cultural events often attract visitors who currently have to travel long distances to view their favourite paintings or attend a music concert. With broadband, these cultural experiences can be provided very realistically at a distance, both in the home and in local cultural centres. Heritage institutions and archives are also providing access to their collections via digital networks, for both the general public and for special target groups such as education.
- 8 **Traffic and transport.** Movements of persons will be reduced by many of the above services, helping to control tailbacks and parking problems. Many different forms of traffic information (diversions, directions), payments (toll roads) and entertainment (video conversations between lorry drivers and family members) can be offered via broadband. This involves broadband communications with the home and with the vehicle.

Broadband can also provide a tremendous stimulus for small and medium-sized enterprises (SMEs). At present, the ICT opportunities in the SME sector are limited in comparison with those of larger companies. As for consumers, the services that are attractive for SMEs are classified in a number of domains, as described below. These services were drawn partly from the communication vision developed by TNO ⁶. SMEs account for 50% of the Dutch economy: a very large group of companies that vary in terms of both the size of the business and the type of activities performed.

- 1 **Home:** In the commercial services sector, SME employees will often work from home and while travelling. They want access to business information, independently of the device (PDA, Laptop, PC). They will therefore want good connections between home and the business network. The SME sector also includes a large number of freelancers. They always work from home and want to be able to communicate easily with clients, for example via e-mail, telephone, sending data and audio-visual files, etc.
- 2 **Work:** Future services for SMEs are designed to support the business process. Potential services include digital storage of archives or back-ups, as protection against computer crashes and the loss of vital information. SMEs work internationally. Live video meetings can save them a great deal of travelling time. Bodyshops will send photographs to garages or owners in order to discuss repairs. SME workers want an insight into what their suppliers and clients do, in order to achieve the best possible match with their activities. This requires permanent connections with high availability. Security companies will be able to guard buildings and offices at a distance.

⁶ TNO Telecom, 'ICT.future, Vision of Communication as a basis for strategy' (2003)

- 3 *Health and care*: Patients regularly visit GPs with questions concerning e.g. recent hospital treatment. Via a broadband connection, hospitals can easily send GPs digital photographs and video recordings, so that GPs can give their patients specific advice.
- 4 *Shopping/Purchasing and Sales*: SME employees often also perform purchasing and sales activities. It is extremely important for SME employees to be easily accessible to clients. SME employees can increasingly use digital solutions for this purpose, trading products via digital markets. The SME sector also includes many retailers. They can offer products via an online shop with tours of the store and product information.

2.3 Different types of users

All these services can be used by individual or groups and by companies. The differences in use are exceptionally large. Some people will use only the Internet and e-mail for years to come. Many others will encounter specific new services via work, school, the government or purely out of interest. Step by step, the use of broadband connections will grow from simple individual use to broadband use in families and companies. With the increase in use, the demand for more broadband infrastructure will also grow.

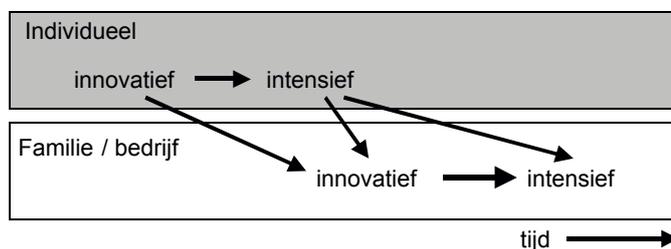


Figure 3. Movements in time from innovative individual use to intensive use by families or businesses

(Translation of the concepts in figure 3:

capaciteit: capacity	intensief: intensive
individueel: individual	familie/bedrijf: family/business
innovatief: innovative	tijd: time)

This is illustrated below by five service packages take up by different users. In the short term, the first two packages will be used most frequently. After a number of years, use will gradually shift to packages 3, 4 and 5.

- 1 The 'traditional Internet user' uses only the Internet and e-mail, without the need for broadband capacity.
- 2 The 'innovative individual user' will also primarily use the Internet and e-mail, but will also download video recordings with VHS-quality at home and in a few cases, will use videotelephony via a web cam.
- 3 In addition to the above, the 'intensive individual user' will increasingly use video services, exchange video content with others and, for example, will intensively use digital services for work purposes.
- 4 The 'innovative family or business', such as a family or an SME, involves several users of the same broadband connection. The use of package 2 is more intensive, because several users may make use of broadband services at the same time. There will also be a need for high quality voice services (telephony) on the same broadband connection, so that the group saves costs on telephony.
- 5 'Intensive use of broadband in families and companies'. This could involve a family of two parents with young children who make intensive use of broadband services. At the same time, the family will use a number of services from the above domains. One of the parents will combine the care of the children with extensive facilities for telework. The children will play games with their friends via the same broadband connection. There will also be daily video contact with a grandmother, who can remain in her own home as a result. The family will watch their favourite TV programmes, provided digitally on the broadband connection, together and interactively. When the children are in bed, both parents can find and watch a relaxing film at home or listen to a favourite music concert together.

2.4 Infrastructural requirements

This requires translation of the broadband services into basic services that can be delivered by the infrastructure.

The above broadband services make use of several basic services that can be divided simply into the following four categories:

- 1 Audio: telephony, voice mail, distribution of sound recordings and radio programmes
- 2 Video: videophony between two people, videoconferences with groups, distribution of video recordings on request or live, and the home cinema.
- 3 Data: This covers a large group of applications involving data from computer files and local or distributed computer programmes: web surfing, games and 'virtual reality'. The growing popularity of digital photographs and films creates demand for more broadband capacity in order to transmit these without problems.

Service package	Required bandwidth
1. Traditional user	Narrowband
2. Innovative user	Mediumband
3. Intensive user	
4. Innovative family/business	Broadband
5. Intensive use family/business	

Figure 4: Service packages and their bandwidth requirements (Source: TNO-FEL)

Background: continuous high availability of connections is not needed for all services. Information transfer that is not time-critical, such as e-mail, SMS/MMS and large data files. These basic services make very different demands on the infrastructure in terms of the quality and the required bandwidth. A videoconferencing service requires more bandwidth than a simple telephone call.

The quality requirements relating to e.g. the permissible delay in communication also vary. With telephony, a delay in responses of a quarter second or more is very disruptive. For viewing video recordings (non-live), a delay of several seconds is no problem.

Existing use of broadband, as described in Item 1 above as 'the traditional individual user', can be supported via ADSL or cable for years to come. The use of ICT facilities such as PCs, the Internet and broadband is developing very rapidly.

In the scenario described above, of demanding broadband users in a family setting or in companies (SMEs), demand for higher quality broadband connections that cannot be provided with the existing infrastructure will develop within three to six years. The infrastructures that could support this scenario make use of glass fibres that will either be installed in the meter cupboard in the home ('fibre to the home') or glass fibres installed in the street boxes ('fibre to the curb'), from which the broadband signal is transmitted on the existing telephony network, the cable television network or the wireless network to the home. This will entail full or partial upgrading of the existing telephony or cable television networks⁷.

⁷ TNO report FEL-03-C059 'Options for Infrastructures' (March 2003).

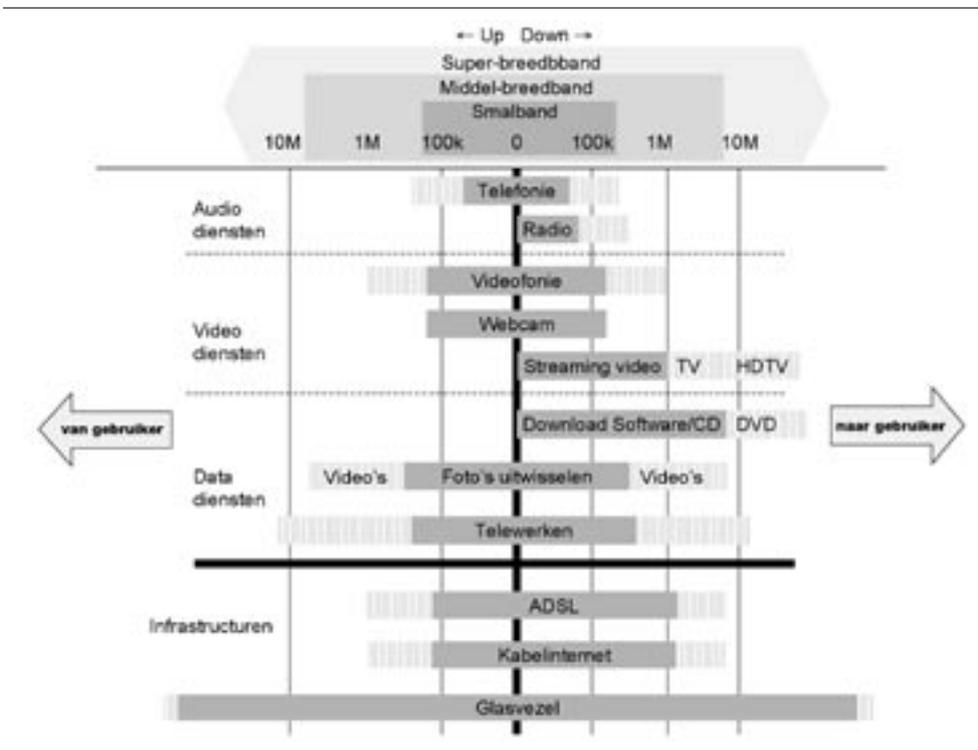


Figure 5: The data speed requirements of different services in relation to infrastructures

(Translation of the concepts in figure 5:

super-breedband: super-broadband
 middel-breedband: medium-broadband
 audiodiensten: audio services
 videodiensten: video services
 telefonie: telephony
 videofonie: videophony

van/naar gebruiker: from/to user
 foto's uitwisselen: exchange of photographs
 telewerken: telework
 infrastructures: infrastructures
 kabelinternet: cable Internet
 glasvezel: glass fibre)

2.5 Relationship between services and infrastructure

Many of the above broadband services are already possible, but supply of the new services is still limited and is trailing the possibilities in the infrastructure. The government has therefore stimulated development of new services in recent years via the Kenniswijk project. See Chapter 6 for some examples of services. In most cases, these services are already possible in the existing infrastructures.

The government has also stimulated development of services requiring high quality and super-broadband connections. This applies in particular for the GigaPort and Freeband projects, and for the projects of the Telematics Institute and TNO. Examples of these services are presented in Chapter 6. The reason why supply of such services by commercial providers still limited relates to four aspects: the services are often still difficult to use, the price is still too high, the services required demand a broadband infrastructure that is not yet available and the business model for commercial service provision is not yet well-developed.

Accelerated installation of fibre to the home or to the curb will enable faster introduction of broadband services. A number of large and medium-sized municipal authorities in the Netherlands often follow this strategy. This is illustrated below for the situation in which glass fibre is installed in 2006, so that the broadband services become available in 2006 rather than in 2010.

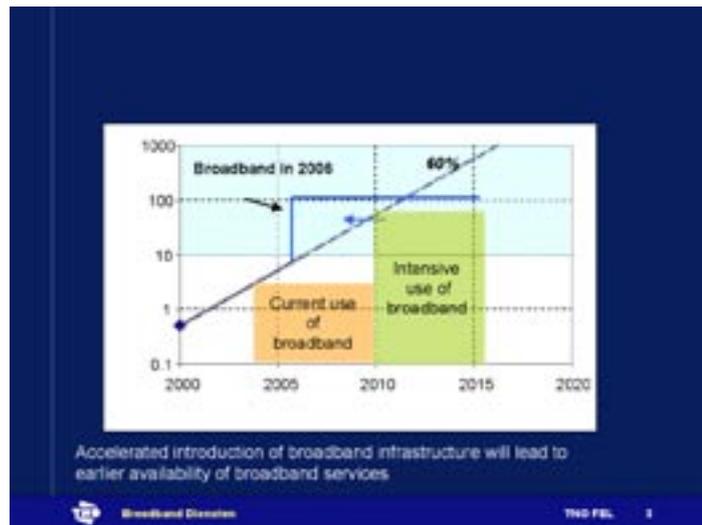


Figure 6. Introduction of broadband infrastructures in relation to the availability of broadband services (source: TNO-FEL)

The slow development of business models is briefly explained below. For more than a century, the telephony service has been provided worldwide via a simple business model: the local Post and Telecommunications Service manages the infrastructure and supplies both the basic telephony service and further services (sending bills, correcting malfunctions etc.) to the clients. The Internet service has a more extensive business model, with an Internet service provider (Chello, Planet, Wanadoo etc.), a network provider (KPN, Casema etc.) and a large number of content providers (provision of information on websites). Consumers primarily pay the Internet service provider, which buys in basic services from the network provider. In many cases, the content is still 'free of charge'. With broadband services, free content is often not possible. The party who pays can vary from one service to another. The method of payment for content and network use is also becoming more complex. In the care sector, for example, care providers have an important role to pay, but are only prepared to pay the costs if broadband services in the sector simultaneously lead to cost savings through reduced use of traditional care services such as visits to GPs or care in nursing homes.

3 Market developments and trends

Some developments in the electronic communications market lead to a structural transition from the existing relationships. The telecom market as a whole is in transition, with consequences extending far beyond the sector itself. In view of the trends and movements of market parties, central government faces a number of fundamental policy issues, particularly in the field of market regulation, competition and any central government stimulation policy.

3.1 The future development of demand and capacity limits

In recent decades, electronic data traffic has grown very sharply, both in the Netherlands and internationally. This capacity growth is a direct result of substantial growth in the use of electronic services and applications in every area of the Dutch economy. This chapter discusses the market developments that can be expected, and the related policy issues.

Within Europe, the Netherlands holds a leading position with regard to the number of households with broadband connection (ADSL via the fixed telephony network or cable Internet via the TV cable). An extrapolation of these developments shows that the Netherlands can retain this leading position in the coming years. An international comparison of penetration levels reveals major differences between countries, with South Korea as the clear leader. The Netherlands ranks sixth in this comparison.

The number of ADSL subscribers grew faster in 2003 than the number of cable Internet subscribers, resulting in 944,000 ADSL subscribers and 969,000 cable Internet subscribers. Fierce competition means that the prices for broadband access in the Netherlands are currently low.

Number of broadband connections by access technology

	Cable	ADSL	FttH/FttD	BB-total
1999 - Q4	75,000	0	0	75,000
2000 - Q2	160,000	3,500	0	163,500
2001 - Q2	330,000	65,000	0	395,000
2002 - Q1	492,400	185,000	0	677,400
2003 - Q2	850,000	575,000	15,000	1,440,000
2003 - Q4	940,000	960,000	25,000	1,925,000

Given the explosive growth that can be expected in electronic communication in the Netherlands, the market assumes that the broadband via the existing fixed infrastructures will reach its limits in the foreseeable future. This is also noted in the recommendations of the national Broadband Expert Group to the government. Extrapolation from historical demand for capacity suggests that average end-user demand can be expected to reach 10 Mbps in the foreseeable future. At present, there are no indications that capacity demand will stagnate. However, this means that it is not possible to predict with any certainty exactly how the growth will manifest itself. This is also why the paper cannot yet make any precise statements on the required rate of broadband development.

Based on a conservative estimate that does not take account of exponential network effects, it can be assumed that far larger data flows will arise in the near future than the existing network technologies can process (ADSL and cable Internet currently provide end-user connections with a maximum bandwidth between 2 and 8 Mbps). The use of richer applications and the growing demand for interactive communications will not only entail capacity growth, but also the need for symmetry in broadband traffic.

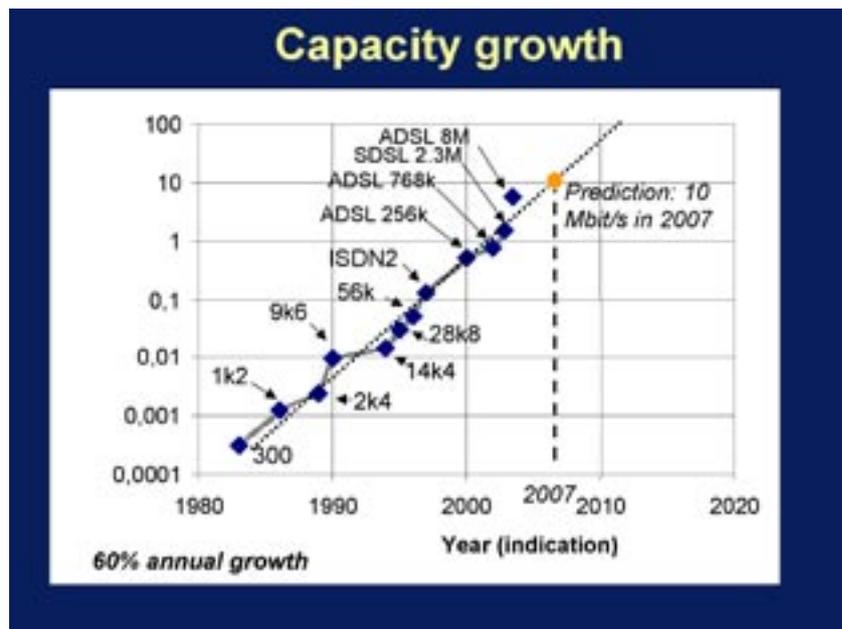


Figure 7. Growth of network capacity (source: TNO-Telecom)

3.2 Upgrading of the connection network

Closer examination shows that capacity problems will primarily be an issue in the network to end-users (homes, institutions and companies): the connection network. In the future, this connection network (the 'first mile') will form the greatest restraint to processing the growing demand for capacity. The capacity of the telephony and cable television connecting networks is sufficient for the supply of the existing ADSL and cable Internet speeds, but will approach its limits through a growing number of users and increasing demand for more band width. The reason for this is that the connection network currently consists of (telephony network) or coax (cable television network), which has a limited capacity. The current national and urban 'backbone' networks consist of glass fibre and offer enough capacity for the future. The problem can be described by stating that there is a 'dirt road' (the connection network based on copper or coax) between the 'race tracks' (the glass fibre backbone network) and the home network with the 'racing cars' (the ancillary equipment connected in the home, such as TV sets, telephones and computers).

The developments relating to the connection network (such as the installation of new connection networks and the upgrading of existing ones) call for new business models for broadband, which will involve major investments. Not only companies, but also government agencies have an interest in solving this bottleneck. Applications in key social fields, such as education (life-long learning), research (increasingly large data files), health care (waiting lists), mobility (files) and security (video in public areas) can only come to maturity if they are facilitated by an adequate broadband infrastructure.

3.3 Transition: the position of market parties

As mentioned earlier, the telecom sector is in a transitional phase. In the coming 10 years, different forms of broadband access will exist side by side: xDSL, coax (cable), wireless technologies such as WLL and satellite and 'fibre to home', the ultimate fixed connection via glass fibre. In the long term, glass fibre appears to be the most resilient. Both cable and telecom operators endorse the expectation that in due course, the connection network to homes will become a glass fibre network on which 'triple play' will be provided. However, there is no clear answer to the question of how fast this will take place, and exactly how the transition will be completed. There is consensus on the fact that the transition will have an evolutionary character. Technologies will not succeed each other in

sequence. There is more likely to be parallel development in which the market share of glass fibre increases and that of existing infrastructures diminishes. This does not change the fact that further investment in upgrading of existing networks is essential in order to ensure the overall quality of facilities throughout the country. They play a crucial role in the further development of demand here.

In large parts of the Netherlands, the cable has evolved from a distribution network for television and radio into a fully-fledged telecommunication network (Internet and telephony). More than 95% of Dutch households have access to a cable connection. More than 60% of these are suitable for telecommunication.

The copper network is also showing strong development. The introduction of ADSL has led to a substantial increase in capacity and has also made 'always on' connections possible. For these reasons, cable and ADSL via the KPN network have become fierce rivals on the Internet market. However, the competition will not confine itself to this market. Some cable companies now also offer telephony. When Internet telephony ('Voice over IP') also becomes available, competition will become even fiercer. The competition between the cable and the KPN network will sharpen still more once TV can be offered via the Internet (ADSL or other technologies). Both services are expected to be available via broadband within five years. As a consequence of these developments, KPN will lose its telephony monopoly and the cable operators their broadcasting monopoly. Cable and telecom operators will therefore face the risk that their rivals will be able to offer full triple play earlier than they can. Their own infrastructure and services would lose value sharply as a result.

3.4 The players

Traditional players (telecom providers and cable operators) and newcomers (including construction companies, project developers, energy companies, housing corporations and municipal and provincial authorities) are investigating the possibilities of broadband for consumers. In view of the high investments required and the poor financial climate, these parties increasingly tend to form partnerships in order to share the investment costs. One of the scenarios here is fragmentation of the supply chain (channels, network operators, service providers etc.), which will create a heavily horizontalised market. The different roles that parties can play in broadband business case therefore form an important point for attention. We should bear in mind here that the market parties will continue to hold different positions, depending partly on the economy and the political context.

In recent years, traditional players have taken a cautious attitude. Although these parties also explicitly endorse the need for further broadband development, they are hampered here by their 'past', if competitors switch to glass fibre earlier than they do themselves. Broadband cannibalises the income they generate from their existing networks. So far, these parties have chosen the route of evolutionary, careful and gradual development. By gradually increasing the speed and capacity of existing networks, they avoid destruction of capital and glass fibre comes closer on a step-by-step basis. The idea of careful, gradual development plays an important role in their decisions on new investments.

Telecom providers – particularly the incumbents – have money to invest, but are hampered by their activities to further increase the capacity of their existing infrastructure with DSL technologies. In other words, they do not consider it feasible or responsible to invest in switching the connection network to glass fibre while there is plenty of competition from their own ADSL and cable companies at the lower end of the market. Cable operators have less investment power, but do have more time and opportunity to substantially increase the capacity of their networks. However, if telecom providers start a price war, they have no option but to join in, to avoid being priced out of the market. As a result, they too will postpone investments in glass fibre and upgrading the existing network.

The newcomers are creating heavy pressure for a fast rollout of broadband now. These newcomers are cable manufacturers, installers, housing construction companies, etc. In the present economic situation, they face a shortage of work. They are focusing not only on installation, but increasingly, also on the management and operation of the passive network (cables, and not yet actively glass fibre). The advantage for them is that the one-off income for installation is replaced by a continuous

flow of income that is less sensitive to economic fluctuations. Broadband therefore offers them attractive opportunities in which they are prepared to invest. However, this group of market parties is not in a position to bear the investments for the entire value chain.

3.4.1 'Netherlands Broad'

As an organisation representing the interests of Dutch cable companies, VECAI has drawn up a vision for the future of broadband, entitled 'Broadband, Economy and Society: Where a narrow country can be broad'. This vision can be regarded as the response of the cable companies to the 'Delta Plan Glass', KPN's vision for the future of broadband (see below). In KPN's vision, investments must be made now in a new generation infrastructure: a national glass fibre connection network. However, this calls for a switch to a different market order: the rollout of physical infrastructure in a public-private partnership (PPP)⁸ and competition between commercial service providers on this infrastructure. VECAI's future vision contains the following elements:

Continued technological development of existing infrastructures is assumed. This involves retaining competition between infrastructures and switching to a new generation (glass fibre) only when there is enough demand for this. A great deal is expected of a hybrid interim form: glass cable. VECAI does regard glass fibre as the technology for the (distant) future, however.

The principle is that the ownership of services and infrastructure should remain in the same hands. The report does not make it clear whether other commercial service providers can use the infrastructure. It does, however, emphasise the importance of public broadband services.

Government should play a modest role, by facilitating and stimulating public services. There should be no intervention in the existing market, certainly not with financial resources.

On 19 January 2004, the Platform Netherlands Broad Platform was installed in connection with this future vision. According to the press release⁹, the Platform's activities are directed at 'making the possibilities of broadband serviceable for the specific needs of Dutch citizens, companies and government agencies'.

3.4.2 KPN's 'Delta Plan Glass'

In the 'Delta Plan Glass', KPN calls for a major effort by the market and the government to accelerate the installation of a glass fibre network in the Netherlands. This plan departs to some extent from the evolutionary route. A condition for the installation of a national network is to regard the future glass fibre connection network as a natural monopoly and to allow competition between service providers on the glass fibre network. According to KPN, allowing the installation of a glass fibre connection network through a partnership, and placing its management and operation in the hands of a network company, will create the necessary conditions for a return on the investments.

3.4.3 Position of the G4

In the G4 municipal authorities, proposals are being developed for the rollout of urban glass fibre networks and services (between citizens, by the market and by the municipal authority). A structured and sustainable broadband infrastructure and prevention of the loss of public capital can only be achieved through good central government steering. The G4 authorities are asking central government to abandon a policy aimed directly at a national rollout and to offer local government suitable instruments to make accelerated installation possible (in partnership with market parties). Central government should then support urban municipalities that take initiatives in a financial (e.g. via fiscal facilities) and/or administrative/legal sense. The creation of several different connection networks is undesirable, as this leads to loss of capital and unnecessary nuisance for the public as a result of excavation work. Ways to avoid continued investment in existing infrastructures must be investigated. The G4 regard an amendment of the Telecom Act, aimed at a driving and, possibly, a participating role for the municipal authorities in the installation of the passive infrastructure as highly desirable, as well as more scope for the municipal authorities to steer the rollout more closely and to regulate potential monopolies. The same applies for the co-ordination of the underground infrastructure (limiting the tolerance commitment and any commitments to physically remove abandoned networks).

⁸ In this scenario, KPN's network business is absorbed by this PPP. KPN will then become primarily a service provider.

⁹ Press release, The Hague 19 January 2004, www.nederlandbreed.nl

3.5 New dilemmas and issues in the further development of broadband

The above trends have significant consequences for the ICT sector in general and for the strategies of individual companies in particular, in terms of competition, market power and business models.

3.5.1 Layered competition

Competition is desirable for several reasons. Firstly, it provides an unmistakable stimulus for innovation. Competition also ensures that end-users have the maximum choice of the best services at the lowest costs and that at the same time, the technological possibilities can actually be utilised (costs, choice, quality and capitalisation).

However, the trends towards both convergence and horizontalisation raise the question of where competition resulting in these outcomes will actually occur. Both the possibilities for and the effects of competition at the lower network level – that of the connection network – will be limited. This raises the legitimate question of whether competition at this level will lead to the required innovation. At higher levels, there is more scope for competition and the dynamic is greater. It is at this level that the effects in terms of the required innovation can be expected.

The regulations for access to communication networks for the providers of communication services result in a more open and competitive service environment. Paradoxically, this can also lead to additional, new sources of market power. The battle for market power will be fought on many different fronts. Understanding of these mechanisms and of new technologies, including the inter-relationships, is necessary for regulators to promote a fair market that functions well¹⁰. The layer model shown in the diagram below, developed by the Broadband Expert Group, also implies that the layers do not have equal status from a competitive point of view¹¹. Or, as Prof. Dommering puts it: 'The lowest layer is the physical layer with the highest invested costs. Steering and organisation of the middle layer calls for objective government supervision. The top layer forms the free market'¹².



Figure 8: Layer model according to the Broadband Expert Group

¹⁰ See 'Regulatory implications of the introduction of next generation networks and other new developments in electronic communications', ex. Summary, May 2003, conducted by Devoteam Siticom on assignment for the European Commission, pg. 13.

¹¹ From the 'Netherlands, Broadband Land' report, Broadband Expert Group, The Hague 30 May 2002, pg. 16.

¹² See E.J. Dommering 'A new measure for network markets: Institutional network design', in Informatie & Informatiebeleid (I&I) 2002-2004, pgs. 24-33.

3.5.2 Characteristics of the connection network: natural monopoly

The installation of the connection network is characterised by high invested costs: i.e. the excavation work is highly wage-intensive and makes heavy demands on physical planning, particularly because of the close-knit structure, which necessitates connecting every street and every home/office. The costs of connecting homes in remote areas can no longer be recovered. Practice has shown that it is not profitable to install a second connection network. Whether this applies for the installation of the 'first mile' still remains to be seen, but the fact is that connection network operators have the advantage that they cannot easily be beaten by other market entrants. In that case, duplication of the connection network is virtually ruled out. This creates the risk of a monopoly in the connection network. Another important feature involves economies of scale. As with other networks, these advantages will occur in the connection network on the side of the users. The value of the connection network will increase with the number of users connected to it¹³.

Many initiatives are already being developed in the Netherlands at the regional or local level. As a result, a wide diversity of technological and organisational choices arises. Consequently, market parties are losing scale benefits. In order to make optimal use of network effects and scale benefits, access to the networks and connection of different networks must be assured to avoid fragmentation.

13 See E.J. Dommering, 'A New Measure for Network Markets: Institutional network design', in Information & Information Policy (I&I) 2002-2004, pgs. 24-33.

4 *Europe, the Lisbon strategy and the e-Europe Action Plan*

4.1 **Concrete EU actions to stimulate broadband**

The European Commission takes the view that broadband will materially alter the communication behaviour of people and could make an important contribution to increased labour productivity. The main framework instruments and concrete actions to achieve the above policy objectives are:

- a. The e-Europe Action Plan
- b. The Framework Programme for Research and Development
- c. The 'Growth' initiative

4.1.1 **The e-Europe Action Plan¹⁴**

The e-Europe Action Plan contains European targets for national policy. The Member States hold primary responsibility for its implementation. In 2003, all Member States undertook to formulate a broadband strategy, to exchange 'best practices' and to co-operate in benchmarking.

The targets for the e-Europe Action Plan 2005 are:

- I. To stimulate the rollout of secure broadband infrastructure
- II. To promote services, applications and content in key sectors (e-government, e-health and e-business). By focusing on these large sectors, the European Commission aims to give a strong boost to demand for broadband services.
- III. Reform of European and national legislation, so that this does not create any unnecessary constraints to new services, competition is assured and operability improves.

4.1.2 **Framework Programme for Research and Development¹⁵**

The 6th Framework Programme for Research and Development has a budget of EUR 17.2 billion, divided over a number of themes and programmes. The funds are allocated to projects that can be submitted in 'calls for proposals'. Funds have been reserved for broadband-related research under different themes, with a total of EUR 550 million available. The main theme is 'Information and Society Technologies' (IST):

- 'Broadband for Everyone' action line
- 'Development of Mobile and Wireless Systems' action line.

4.1.3 **'Growth' initiative**

In October 2003, the European Council decided to develop a European growth initiative, in order to give an extra stimulus to economic growth and employment. Broadband and ICT R&D form important parts of this initiative and therefore also figure in the provisional 'quick start' list of urgent projects, to be realised before the end of 2005. These are:

- 1 Mobile communication (large-scale test bed for new technology)
- 2 Upgrading of the 'GEANT' ICT-research infrastructure, the broadband network connecting universities and research institutes.

4.2 **Key issues on the EU policy agenda for broadband**

4.2.1 **The role of government**

Upgrading networks is primarily a market task. However, the Commission realises that market parties are going through a difficult period. The Commission takes the view that stronger demand is the main factor that can help to solve the 'chicken and the egg' problem. Public stimulation of demand (by offering public services via broadband) can encourage private parties to invest again.

14 http://Europe.eu.int/information_society: Announcement of e-Europe 2005: an information society for all COM (200) 263 def.

15 <http://www.cordis.lu/fp6/ist.htm>; http://Europe.eu.int/comm/research/index_en.cfm

The Commission therefore believes that every policy aimed at stimulating the supply of broadband should be coupled with policy aimed at stimulating demand. This is therefore the approach chosen in the e-Europe Action Plan.

4.2.2 Access in less profitable areas

The Commission takes the view that different broadband technologies should be developed side by side. After all, every connection technology has its own profitability considerations. These considerations will overlap to some extent (leading to competition in urban areas) and complement each other to some extent. As a result, remote areas, or areas with certain restrictive geological features can also be served.

4.2.3 Multi-platform approach

In the rollout and development of broadband infrastructures, the Commission places the emphasis on the importance of convergence and a multi-platform approach. Consumers must be able to switch easily from one provider to another and to combine different infrastructures (e.g. satellite and cable). The Commission sees an important role here for the development of wireless and glass fibre applications in order to realise multi-platform content. This refers to services that can be taken up by e.g. mobile telephone, satellite and television.

4.3 The Netherlands as a member of the leading group

4.3.1 The international leading group

International comparisons show that the Netherlands is now among the world leaders in the field of (tele)communication networks in general and broadband in particular. The following comparative figures of the OECD, measured in June 2003, illustrate this position.

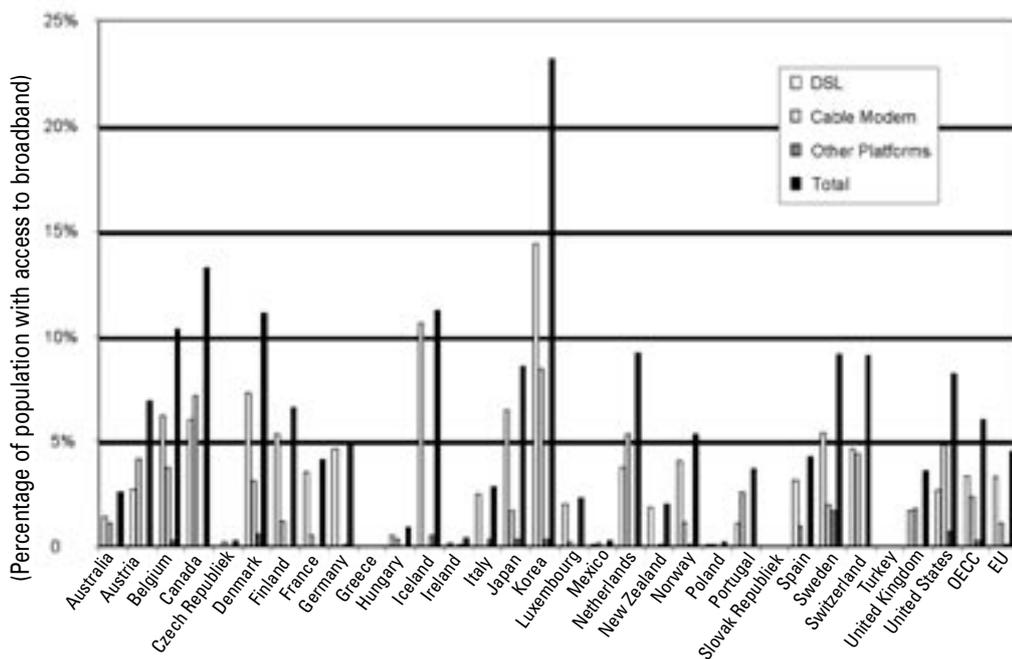


Figure 9. Broadband access in OECD countries. Source: OECD, June 2003.

National broadband strategies vary. This is not only because the countries have different starting positions (e.g. differences in Internet penetration, geographical features and technological cover), but just as importantly, because Member States aim to distinguish themselves with their strategies, in order to draw the maximum benefit from first mover effects. This consideration certainly applies for the Netherlands, with its service and knowledge economy and strong focus on international trade.

The major differences between countries have not gone unnoticed and have led some governments to formulate new broadband strategies¹⁶. There are major differences between Member States in terms of the number of broadband connections. Together with Denmark, Belgium and Sweden, the Netherlands is in the European leading group, well above the European average. In the Netherlands, almost two million households have a broadband connection. This high number is due to fierce competition between ADSL and cable Internet, the highly liberalised Dutch broadband market and the possibility of upgrading existing technologies, which makes it possible to offer consumers greater capacity and speed.

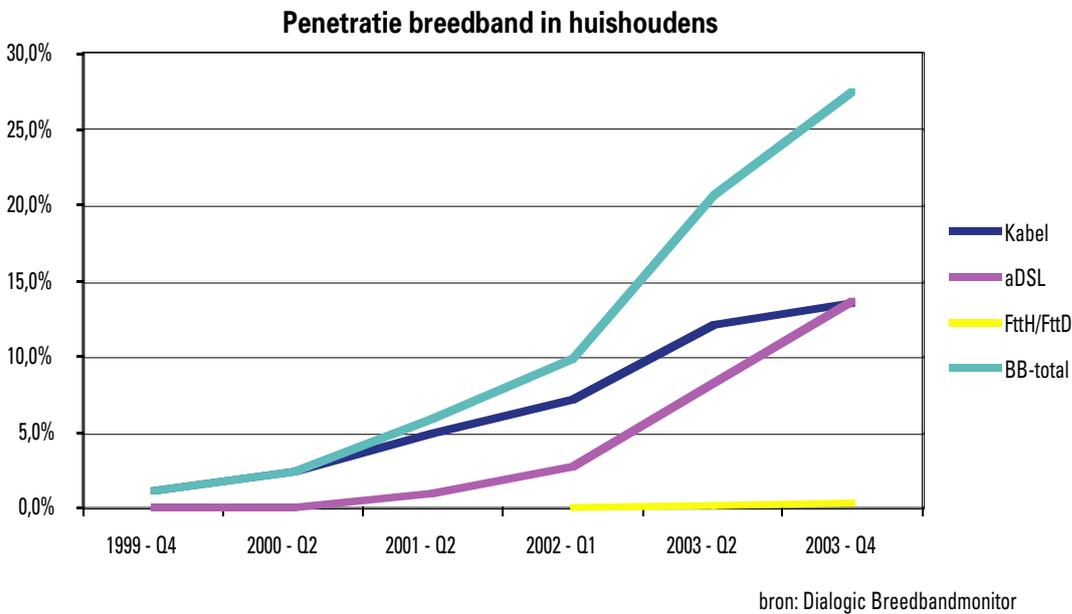


Figure 10. Number of broadband connections in the Netherlands (source: TNO-STB, Dialogic Broadband Monitor and Telecompaper.com)

(Translation of the concepts in figure 10:

penetratie breedband in huishoudens: broadband penetration of households
 kabel: cable)

4.3.2 The e-Europe Action Plan and Dutch performance

As stated earlier, the e-Europe Action Plan sets European targets for national policy. Implementation is primarily the responsibility of the Member States. In recent years, the Dutch government has actively implemented the broadband measures resulting from the e-Europe Action Plan. The Dutch performance in relation to the targets for the e-Europe Action Plan 2005 is discussed below.

A. Stimulating the rollout of secure broadband infrastructure

Target 1: A broadband connection for all government services, schools and hospitals in 2005

With 'Kennisset', the government gave a major boost to the use of broadband Internet for schools. The launch of Kennisset led to broadband connections for more than 10,000 educational institutions (not including universities), via cable. Libraries and museums are also connected to Kennisset. As a result of developments in the broadband market, the supply is so large that centrally organised

¹⁶ South Korea pursues a very active stimulation policy, aimed at providing all households with a broadband connection (1 megabit) in 2005. The entire operation will cost EUR 10.9 billion, which will largely be financed by KT Corp (South Korea's biggest telecom company), the country's Internet providers and the government. The South Korean government will make loans of EUR 211 million available. In recent years, South Korea has already invested EUR 9 billion in Internet and is far ahead of other countries in the broadband field. Some 20% of the population already has a fast Internet connection, (see Emerge, 7 November 2002). In response to this strategy, CENIC and Gartner recently published a report presenting a vision for broadband in the state of California. The report regards broadband as a carrier for the next wave of economic growth. According to the authors, broadband is the basis for a 'networked economy' in which everyone can communicate entirely via broadband (see 'One Gigabit or Bust Initiative: A

supply is no longer necessary. Schools can provide for their own needs via the market. Since 1 January 2004, schools therefore choose their Internet access themselves. They receive compensation for this and can use central facilities to make their choice.

Target 2: Broadband available everywhere (through connection technology such as wireless)

In the course of 2004, KPN will increase the national broadband cover from 87% to 97%, by modifying the remaining 555 telephone switchboards that are currently not suitable for ADSL. There are technical constraints to adapting the last 3% of telephone switchboards for ADSL, such as the distance for the connection to the switchboard¹⁷. This means that a specific government policy on access in rural areas is no longer necessary in the Netherlands, with the possible exception of a number of schools.

Target 3: Stimulating development of wireless broadband through a reformed spectrum policy

The principles of the frequency policy relate to optimal use of the spectrum by as many as possible of the parties that contribute towards social and economic development in the Netherlands. New technologies (digitisation and software-driven technologies) enable more efficient use of the spectrum. New technologies also allow use of parts of the spectrum that have traditionally remained unutilised. The reform of spectrum policy is designed to match the possible use of the spectrum faster and more effectively to changing technologies and market requirements. This will make more bandwidth available, as the market requires. Alternative wireless and mobile broadband connections for citizens and companies are possible with the following technologies: satellite (broadcasting and Internet), DVB-T (mainly broadcasting), UMTS (mobile Internet), WiFi, Wireless Local Loop and Ultra Wideband (broadband wireless technologies).

*Target 4: Half of all connections to be broadband connections in 2005*¹⁸

With a penetration of 27% of Dutch households with a broadband Internet connection (via ADSL, cable or glass fibre), the Netherlands performs well for private Internet use in comparison with other European countries. The past year has brought strong growth in the switch to ADSL, rising from 65,000 connections in mid-2001 to 951,000 at year-end 2003. The number of cable connections grew from 330,000 to 940,000 in the same period. The annual growth rate is about 100%.

B. Promotion of services, applications and content in key sectors (e-government, e-health, e-business). By focusing on these large sectors, the European Commission aims to provide a strong boost to demand for broadband services.

Target 5: e-Content Action Plan: more detailed specification of e-government, e-health and e-business actions

The Netherlands performs less well in terms of the use and development of services. On the basis of continuous research into the availability of electronic public services in Europe, on assignment for the European Commission, the Netherlands holds a middle position for interactivity. However, at the highest level, of fully electronic service provision, the Netherlands performs poorly, ranking second to last.¹⁹ An evaluation of e-Content is currently in progress.

C. Reform of European and national law, to ensure that these do not create unnecessary constraints to new services, ensure competition and improve operability

Target 6: Implementing new package Directive for electronic communication

The recent reform of the Telecommunications Act created a new regulatory framework that is far more suitable for responding to developments in the sector. Because the Independent Postal and Telecommunications Authority (OPTA) can now define markets itself, on the basis of a market analysis, custom work has become possible. If there is too little competition in the defined markets, OPTA can take measures to address the observed market problems as effectively as possible.

¹⁷ KPN press release dated 10 December 2003

¹⁸ COM 2003(65), adopted by Spring Summit 2003

¹⁹ See study entitled 'Online Availability of Public Services' by Cap Gemini, Ernst & Young, 2004, on assignment for the European Commission.

Competition between providers can be promoted by enforcing access to networks and ensuring that the conditions for access are reasonable. However, it is necessary to prevent investments in existing and new networks from becoming unattractive. After all, such investments are necessary to improve and expand existing networks and for the installation of new innovative networks. Through this flexible approach, over-regulation is avoided and regulation can be eased as competition develops. Where competition does not develop, or does not do so sufficiently, customers can be protected against abuses of power.

5 *The contribution of broadband to the Dutch economy*

5.1 The OECD and the economic contribution of ICT

The presence and use of broadband infrastructures are essential factors for economic growth and for the creation of a knowledge economy. The OECD recently published the following calculation:

' Information and communication technology (ICT) is a proven contributor to economic growth derived from improved in business processes and increased access to markets, for example for small and medium-sized enterprises. With growth over the last year of 53% translating to 75 million broadband subscribers in OECD countries by the end of September 2003 and an estimated annual US30 billion in access revenue the significance of broadband as a key component of ICT-driven growth has been established. Together with increasing user interest and availability, the average OECD penetration rate of 6.6 subscribers per 100 inhabitants indicates major potential for future growth with a number of the leading countries already well ahead of the rate'²⁰.

5.2 Available quantitative research

No adequate quantitative analysis of the social benefits of broadband can be made at present, because of a lack of reliable empirical data on broadband – unlike on the number of subscribers. Rand Europe has investigated the possibilities for quantification of the benefits. It concluded that a reliable model is difficult to develop. In order to measure the effects of investments in broadband, these must be modelled separately from 'ordinary' investments. However, too little is known at present on the impact of ICT in general, and of broadband in particular, to use reliable specifications in a model.

According to Rand Europe, broadband may not be a miracle cure, but it certainly has macro-economic advantages in terms of growth, innovation and competitiveness. A backlog in the installation of broadband offers competing economies the opportunity to build up a lead. A position among the leaders in the development of broadband gives the Dutch economy a competitive advantage in the world market²¹, promotes productivity growth and makes the Netherlands a still more attractive location for businesses and for capital investments.²²

Furthermore, it appears that the positive effects of broadband in the Netherlands will lie mainly in the SME sector. Companies using ICT for a wide diversity of activities and commercial applications are quickly gaining ground. Broadband is not essential to the development of such activities, but a widespread and affordable broadband network will make it easier for companies to benefit from the advantages of ICT. This is primarily the case in the SME sector, where there are major opportunities for growth. The future growth of e-commerce lies primarily in the private sector. Companies are increasingly switching to Internet-based applications, in order to benefit from the substantial savings associated with business-to-business e-commerce. Broadband can act as an incentive for less ICT-intensive sectors and for SMEs to make wide use of ICT and the possibilities of the Internet²³. The view that broadband makes a relevant contribution to economic growth and improved productivity is also shared by well-known research agencies such as Gartner.

20 See OECD press release entitled 'Maximising broadband to boost economic and social development' Paris, 9 October 2003.

21 Research by the Netherlands Foreign Investment Agency (NFIA) shows that foreign ICT companies regard a good ICT/broadband infrastructure as self-evident. Source: 'ICT Business Establishment Climate: An international benchmark study', Aug. 2001, Ernst & Young ILAS, pg. 16.

22 Accelerated broadband roll-out for the Netherlands: A review of economic benefits', study by Rand Europe, Sept. 2002, commissioned by the Ministry of Transport and Public Works, pg. xii.

23 Accelerated broadband roll-out for the Netherlands: A review of economic benefits', study Rand Europe, commissioned by the Ministry of Economic Affairs, Sept. 2002. pg. xi.

Gartner Dataquest conducted research into the economic impact of the development of an ubiquitous broadband network for the state of Michigan. The results of the 'LinkMichigan model' showed a positive impact of an estimated USD 300 to 500 million over a period of 10 years. Building on the 'LinkMichigan model', Gartner used these correlations to develop a model for estimating the economic impact of a national broadband network over a period of 10 years. This model shows that the annual incremental growth in a country like the US would receive a boost of billions. Furthermore, the development of broadband would lead to strong employment growth²⁴.

Gartner has now also formulated a vision of broadband for the state of California. Here, broadband is regarded as a carrier for the next wave of economic growth. According to the authors, broadband is the basis for a 'networked economy' in which everyone can communicate entirely via broadband. Gartner states 'California is on the threshold of a multi-billion dollar opportunity. A USD 376 billion upside in gross state product (GSP) by 2010 is made possible with implementation of a focussed 'One Gigabit or Bust' broadband initiative. Moreover, 2 million new jobs could be created'²⁵

24 Source: 'The Payoff of Ubiquitous Broadband Deployment', Gartner Dataquest, 1 July 2002. TELC-WW-DP-0197.

25 'One Gigabit or Bust Initiative: A broadband vision for California', May 2003, CENIC and Gartner, pg. 1. For the relationship between broadband and productivity, see also the paper by Senator J.I. Liebermann, "Broadband: A 21st Century Technology and Productivity", Washington May 2002.

6 The broadband policy in perspective

6.1 Introduction

In addition to organic market developments in the field of broadband, such as those outlined in the preceding chapters, the government has taken a series of steps in recent years for further development of new generation networks and the accompanying services.

The issue of broadband has had the attention of the Dutch government for a number of years. In the 'Broadband Building Blocks Paper' of mid-2001, the Kok government emphasised the social importance of broadband. The government sees reasons in this paper to make additional, specific efforts in the near future to facilitate developments in the market (the 'rights of way' problem, access to newbuild locations, bundling of demand and other stimuli).

The desire to make extra efforts led to the installation of the 'Broadband Expert Group' in December 2001²⁶. This group, consisting of representatives of the private sector, was assigned to prepare an advisory report on a number of strategic issues relating to broadband. The report, entitled 'Netherlands Broadband Land', contains a shared market vision for realistic development models for broadband in the Netherlands, a description of an ambition level with the accompanying targets for the rollout of broadband and finally, concrete recommendations for policy measures by the market and government.²⁷ Eight municipal broadband trials also commenced in 2002, to build up experience with the realisation of business models for the installation and operation of broadband.²⁸ The public broadcasting association, the NOB and the Netherlands Audio-Visual Institute developed pioneering activities in the development and deployment of broadband content and services, such as First Mile TV, public access to the Institute's audio-visual archives and repeat TV broadcasts via the Internet.

Finally, when the Kenniswijk project was launched in 2000, the government promised the Second Chamber of Parliament a 'midterm review' of the project in the autumn of 2003, to assess the effectiveness of the instruments and working methods used, and the concrete results. The interim evaluation will be completed and presented to the Second Chamber in the near future. Any changes of course as a result of the evaluation will be placed in the context of this paper.

In the Cabinet Position on Broadband published in early 2003, the Balkenende I government endorsed the main recommendations and findings of the Broadband Expert Group²⁹. The Cabinet Position included the Broadband Action Programme for 2003 to 2006. This Action Programme is the concrete development of the government's contribution to the realisation of 'Netherlands Broadband Land' through 'no-regret actions'. The programme is aimed at realising government 'launching customership', knowledge diffusion and the removal of obstacles in legislation and regulations.

In view of the former political situation (an outgoing Cabinet), a deliberate decision was made to postpone fundamental decisions regarding market regulation, legislation and regulations and potential financial arrangements. The direct effect of the actions on developments in the market was therefore limited. The Cabinet Position on Broadband does place a number of fundamental policy issues on the agenda, for discussion by a new government at a later date:

- New market order in relation to regulation and supervision
- Potential use of financial instruments
- Access in non-profitable areas
- The role of local authorities

26 Second Chamber Documents, 26 643, No. 32

27 Mrs. de Vries, State Secretary of Transport and Public Works, presented the 'Netherlands Broadband Land' report to the Cabinet on 30 May 2002.

28 See www.broadbandproeven.nl

29 Second Chamber Documents 2002/03, 26 643, No. 38

Central government actively pursued a policy to co-ordinate the efforts of the market and government. The resulting experiments, such as the broadband trials, GigaPort, Surfnets and the Kenniswijk project, had a major impact on the awareness of both market parties and government agencies of the possibilities of broadband. Throughout the country, broadband initiatives were also taken outside the central government subsidised pilot schemes. Some municipal authorities took vigorous action of their own, and developed broadband policies without any central government subsidy. The major cities are working hard on strategies aimed at stimulating the rollout of glass fibre³⁰.

Some notable observations from a recent quick scan of access to (semi-)public institutions by the municipal authorities covered by the urban policy (G30)³¹ are:

- There are major phase differences between the municipal authorities: some have already realised a gigabit ether network through a form of demand-bundling, while others have not yet considered the issues.
- Most municipal organisations have their own networks that connect the main locations.
- About one third of the municipal authorities have taken initiatives to bundle demand, working with a (large) number of (semi-)public institutions.
- The possibilities for supra-sectoral bundling of demand are being investigated in a very large number of municipal authorities. This leads to the expectation that more projects will follow in the years to come.
- The number of (semi-)public locations in cities is difficult to compare, due to differences in definitions or counting methods. A small number of cities have produced a bullet-point card to define the public institutions. In most cities, the number of (semi-)public locations is not known.
- Most municipal authorities are considering glass fibre access to homes and industrial estates. Only a small number of authorities have drawn up very concrete plans.

This promotes the development of broadband in a phase in which both the market and government agencies are seeking the right position and role. Recent times can be characterised as a search period by both the market and the government for their proper positions and roles. This search phase has ended almost automatically with the evaluation of experiments such as the Kenniswijk project and the expiry of subsidy schemes. All parties involved regard the design of a more structured and controlled approach as necessary for the next step.

6.2 Results to date

The government has stimulated the rollout of broadband with the following measures:

- 1 The Broadband Action Programme
- 2 The broadband trials
- 3 Kenniswijk
- 4 GigaPort and Surfnets
- 5 The Telematics Institute
- 6 Freeband & Next Generation Infrastructures
- 7 'Urbanlink'.

These initiatives are summarised below.

6.3 The Broadband Action Programme

The Ministry of Economic Affairs began implementation of the four-year Broadband Action Programme in early 2003. The government plays a facilitating role in the programme: improving conditions and specific stimulation. One of the main goals is to create movement and give direction, in order to facilitate and stimulate the continuity of broadband development (via the 'broadband flywheel').

³⁰ See, among other things 'Subsidies smooth installation' in the Automation Guide of 13.6.03

³¹ From a summary of the 'Glass Fibre Quick Scan: Results of a brief review of activities by the G30, aimed at glass fibre access to (semi-)public institutions', conducted by Dialogic on commission from the Ministry of Economic Affairs, Utrecht, February 2004.

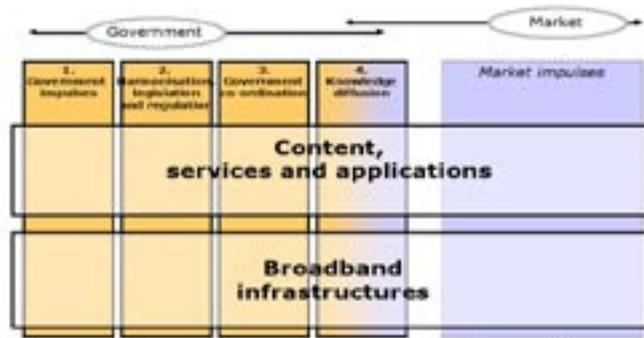


Figure 11. Broadband Action Programme

All pillars in the Action Programme affect the service layer (content, applications, services) and the layer of the physical broadband infrastructures. The Knowledge Diffusion pillar is developed through PPP. The market impulses do not form part of the Action Programme.

The four main pillars of the Action programme, including the results to date, are outlined below.

<p>Pillar 1 Government impulses <i>by bundling demand for broadband infrastructures for the government and stimulating development of (semi-)public broadband services</i></p> <p><i>Results of Pillar 1 to date:</i></p>	<p>Broadband can substantially improve existing (electronic) services of schools, hospitals and other (semi-)public institutions and make them more efficient. Entirely new services are also possible. Broadband will have a growing impact on the core tasks of these organisations and form part of the primary processes. Broadband offers particular opportunities for 'chain concepts'. In these concepts, various organisations work together to enable optimal, integrates service provision for citizens and consumers.</p> <p>Government impulses are provided by stimulating trials and experiments with broadband and by removing organisational obstacles in chains or service provision. The government also formulates policy for broader implementation of broadband services (chain concepts) and the installation of broadband infrastructures (supra-sectoral bundling of demand).</p> <ul style="list-style-type: none"> • A process to install a glass fibre infrastructure in central government buildings has been started with the Ministry of the Interior and Kingdom Relations. • A number of broadband projects have been started in the field of education and new media, with the Ministry of Education, Culture and Sciences. • A thorough review of recurring obstacles in the deployment of broadband will take place shortly at a number of Ministries (the Ministry of Education, Culture and Sciences and the Ministry of the Interior and Kingdom Relations). • Coalitions are being formed in the infrastructure field, including the Trend Foundation in Enschede and BIT in Tilburg. The aim is to realise a national vision for supra-sectoral access to public buildings on the basis of best practices.
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<p>Pillar 2 Harmonisation of legislation <i>by looking for amendments in legislation and regulations that remove obstacles or stimulate the development of broadband</i></p> <p><i>Results of Pillar 2 to date:</i></p>	<p>Legal constraints and obscurities can hamper the development of innovative broadband services and infrastructures. The purpose of this pillar is to remove these barriers, in close co-ordination with interested parties. Amendments of legislation and regulations that have a stimulating effect on the broadband flywheel will also be sought.</p> <p>A list of obstacles and stimulation possibilities for the development of broadband has been drawn up, together with parties with a direct interest, on the basis of concrete practical cases. This involves issues such as competition law, state aid, copyright, performing rights, telecom law, competition, the UD problem and phone-tapping policy.</p>
<p>Pillar 3 Government co-ordination <i>provides clarity for market parties and avoids fragmentation</i></p> <p><i>Results of Pillar 3 to date:</i></p>	<p>Government agencies are working on initiatives in the broadband field at various administrative levels. The objective of the 'Government Co-ordination' pillar is administrative and technological harmonisation of the initiatives by central government and by municipal authorities and provincial authorities. This provides greater clarity for market parties and prevents restriction of the broadband flywheel through fragmentation.</p> <ul style="list-style-type: none"> • The inclusion of broadband in the Urban Covenant • A guide for regional authorities on how to apply for Structural Funds.
<p>Pillar 4 Knowledge diffusion <i>provides for more transparency and direction and reduces risks</i></p> <p><i>Results of Pillar 4 to date:</i></p>	<p>Broadband is at the start of its development and so has a strong search character, with many uncertainties. This applies particularly for organisations where ICT is not the core task. The purpose of the Knowledge Diffusion pillar is to increase transparency, provide direction and reduce risks in investment decisions. This goal can be achieved through efficient and effective dissemination of learning experiences and other knowledge between market parties and the government authorities, which will promote the dynamics of the broadband flywheel. The Knowledge Diffusion pillar will be developed by a PPP.</p> <ul style="list-style-type: none"> • This knowledge centre will be launched shortly, under the name 'Netherlands Broadband Land Foundation in formation'.

6.4 The broadband trials

In 2002, the Ministry of Economic Affairs made EUR 6 million available for local and regional broadband trials. Through these trials, experience was gained in the development of a business model for the installation and operation of broadband. The approach proved to work. The knowledge built up through the trials is available to other municipal authorities and third parties, so that of the trials can have a learning effect.

The projects helped to build up insight into:

- The conditions in which the high-costs of installing infrastructure can be profitable
- The type of services for and use of the Internet through the availability of broadband connections and which new services lead to greater demand for broadband.

The broadband trials were very varied. Some cities developed models for creating 'fibre to the home', others sought for a cost-effective way to obtain a city ring or broadband in a specific district. They also investigated the content that should be provided in order to interest households in broadband connections. In many cases, the broadband trials involved a combination of these elements. A review of the eight municipal broadband trials is presented below.

Almere

The original idea was to set up a consortium that would install a glass fibre network in two residential estates and two industrial estates. At the end of 2002, this plan proved to be non-feasible and the municipal authority decided to install the passive network itself. The 'Almere Fibre Network', in which glass fibre cables are installed to every home or apartment complex in two residential estates and to all company premises in two industrial estates, was realised in 2003.

Appingedam

The Appingedam municipal authority wants to make the authority itself a 'test environment', by developing a business model for broadband access for all residents, companies, institutions etc. The project proposal provides for the development of the business case. The budget for the installation of broadband is not yet complete. For the time being, the role of the municipal authority is confined to bringing together the parties.

The Hague

Together with companies, The Hague municipal authority wants to develop a multi-partner business model that can operate independently of the technology. The authority recognises that local government has a potential role to play in the rollout of broadband, but does not want to take the place of the market parties here. The other parties that will ultimately take part in the rollout of broadband are not yet known, nor, therefore, are the financial risks. The authority has reviewed the city's districts to see which have the best chance of success in the rollout of broadband.

Deventer

A number of parties have formed a company to undertake the installation and (non-profit) operation of a broadband network. The partners include three housing corporations and a hospital. After completion of research into the required business model, the municipal authority will decide whether to take part in the company that will operate the glass fibre network, and if so, in what form.

Groningen

Groningen aims to create a network primarily for large-scale commercial users. Once the right scale has been achieved, the price can be reduced and connections will also be made for individual citizens. The municipal authority operates as a 'launching customer' in order to connect the municipal locations via a glass fibre network.

Leeuwarden

The municipal authority has started installing its own city link (now two-thirds complete). In the first instance, attention is focused on access to government buildings and institutions, the care sector, cultural institutions, education and the commercial services sector. The supply of broadband connections to consumers is a secondary aim.

Nijmegen

Together with the Catholic University of Nijmegen, the Nijmegen municipal authority has a wide-ranging glass fibre infrastructure which at present, is used only for the connection of municipal institutions, education and student accommodation. As part of the project, the municipal authority plans to connect local residents to this infrastructure in a number of FttH pilot schemes.

Utrecht

Two residents' initiatives have developed within the municipality, to install broadband in an existing residential area (Lombok) and on a new housing estate (Kersetuin). Despite the close involvement of the residents and the high participation rate (70%), the business case in the Kersentuin does not appear to be complete. The municipal authority must pre-finance the project if it is to go ahead. In Lombok, connection to a glass fibre network appears to be unfeasible, due to limited interest. The possibilities of a wireless broadband network are now being investigated here.

6.5 Kenniswijk

Kenniswijk is a large-scale experiment in the Eindhoven region, in which innovative broadband services and infrastructures are tested and developed in an area with a population of 100,000. The private and public sectors both invest in Kenniswijk. Kenniswijk is not a government project, but is a government initiative taken at the market's request. Internationally, Kenniswijk is among the leading 'smart cities' (Stockholm, Ottawa, Singapore, Kuala Lumpur). The simultaneous investment in services and infrastructure, in combination with good facilities for users, makes Kenniswijk unique. The objectives of Kenniswijk are to break through the conflict between infrastructure and services (through simultaneous development of services, infrastructure and user facilities), to strengthen the international competitive position of the Netherlands as a location for ICT companies and to obtain an insight into the effects of ICT on social, spatial and mobility patterns.

The Kenniswijk experiment started at a time when expectations for ICT were running very high. In the present economic climate, these expectations have cooled considerably. Investments in new innovative services are considered critically. Companies that now invest in Kenniswijk focus mainly on the long-term prospects. In total, there were some 1,200 broadband connections in Kenniswijk in April 2004 (175 of them active) and 60 innovative services in development, of which 20 are available to consumers (see www.kenniswijk.nl). There are also advanced initiatives for the realisation of more connections. Some striking services are described below.



Figure 12. Striking examples of Kenniswijk services (source: Kenniswijk)

(Translation of the concepts in figure 12:

Eindhoven City Council in View

See Eindhoven City Council meetings live, or search the archives

First Mile TV

DVD-quality 24-hour TV via the Internet. Never miss a programme again.

Discoverynet

Discoverynet: the online learning site, where you can input knowledge as an 'expert' or find knowledge as a 'student'

HeartsPoint

Self-care online: tests for thrombosis at home

ButterflyTV

Supra-district Internet TV for and by local residents)

When the Kenniswijk experimental environment was launched, the government of the time announced that it would be subjected to an interim evaluation to see whether the original ambition was realistic and whether the instruments deployed are effective and efficient.

The evaluation shows that some valuable results have been achieved and a number of useful unforeseen effects have occurred. Nevertheless, in the present economic conditions, the original firm ambition of a dynamic experimental environment with 30,000 broadband connections and 140 new services by the end of 2003 proved to be unsustainable. The private sector does not see enough opportunity to make the contribution originally envisaged. The instruments that were jointly developed have therefore proved to be insufficiently effective and efficient. In the coming months, a dialogue on the adaptation of the experiment is planned with the parties involved.

- After consulting all the parties concerned, the government sees reasons to modify the ambition to make it more realistic and to adapt the instruments to the new situation. The valuable outcomes and the interests of all the parties involved will be taken into account here. Modification of the Kenniswijk concept must also support the government policy formulated in this Broadband Paper and in the ICT agenda. The emphasis lies on the use and application of services of public importance.
- The PPP method will be reassessed. A form of partnership based on concrete products and services is being considered. In the services field, Kenniswijk is also aimed at other initiatives in the Netherlands, under the motto of 'connecting the dots'. This will benefit national upscaling of services that have been developed. The acquired expertise can be contributed to the 'Netherlands Broadband Land Foundation in formation'.

6.6 GigaPort and Surfnet

The GigaPort network is one of the most advanced communication networks in the world. This network supports the exchange of knowledge between Dutch educational and research institutes, as well as with leading institutions elsewhere in the world and with the private sector. With GigaPort, the Netherlands compares internationally with countries that are often seen as the leaders, i.e. the U.S. and Canada. Surfnet connects the networks of universities, colleges of higher education, research centres, teaching hospitals and science libraries in the Netherlands, and with other networks in the rest of the world. The private sector also uses GigaPort as a test plant for pre-competitive research into advanced ICT technologies and applications. A unique point is that universities and colleges of higher education set up such a project together with businesses. In other European countries, this is almost never the case. The concrete results of the GigaPort project are:

- GigaPort has strengthened the attraction of the Netherlands as a business location: a number of companies have clearly stated that the presence of GigaPort in the Netherlands was an important factor in their decision to locate in this country.
- The Dutch ICT research and education infrastructure has been brought to and maintained at a top level.
- Cluster formation and alliances between R&D companies, universities, colleges of higher education and research institutes has been promoted on a long-term basis.
- Suppliers of telecommunication equipment and services have stated that GigaPort has accelerated their innovation plans and has activated new players: some of the contracts for trials with new access technologies have been awarded to smaller new players, for example.

- The rollout of glass fibre networks in the Netherlands (particularly in peripheral areas) has been accelerated by the inclusion of trials for access technologies.

6.7 The Telematics Institute

The Telematics Institute is a research institute that is managed and financed by the private sector and supported by the government as a Top Technological Instituted. The organisation is an alliance of large national companies, research institutions and the government. Its core task is the rapid translation of fundamental research into commercial applications in the telematics field. Examples of broadband projects are:

Teleconsultation between physicians

Broadband makes distance consultation of a department (physician) possible at any time, and to retrieve, comment on and if necessary, process essential patient data on-line during a consultation. Experience shows that teleconsultation only pays off if bandwidths of at least 10 Mbp/s per application can be supported. This relates to the quality and speed at which images can be switched: digital photographs must be very sharp and waiting times of (dozens of) seconds for the selected photographs causes delays and is disruptive to the progress of a discussion.

Telecare (less fragmented care for chronic patients)

The quality and financing of health care is under increasing pressure, due to the growing number of patients with chronic complex complaints, who are often structurally dependent on the care of others, involving many different disciplines. For this type of patient, the Dutch health care system is far from optimal, because care is often fragmented and inefficient, due to a lack of partnership and co-ordination between the physicians and institutions involved. The purpose of the TeleCare project is to improve such care through communication and the exchange of information between the different physicians and institutions, making use of integrated fixed and mobile ICT applications.

Telemonitoring of patients

In this project, scenarios and demonstrations are developed for a single prototype for patient care at a distance, to be applied in medical practice.

6.8 Research programmes: 'Next Generation Infrastructures' and 'Freeband Communication'

As part of its broadband activities in 2003, the Ministry of Economic Affairs formulated two large national research programmes in which research institutes, private companies and government institutions take part. These programmes are subsidies via the BSIK scheme.

'Next Generation Infrastructures'

The purpose of this programme is to develop scenarios and econometric models to test the validity of future infrastructural investments. A 'centre for next generation infrastructures' will be set up for this purpose, which will combine knowledge of infrastructures, generate new knowledge and disseminate this further. The programme will run for six years.

'Freeband Communication'

The purpose of this programme is to create a knowledge base for a new generation of transparent communication and information exchanges between individuals. The underlying idea is that future services should be able to find access to all available fixed and wireless infrastructures and that unlimited bandwidth will become available through this interplay of technologies. This programme has a life of four years.

6.9 Stedenlink ('Urbanlink')

The 'Stedenlink' Foundation promotes learning and partnerships between cities that are leading in the development towards a knowledge city. To this end, they pursue a broad ICT policy aimed at the social added value that ICT can have for their populations. The purpose of 'Stedenlink' is to stimulate the exchange of knowledge and development between cities. The network has an agenda function in relation to local and central government and to the mid-field in society.

7 Legislation

7.1 New regulatory framework for the communications sector

In the application of the new regulatory framework (ONP), it is important that innovative developments have enough scope to prove themselves in the market. This means that these developments must be able to offer their added value to customers in a sufficiently distinctive way. Consequently, existing regulations should not be applied to new developments on a one-to-one basis. Regulation should be treated with as much restraint as possible in such situations. It is necessary to prevent structural strengthening of dominant positions, but innovations by parties with strong market positions must also remain attractive and receive a chance to prove themselves in the market.

7.2 Rights to install facilities

The Ministry of Economic Affairs is currently preparing the amendment of Section 5 of the Telecommunications Act, concerning the tolerance commitment for the installation of cables for public electronic communication networks. The Second Chamber has been notified by letter of the main points of the policy underlying this reform³².

The proposed legal amendment aims to remove a number of obscurities in the Act and some problems experienced in practice with the installation, maintenance and clearance of telecom cables. The amendment must also lead to a better balance between the various public and private interests at issue in the installation of a public electronic communication network. The excavation work involved in laying cables leads to unnecessary hindrances for the public, among other things.

A tolerance requirement applies for the installation of public electronic communication networks. The current Act restricts the parties who could invoke the tolerance requirement for providers of these networks. The proposed amendment will include a provision that extends the tolerance requirement to installers of telecom cables, i.e. to parties that are not network operators themselves, but who wish to lease or sell them in due course. This meets the needs of parties specialising in the installation of networks.

Municipal authorities may not levy sufferance taxes on cables for a public electronic communication network, because these are covered by the tolerance requirement. Another new point is that installed cables need not be at the service of such a network immediately after installation and, therefore, in use. Parties are given four years before cables must be in use. If this is not the case, the tolerance requirement expires and with it, the exemption from sufferance tax. This is to stimulate relatively simple and fast installation of cables (or other facilities) at times when the land is already being excavated for maintenance work, even if the cables are not needed immediately for the operation of the network.

Providers intending to lay cables must apply to the municipal authority for consent. This is because the municipal authority retains a co-ordination task for the installation of public electronic communication networks and, in the public interest, should attach conditions to a consent decision. In the amended Act, these public interests will be made explicit. They include underground regulation or avoidance of excessive nuisance. Municipal authorities must also adopt regulations. The requirements for this, too, are made more explicit. For example, municipal authorities must adopt rules that promote co-utilisation of facilities by providers. They can also require providers to investigate the possibilities for co-utilisation before commencing installation. This can avoid the underground from becoming unnecessarily full. Furthermore, suppliers could save on (excavation) costs as a result. This clarification of the law in comparison with the existing Act could mean less freedom for providers, but will also offer them more certainty about current procedures (more uniform regulation by municipal authorities).

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7.3 Copyright

The emergence of broadband leads to new forms of publication. Examples include the provision of video on demand, via broadband Internet, or television broadcasting via broadband Internet. As a result, the parties involved in the development of broadband networks and services face issues relating to copyright and performing rights. In the past year, some of these issues have been studied from the point of view of innovation and competition. A number of issues are discussed in brief below.

- **Market transparency:** Parties wishing to distribute audiovisual content via broadband networks must deal with different holders of rights and management organisations, all with their own legal basis, field of work, breadth of representation and remuneration systems. The level of compensation and the parameters on which this should be based must be transparent. Developers of broadband applications must also be able to obtain enough insight into the networks and working methods of collective rights organisations.
- **Actual versus potential audience:** In a digital environment, it becomes possible to measure actual use of material protected by copyright ('actual audience principle')³³. So far, the level of remunerations has been determined primarily on the basis of the potential audience for a broadcast. As the audience becomes easier to measure, use of actual audience principle as an important factor in the determination of fair recompense becomes a more obvious choice.
- **Access to historical material:** Broadband offers an opportunity to provide existing content digitally, so that it can be viewed on demand. A condition for providing access to databases with 'old' content in this way is that the holders of the rights to works protected by copyright grant permission for their publication. In practice, it requires a considerable effort to trace all the holders of rights to material protected by copyright, in order to obtain their consent. Systems to support this process are already being developed. An additional problem is that until a few years ago, the licensing contracts did not take account of any re-use via a broadband network.
- **New forms of publication:** New technological developments lead to new forms of publication, including of material protected by copyright. It is important that market parties reach agreements in this regard on introductory rules for the use of the material. Temporary licences for experiments can remove the uncertainties to some extent. Collective rights organisations can make a contribution by taking an accommodating attitude to agreements on the settlement of rights during the experimental phase. The parties concerned have already taken a number of steps in this respect.
- **Digital Rights Management (DRM):** DRM refers to electronic systems for the provision and use of creative material in digital form that allow protection against illegal use and monitoring and settlement for legal use. DRM systems seem likely to play an important role in the future, but their introduction is not proceeding very smoothly. One of the issues is that the sustainability of DRM systems is not assured at present. When security of a system deployed on a large scale is breached, this can have major consequences. Another factor is delays in the development of a DRM standard.

³³ See also: Copyright Paper, Second Chamber, 2003-2004 session, 27 088, No. 32.