Nederland Breedbandland

Recommendations to the Cabinet from the national Broadband Expert Group for achieving a national lead in the field of broadband infrastructures and applications

- unofficial translation -

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1 Introduction

1.1 The background

In the *Nederland Breedbandland* report, the Broadband Expert Group presents its vision of the future development paths for broadband in The Netherlands. The Expert Group was set up at the end of 2001 to make recommendations to the Cabinet, in the person of the Secretary of State for Transport, Public Works and Water Management. It involves a search into how the market and the government can jointly give the broadband market a new boost.

The recommendations consist of:

1. a shared market vision regarding realistic development models for broadband in The Netherlands;
2. defining a level of ambition with associated objectives for the rolling-out of broadband;
3. concrete recommendations for policy measures, based on which the government and the private sector can make specific choices.

The Netherlands wants to be in a leading position in Europe in the fields of ICT in general and broadband domains in particular.[1] In the memorandum "De Digitale Delta: e-Europe voorbij" [The Digital Delta: Beyond e-Europe], the government has highlighted clearly its ambition of realising a broadband infrastructure *more rapidly*.[2] The Government sees the rollout of the future-proof broadband access network as an important condition for healthy economic and social development in this country.

Market parties, as well as the Government, recognise the strategic importance of broadband. The current growth in Internet traffic at the digital bottleneck at the Amsterdam Internet Exchange (AMS-IX) is large. Figure 1 shows unequivocally the strength of the increase. Internet traffic has nearly quadrupled in less than a year.

[1] See, inter alia, the key memorandum *De Digitale Delta [The Digital Delta]* of June 2000, which outlines the Cabinet's ambitions, and a number of subsequent memoranda, such as *Netwerken in de Delta, Kabel en consument: marktwerking en digitalisering [Networks in the Delta, Cable and the Consumer: market forces and digitalisation]*, and *Voortgangsrapportage De Digitale Delta [The Digital Delta Progress Report]* of October 2000.

[2] See *De Digitale Delta: e-Europe voorbij, 2000, p. 10.* The Cabinet states here that it wants to develop building blocks for the rapid construction of an extensive Internet infrastructure. The associated building block memorandum contains further details.

Figure 1 Growth in capacity on the Amsterdam Internet Exchange in the period January 2001 - May 2002.

Source: www.ams-ix.org, 8 May 2002.

The strong growth in traffic cannot be explained so much by an increase in the number of users as by the increased intensity of use. People are using the Internet more often and more intensively. The development of broadband Internet strengthens the growth in data traffic even more through increasing mutual communication and the exchange of increasingly larger files. The real large-scale development of the Dutch broadband market has yet to get into its stride. The average data traffic per user will unmistakably continue to increase excessively.in the next few years.

The increased demand for capacity will lead within the foreseeable future to bottlenecks in the current connection networks which must be facilitated with the construction of a future-proof broadband infrastructure. This problem plays a part in particular n the local networks , which are known as the *local loop* or the *first mile*.

Bottlenecks

Concerns have arisen in The Netherlands in recent years about the development of broadband access for consumers to the electronic highway. The broadband market will depend in the future on the timely construction of new network infrastructures in the local loop. This is because of inherent limitations in the existing connection networks that manifest themselves when attempts are made to achieve not only high communication rates but also high connection penetration and simultaneity of use.[3]

The established telecoms and cable companies are experiencing financially difficult times at the moment and are scarcely in a position to invest independently in new fixed

[3] See, inter alia, GigaPort (2000), *Internettoegang via de kabel op GigaPort-niveau [Internet access via cable at GigaPort level]*, November and Gerrit van der Vorst (2001), *Telecommunicatie,-infrastructuur: De 'missing link' [Telecommunications infrastructure: The missing link*], BTG, Driebergen, December.

infrastructures in the local loop. This has direct consequences for development and the use of broadband applications and services. Countless new collaborative links and consortia that are involved in local fibre optic initiatives have been established as a result . This has everything to do with the long depreciation periods (approximately 25 years) for the passive infrastructure (ducts, cables and set-up points.The traditional vertical business models in which the investments made in infrastructure must be paid back from in-house operation of services with content and added value, would appear to be inadequate in the future broadband era. Horizontalising in its turn requires more agreement and organisation.

1.2 The social and economic importance of broadband

ICT in general, and broadband in particular, will act as the oxygen for our society to an increasing degree in the future. Electronic information, communication, entertainment and transaction applications - in all their variety -already have a strong influence on our daily lives.

The economic importance of ICT and high-value electronic infrastructures is huge. This country devotes 8% of its Gross Domestic Product (GDP) to ICT. According to the CPB, 25% of the growth in that GDP comes from the ICT sector, and 50% of the growth in productivity in The Netherlands is directly related to ICT.[4] A major part of ICT activities is related to the infrastructure, or is dependent upon it.

In this country, the national government, the municipalities and the market parties recognise the importance to society of broadband facilities, not just economically but socially as well. Broadband's impact will only really be measurable once the market and the Government succeed jointly in translating effectively the opportunities broadband offers into applications for the domains of *education, care, public management, security, culture, work, trade and leisure*. These applications must become available not only to the *happy few* in the four major cities, but also for the broad public outside them.

The care sector, for example, will be confronted in the next 15 to 20 years with an enormous demographic shift in society. The number of people active in the GDP will fall strongly, and the number of people requiring care will rise sharply. Broadband networks will be able - if they are available on time and on a large scale - to play a crucial part in enabling the same level of care to continue.The expected demographic shift will have a comparable effect on the education sector.

[4] Task force ICT-en-kennis (2001), *Samen, strategischer en sterke [Together, more strategic and stronger]*, The Hague, July, p. 18.

If we want the information and communications applications to become effective cornerstones of our information society and knowledge-based economy, then this country must possess a network infrastructure that performs faultlessly. This means that citizens and consumers will have to have network connections at home that will enable them to work in the same way as they do in the office. New, and primarily richer, forms of personal communication will thereby act as major drivers. Furthermore, the citizen must have remote access to high-value education, care and security, culture and countless other public services.

Because we want all future online information, communication and leisure applications to function at least in the way we are used to with our telephone, television, gas and electricity, there will have to be considerable investment in the next few years in a future-proof broadband infrastructure at a level of quality that is essential for such a facility.

1.3 Basic assumptions and core concepts

Since the liberalisation of the telecommunications sector, the main interest in renewal of and investment in the telecommunications infrastructure is in the market. But, if the market does its work inadequately, the Government will have to take steps. In that case, the Government will have to give the market extra incentives.

In geographical areas where market parties will not invest in new infrastructure themselves, public and private collaboration can be a powerful instrument in encouraging the development of broadband. If the Government and the market can jointly develop an initiative, policy will have to be oriented particularly towards *stimulating demand* and not so much towards stimulating supply. The Government will have to continue to place the role of competition in the broadband market at the forefront of its incentive policy. This means, inter alia, that the unbundling of networks and open, transparent non-discriminating access for service providers will be basic assumptions in developing new business models for local broadband networks. In its incentives, he Government must avoid disturbing the mechanism of the market as far as is possible.[5]

The Expert Group has determined that there is a strong need among the market parties as well as in various public organisations for a strong central directing role on the part of the Government in facilitating the transition to the broadband era.

[5] See also the basic assumptions of the OECD with respect to government assistance in stimulating broadband; OECD (2002), *Broadband Infrastructure Deployment: The Role of Government Assistance,* DSTI/ICCP/TISP(2001)8/REV, Paris, 12 February, p. 3.

Delineation of the broadband domain by the Expert Group.

Because broadband technology is still undergoing a great deal of development, the definition of broadband is a moving concept, with the target in terms of transmission speed being constantly raised. While consumers are now yearning for connections at 1 Mbps, connections at 10 Mbps will become more usual in the future. In any case, many people already use applications at work wherein connection at such speeds are quite usual.

Existing cable and ADSL connections are designated currently by the market as broadband, which is common practice internationally at the moment. Many experts call this type of connection 'midband', According to them, 'real broadband' only starts at 10 Mbps, assuming a sustained rate and a symmetrical connection.[6]

The Expert Group interprets the term 'broadband' for this report as follows: a connection that is constantly available and is suitable for good quality video and audio applications and for exchanging extensive data files. In the broadband objectives later in the report, the Expert Group distinguishes an initial category of connections with speeds from 1 Mbps to 10 Mbps. This sets aside an important role for the upgrading or further upgrading of existing DSL and cable infrastructures. A second category involves speeds of 10 Mbps and higher, where the emphasis is on constructing fibre optic connections from the home. This latter connection is desirable for, inter alia, high quality video applications - particularly simultaneous use by several people in each household.

With the aforementioned interpretation of broadband, the Expert Group is using a broad delineation of the broadband domain in this report.

[6] See, inter alia, ISOC (2001), *Slim Graafwerk; Samen werken aan glasvezel in de wijk [Clever digging; working together on fibre optics in the neighbourhood]*, The Hague, 21 June, p. 10.

2 A view of the development paths for broadband

2.1 An evolutionary development

The Expert Group envisions evolutionary development in which the transition to fibre optics for the first mile is inevitable. Because there is no question of a greenfield situation, there must be a clear picture in the transition phase to the eventual total use of fibre optics in the local loop of how the development of new infrastructures links in with the continued development of existing ones. The development of new broadband applications and their large-scale use cannot be regarded separately from the wide availability of broadband connections. An integrated view of the development of broadband applications and infrastructures is necessary. Only then will there be a breakthrough in the 'chicken and egg' situation.

Although a few local fibre optic initiatives have been launched, it will still be some time before new fixed infrastructures in the first mile become available on a wide scale. A parallel development of the existing telecom and cable infrastructures is therefore necessary in order to be able to cope with the demand for broadband connections in the next few years. In the first place, personal communication(rich mail, chatting, ICQ and video telephony) and peer-to-peer applications (exchanging photos and music and video files) will move the early adopters to get broadband connections. Ease of use and the cost considerations because of the always on aspect are often decisive here.[7] In the long term, an ever-widening public will want to use a broad supply of public and commercial broadband services aimed at care, education, e-government, e-commerce and entertainment A substantial penetration of broadband connections is crucial to the development of these broadband connections, however.

The lack of investment in Europe at broadband level has led to partial geographical coverage with relatively low penetration figures. This has held the content and service industry back from developing wide-scale broadband applications and content.[8] For these reasons, there are as yet no driving and stimulating market movements coming from the service providers. In The Netherlands, the contents industry has indicated that developing and operating applications in the field of video streaming for broadband will only become significant when at least 300,000 households have a 1 Mbps connection (downstream).

[7] Dialogic (2002), Breedband en de Gebruiker [Broadband and the user}, Utrecht, January2002.
[8] EICTA (2002), *EICTA White Paper on Broadband Europe, Recommendations and Policy Reference Document Prepared by the EICTA BB Task Force*, p.5-6.

Figure 2 Driving the broadband flywheel

The market and the Government can get the broadband flywheel moving by breaking through the existing vicious circle: the simultaneous but unbundling development of applications ant the further development of infrastructures will have to reinforce each other. At the same time, new experiments with fibre optics to domestic premises will have to be started in order to gain experience with new business models and other ownership relationships, and to learn from tomorrow's technologies and opportunities.

Because there is no question of a greenfield situation the central question here is what role can these networks play in the future broadband landscape.

In summary, both cable television and telephone networks offer substantial opportunities for increasing transmission speeds and the number of broadband subscribers.

The cost increases excessively above certain speeds or penetrations. Wireless networks are an important supplement to fixed networks. There can also be the question of cross-fertilisation between the two types of network. Wireless networks - including UMTS - are not an *alternative* to fixed broadband networks.

Although, thanks to upgrading, the existing and wireless networks will play a very important part in what broadband offers in the short and medium term, the transition to fibre optic networks as far as the home is inevitable. If The Netherlands really wants to be in the lead with ICT, then it must be in the lead with *Fibre-from-the-Home*. Suitable business models are required to make starting these new developments possible. The following section deals with a generic model for this purpose.

3 Generic analysis model for new broadband networks

3.1 Introduction

In the foregoing section, the Expert Group determined that fibre optics in the local loop are inevitable in the long term. An analysis model for coming up with workable business cases has therefore been developed, based on the various existing initiatives for local fibre optic networks. This analysis model provides on the one hand an insight into a number of areas where *choices* will have to be made, and on the other hand into the *considerations* that play apart in them. The model can also contribute to setting up a guideline that can give direction to further developments in the broadband market. The model has been developed and worked out for the analysis on the basis of a number of assumptions.[9] In this way, the Expert Group has sought solutions to a number of problems.

This is, of course, only one of the possible models, and is certainly not the *only* model that could be used. It must be emphasised that this model is not a blueprint for a large-scale expansion; the experimental expansion of broadband networks in the next few years in particular will have to lead to progressive insight.

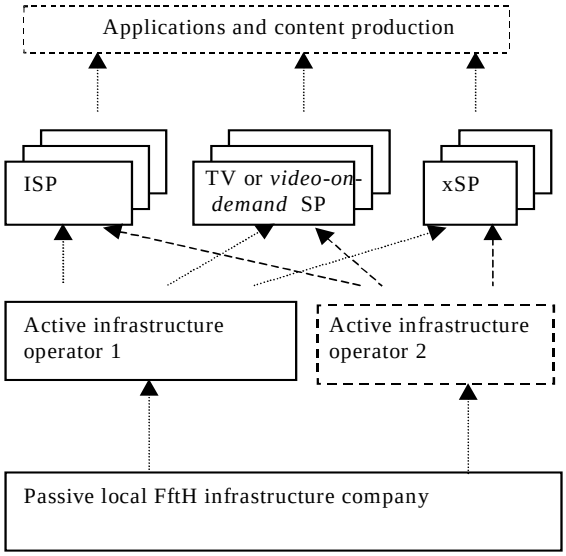

Figure 3 Generic layer model for broadband networks

[9] For the elaboration and calculation of the analysis model, see the Annex to the report *Nederland Breedbandland*.

The model recognises four layers that all provide a transmission service or transmission functionality to the layer above them (these are the arrows in Figure 3). The separate functional layers are the following:

- The *passive infrastructure*. This lower layer contains, among other things, ducts, cabling (fibre optic or other) and the equipment installation sites (such as local centres). It is, in fact, the first three hundred metres from domestic premises. The ducts are laid in trenches in the ground. Characteristic for this layer is that the costs are high and are scaleable only to a limited extent. The greater part of the infrastructure must be laid all at once for all potential users in a particular area, irrespective of whether this area will actually be using the network (activated user). Partly on the basis of its technical and economic useful life, a depreciation period of 25 years is used for this layer.

- The *active infrastructure and switching*. This layer includes the switching equipment in the centres and neighbourhood centres as well as the necessary equipment in the user's home that converts the light signals into usable electrical signals. The technology used strongly resembles the technology encountered in commercial LANs. Investment in this layer is easily scaleable; equipment has to be installed only for activated users.

- *Service Provision* or *Service Providers* (SPs). These organisations provide access services such as access to the Internet, television, video-on-demand or telephony. We use the term xSP as a collective name, with the letter 'x' standing for a particular type of service. In fact, we are already familiar with this layer from the market structure in modem access to the Internet and from Internet access using ADSL.

- The *applications and content production.* This top layer contains a wide diversity of applications and content that end users and commercial and non-commercial organisations produce. Parties who bundle existing content (such as television stations or the authorised media are already doing at the moment) belong in this layer.

3.2 Assumptions in the model

The elaboration of this model is based on a group of assumptions about which consensus has been reached within the Expert Group.

- Division into various functional layers;
- Demand bundling as a basis for financeability;
- Striving for profitable operation on each layer;
- Competition on each layer, unless there are weighty arguments for not doing so;
- Network access for Service Providers under reasonable, transparent, and non-discriminating conditions (open network);
- Feasible within a reasonable time.

Demand bundling is an important basic principle for the realistic operation and financeability of the model. First of all, the neighbourhoods where demand bundling can best be realised must be converted to fibre optics. The actual construction is once off, decentralised (namely at neighbourhood level) and realised in phases.

As a rule, the neighbourhoods with the highest demand, readiness to pay, and with the most favourable circumstances (the number of houses per square kilometre, soil conditions, etc.) will be first.

Neighbourhoods with a substantial amount of new housing will be converted to fibre optics comparatively early. Later on, as the cost falls, it will be possible to convert neighbourhoods where the starting position is less favourable to fibre optics. Where situation lends itself, 'clever' digging will always be employed: if the roads have to be dug up for other work, an FftH infrastructure will be laid immediately.

An important role will be filled by the local authorities as initiators or directors if private initiatives do not get off the ground. By bringing the aforementioned four functional layers from different types of party together, the model closely approaches the central principles of the government policy with respect to arriving at an open and competitive market structure.

3.3 Organisation of the passive layer based on demand bundling

The generic model assumes that the largest proportion of ownership and control of the passive infrastructure will no longer remain restricted to the operator(s) of the active infrastructure. The end users in particular (whether or not represented by housing associations or homeowners' associations), but also property concerns such as project developers, will invest in the future in converting the first mile to fibre optics. This also applies to small and medium-sized companies and countless public bodies (including schools, libraries, hospitals and municipal bodies). Demand bundling is a central concept here. In this way, investment from the property viewpoint could give an important extra financial boost to local broadband initiatives. Connection to a broadband infrastructure provides important added value for property interests. The amounts required are only a small proportion of the current cost of constructing or renovating housing and can therefore be easily justified. Similar considerations apply for project developers. Municipalities can finance part of the investment in the passive infrastructure from social and economic considerations.

In most cases, a particular neighbourhood will be financed by a combination of various stakeholders, such as a housing association and local traders and public bodies. This does not stop commercial enterprises such as the current telephone providers, engineering consultancies, cable installation and facilities management companies from participating in financing consortia. These commercial enterprises could also have an interest in opening up a market that could lead to substantial revenues in related markets. At the moment, market parties are indicating that they are not making independent investments in the first mile without some form of public and private collaboration. If local fibre optic experiments, which a number of municipalities are beginning to conduct, are shown to be successful, it is expected that sources of capital such as banks and pension funds will give the broadband market an extra financial boost within a few years.

If the initiator has bundled the demand successfully, i.e. has promises for the number of connections that are required as a minimum for profitable construction, then this party can set up an FftH organisation that will own the passive infrastructure. All the owners of the passive infrastructure will participate in this organisation. This organisation will now be able to take management of the construction over from the initiator. The FftH organisation referred to will subsequently be able to commission construction of the passive infrastructure by means of tendering. It will also be able to create opportunities for commercial parties to construct an active infrastructure.

3.4 Organisation of the higher layers based on commercial parties

In principle, competition between several parties that are constructing an active infrastructure must be possible. It can be shown that this is undesirable in the start-up phase from the point of view of a minimally-efficient scale. Only if a Request for Information shows that no single market party is prepared to take on the role of active network operator, will the possibility of an exclusive contract (concession) be selected It is recommended that this contract have a limited duration and that all measures be taken to make the introduction of competition possible once it has expired.

Not many rules will be laid down for the active network managers, except that they must guarantee open access for Service Providers. This requirement will prevent telecommunication providers being able to agree on a monopoly position for their own provision of services.

Open network access is one of the basic principles in the model analysed. Vertical integration has not been excluded, however. In this way, the current market parties will be enabled to take on various new roles for themselves. An operator of the active infrastructure may also develop activities on the Service Provision (SP) layer in competition with other SPs. A number of safeguards will have to be built in, of course. Then conditions that the vertically-integrated company applies between two segments of the company that are involved must be identical to the conditions for other SPs.

Construction of a broadband network at neighbourhood level provides unique opportunities for developing services. In this way, all services with local relevance can be realised, for instance in the areas of e-government, virtual communities, care, security, access to school materials, libraries, museums and other valuable local content. The municipality can play a key role in some of these services. There are clear opportunities for local service providers here. These could include services such as community services and local telephony for a flat fee.

By taking demand bundling as a basis, the financing problem for such new networks is relieved a little. Parties such as housing associations and end users can draw the cost of their own part in the construction partly from their own capital and partly from general retail financing. The passive infrastructure can only b scaled a little, however, and will not reach its final level from day one but will gradually increase with time. Financing of the bottom layer is therefore still required. The market parties who want to be active in

the active network layer in particular will also have to ensure they have access to finance. It has emerged from meetings with parties in the market that there is still little readiness on the part of the capital providers to set up financing at the moment. They are following developments with increasing interest, however. The structure of the financing market demands successful examples. The capital providers expect that the market will be sufficiently profitable after an incubation period of about two years for them to step in with financing arrangements on a wider scale.

3.5 Demand bundling by municipal bodies and public buildings as a springboard

Broadband transport networks are required to link local broadband networks to the outside world. Transport capacity is needed at neighbourhood level as well as between local areas. The local authority in particular can play an important part in the availability of these transport networks. The analysis model proposes that, as a launching customer, the municipality open up all public buildings by means of constructing a city ring. This therefore involves a Fibre-from-the-Institute (FftI)-network. As outlined in Box 1, an extended range of such buildings can be considered because they yield a great deal of internal traffic or because they play a crucial role in the communication between government and citizens and between public organisations and citizens. Only the internal savings in communication can justify such construction (see, for example, the Chicago Civicnet and the report Slim Graafwerk, which suggests that a payback period of three years is possible for such networks).[10]

Combining the internal demand bundling of these official bodies with a demand bundling process for small and medium-sized businesses (particularly the ICT and media sectors) and industrial areas in the municipality could be considered. It is also quite conceivable that mobile operators would participate in such an FttI project because they need such a closely-knit transport network for the set-up points in their UMTS networks. Public and private collaboration would be called for in these cases.

By constructing a 'municipal network' between establishments, a fibre optic network will come closer to domestic premises and the necessary technical facilities (neighbourhood centres, co-located rooms or concentration rooms) could possibly be set up at relatively low cost. The next box gives examples of establishments that come into consideration for such a municipal network.

Culture and leisure: cultural organisations (playhouses, theatres, concert halls, cinemas), tourist offices, youth centres, sports centres, museums, municipal archives, municipal photographic department, community centres, local broadcasting, music schools, clubs and societies

Care and health: health organisations (chemists, diagnostic centres, health centres, hospitals, the Red Cross, clinics, local groups, maternity care) care establishments, social establishments (youth welfare offices, youth welfare centres, social services), child care (day nurseries, playgroups, child minder centres), day centres for the handicapped, senior citizens' organisations, transport for the elderly

[10] ISOC (2001), Slim Graafwerk; Samen werken aan glasvezel in de wijk [Smart digging; working together on fibre optics in the neighbourhood], June.

Government municipal services, town halls, community offices, municipal information centres, inspection services (environment, health protection, planning), municipal utilities, ombudsman, non-municipal government establishments (tax offices, provincial government, ministerial establishments), social housing organisations, land registry, job centres

Public order, security and justice police, fire brigade, ambulance service, defence units, district courts, legal aid

Transport: public transport, port facilities

Education: educational establishments (primary, secondary and higher education, adult education, special education, ROC). Higher education in particular could also decide to open up student flats.

Local economy: innovation centres, World Trade Centres

Box 1: Government or public buildings that come into consideration for being opened up.

3.6 Learning points in the analysis model

As stated earlier, the analysis model was set up to provide insight into a number of areas where choices have to be made. Major points of interest that the model brings to the fore are the following:

- The exact management structure of the local FftH project depends largely on local circumstances and requires careful investigation in each situation.
- Although openness and competition are basic assumptions in the model, vertical integration must not be ruled out completely. It then becomes important to formulate the exact conditions under which vertical integration would be permitted and to supervise closely the arrangements to be made with market parties. The specific conditions involve particularly the exact access conditions for other competing service providers.
- Any strong managerial and/or technical fragmentation between these countless local projects must be prevented. A clear role for the Government has be laid down in this respect.
- There have to be criteria which municipalities can use to determine whether a specific neighbourhood is ready for conversion to fibre optics: *The broadband barometer.*
- If there is a question of a lack of financing for local broadband initiatives - this will depend on, inter alia, the actual readiness of end users to pay and on the attitude of the capital providers - then the Government will have to look into what the best way is to make good the shortfall so that the economic-social benefits of large-scale broadband access can be enjoyed after all.

These ideas constitute an important input for the next section, in which the role of the Government is central.

4 Broadband ambitions, objectives and recommendations

4.1 Nederland Breedbandland

To make the promise of the name *Nederland Breedbandland [The Netherlands - a Broadband country]* come true, the market and the Government must together get the broadband flywheel moving and keep it going. The Expert Group envisages a realistic scenario in which The Netherlands can achieve a leading position in broadband. In order to reach this leading position, the Expert Group presents a concrete phased plan in which it has formulated time-linked objectives with associated action items.

4.2 Towards a leading international position

In this scenario, experiments with local broadband projects get a good start through targeted demand stimulation and demand bundling. A closely-directed phased plan will lead to effective spreading. In this scenario, existing infrastructures get the opportunity to continue to develop, but above all, more new alternatives come along (wireless, and particularly FftH). Because of the role the Government plays as launching customer (including *Fibre from the Institute)*, the scaling-up of local broadband initiatives does not remain restricted to the four major cities. With achieving penetration of a few hundred thousand households, the development of content and application also gets well into its stride. The extra financial resources that the Government makes available for user experimentation, bonus scheme for demand stimulation and the partial pre-financing of new first mile solutions - especially the passive part - will get the broadband market moving. Infrastructure competition will be strengthened, which will have a positive effect on the growth of the broadband market. Negative attitudes will be swept away, as a result of which private financiers will become more active.

An important condition for the positive development outlined in this scenario is that the Government will guarantee open and non-discriminating access for xSPs and will ensure the maximum achievable unbundling of the various layers of the generic model.

4.3 Phased plan and objectives

To realise the scenario outlined above, the Expert Group recommends a concrete phased plan. Objectives, action items and measuring points are shown for each time period. Although the focus in these recommendations is in the coming lifetime of the Cabinet, the Expert Group has also linked a long-term vision to them.

2002	**Current situation:** • 550,000 active broadband connections (xDSL and cable)

2003	- Main features of broadband laid down - Set up the Broadband Knowledge Centre (see Section 4.4) - Guidelines for local initiatives available (see Section 4.4) - Set up annual benchmarks **Objective:** • Start 15 to 30 local pilot schemes based on a limited number of realistic development models (not more then three)
2004/2005	- Set up an annual evaluation and revision of business models - Learning experiences with scaling up and network management - Linking local initiatives to larger networks - Initial large-scale application of government services (care and education) - Extensive user survey - FftI realised in larger Dutch municipalities (G25)
2006/2007	- Check on progress of rollout in unprofitable areas - Based on knowledge acquired with the models used, there must now be a scaling up by means of 'regular business' (direct copyability) **Objective:** • 1.25 million active broadband connections between 1 Mbps and 10 Mbps (particularly xDSL and cable) • 300,000 active broadband connections of 10 Mbps or faster (in particular fibre optics) • A basic infrastructure (fibre optic) for 10 Mbps or faster runs to 1.2 million households (homes passed)[11]
2010	**Objective:** • 2 million active broadband connections between 1 Mbps and 10 Mbps (particularly xDSL and cable) • 1 million active broadband connections of 10 Mbps or faster (in particular fibre optics) • A basic infrastructure (fibre optic) for 10 Mbps or faster runs to 2,5 million households (homes passed)
2015	**Objective:** • 2 million active broadband connections between 1 Mbps and 10 Mbps (particularly xDSL and cable) • 3 million active broadband connections of 10 Mbps or faster (in particular fibre optics) • A basic infrastructure (fibre optic) for 10 Mbps or faster runs to 5 million households (homes passed)

The connections referred to in the objectives must be suitable for viewing video material by large numbers of viewers simultaneously (this involves a *sustained* transmission rate and a substantial level of simultaneity)

Table 2: Phased plan 2002-2015

[11] Tis concerns a basic infrastructure on the street level that allows connecting homes directly (the final customer drop).

Realising 1.25 million active broadband connections at speeds of 1 Mbps to 10 Mbps (particularly xDSL and cable) and 300,000 active broadband connections at speeds of 10 Mbps or faster (mainly via fibre optics) by the end of 2006 constitute the foremost objective for the next Cabinet term. This objective will also realise a basic infrastructure at 10 Mbps or faster for a potential 1.2 million houses or buildings ('homes passed'). This basic infrastructure is an absolute precondition for being able to realise later objectives for 2010 and 2015. This applies particularly to the scaling-up of fibre optic connections from 300,000 to one million in the period 2007-2010. The phased plan also contains a number of necessary actions. In the following sections we present a set of measures that the Government can take in supplementing the market to realise the objectives before the end of 2006.

A number of other countries are also working on ambitious plans for the rollout of broadband. If the objectives proposed by the Expert Group are not realised before 2006, then The Netherlands will not be able to achieve the desired international lead.

4.4 Government measures supplementing the market

Connecting up to the chosen level of ambition and the associated phased plan, there follows here an overview of the possible government roles and policy measures.

The roles to be distinguished include those of:

- booster;
- demand bundler;
- launching customer;
- financier;
- director and
- supervisor.

The basic assumption in elaborating the various roles and policy measures is that overall policy is characterised by consistency and legal predictability and reliability, and that it provides certainty for investment by market parties. The measures involve mainly central government, but also local government in a number of items, including demand bundling and encouraging local applications).

Roles	Measures	2003-2007
Booster generic encouragement	• Encouraging experiments with new access technologies (upgrading, fibre optic, wireless) including realising ideal breeding grounds for WLAN access networks (in universities, schools, public places). Inclusive user survey. • Investigation into the development of ambient technology, wireless internet, grids and fourth-generation Internet (sixth EU framework programme) • Increasing citizens' awareness	**€ 400 M** **€ 40M**
Demand bundler	• Bundling the demand at neighbourhood level (process activities for realising FftH) • Demand bundling among government and public establishments (realising FftI, with as a derived goal the safeguarding of an adequate supply of transport services for opening up the east of the country, for example.	**€ 5M**

Launching customer	• Promoting the accessibility of government information and services (Government 2010) • Developing broadband content and applications (oriented towards education, care, security, traffic jams, teleworking, leisure and relaxation) (e.g. renewed Kennisnet at home and other spearhead projects) • Making content that has been realised with public money freely available (buying up rights) • Postbus-51 *on demand* (the information video library) • Linking national icons to broadband (insofar as this is not yet the case); think of the Concertgebouw, the Rijksmuseum and the Floriade)	**€ 50 M** **€ 500M** **€ 60M** **€ 20M** **€ 50M**
Financial stimulator	*Residential level* • Financial or fiscal arrangements (broadband mortgages, broadband private arrangements, tax deductions for employers) • Stimulating demand via bonus schemes at individual level (on activating a connection in accordance with the guidelines), differentiated according to the quality of the connection. This involves infrastructure *plus* services. • Making a revolving fund available for market parties who wish to make targeted investments in the broadband market.	**€ 700 M**
	Government organisations and public establishments • Partial financing of FftI initiatives in unprofitable municipalities	**€ 100M**
Director/ facilitator	• Setting up a National Broadband Knowledge Centre (knowledge transfer) • Developing guidelines for local initiatives • Matching laws and regulations to new broadband developments (Investigating and resolving copyright problems, combating digital crime, modifying the buildings decree)	**€ 40 M**
Suprvisor	• Rebalancing cable television networks by means of flat fees and realistic remuneration for the infrastructure) • Laying down requirements for the quality of a broadband link (reducing vulnerability, quality guarantees) • Proactive monitoring of the rules laid down by the Government (rules must be consistent, provide legal certainty and contribute to a stable investment climate) • Working out a national system of monitoring the observance of arrangements between initiators and market parties (in accordance with the guidelines) insofar as the activities involved fall outside the normal rules for open access.	
Total		**€ 2 billion**

Table 3: Government roles, measures and necessary expenditure

The Expert Group considers the total expenditure of € 2 billion required for the period 2003-2007 to be a reasonable amount for realising the objectives mentioned. The € 700 million mentioned for financial demand stimulation concerns a contribution to the individual expenses of broadband users (for infrastructure and xSP services). The charge for a broadband connection with 25% penetration would be approximately € 80 per month (including VAT). With the proposed demand stimulation, that would mean that the total monthly tariffs would fall from € 80 to about € 60. Should the Government wish to reduce the individual costs further, a corresponding increase in demand stimulation would be required.

4.5 Conclusions and recommendations

In the *Nederland Breedbandland* report, the Broadband Expert Group presents its vision of the development paths and the business models to be developed in more detail for the realistic development of broadband in The Netherlands.

The Expert Group envisions an evolutionary but inevitable development towards a transition to fibre optics for the first mile. The current networks in the local loop provide insufficient capacity to meet future demand. Investment in new fixed infrastructures in the local loop are absolutely necessary, because of the enormous growth in capacity in the next few years. At the moment, these investments are not getting off the ground without some form of public and private collaboration. The business models for large-scale rolling out of *Fibre from the Home* appear at the moment to be insufficiently profitable. The market currently has insufficient financial strength to realise national ambitions for broadband by itself. In the roles of demand bundler, launch customer, financial stimulator and director, the central government and the municipalities can together give the broadband market parties the necessary stimulus.

The Expert Group's *main conclusions* are summarised point by point below:

- The social and economic benefits of the availability of broadband access and its associated applications (for education, care, security, work, culture and leisure) are of crucial importance for The Netherlands in decades to come.
- The upgrading of existing infrastructures plays an important part in the development of the broadband market, but the eventual transition to fibre optics into domestic premises is inevitable.
- In connection with these evolutionary market developments, fibre optic initiatives must be started now so as to be prepared for future market demand.
- An important role has been set aside for the Government, but the market will eventually have to provide the construction of infrastructure and the development of applications and services, or at least most of them.
- In its directing role, the Government will have to set clear and measurable goals (see the phased plan).
- A balanced set of specific and varied measures will be required, including (but not restricted to): a guideline for local initiatives, a Broadband Expertise Centre, encouragement of broadband applications, infrastructure experiments and demand stimulation.
- Schools and other educational establishments are outstanding examples of broadband applications directed towards the wider public. These establishments' sidelines reach a large proportion of society and students are able to support older generations with domestic use. schools as "broadband incubators".
- The process of further unbundling as outlined in the layer model and the transition from vertical organisation to a horizontal chain organisation

(specialisation) offers countless opportunities for new activities in the separate layers.

- A wide diversity of new specialist service providers can be expected, particularly in he xSP layer, offering care, education, security, culture, and entertainment, among other things.
- The rebalancing of the cable tariffs is an important investment incentive for the cable companies, and thereby an important step from out of the market towards achieving a leading international position.
- In order to realise these ambitious goals in 2006/2007, a government contribution of an estimated 2 billion euros will be required during the life of the next Cabinet.
- This incentive will result in sufficient market potential being realised to enable the way to a broadband society to be financially independent.