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Broadband initiatives in Sogn og Fjordane

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PREFACE

This document gives an overview of the broadband development in the region Sogn og Fjordane in Western Norway. The overview has been prepared as part of an international initiative looking for experience in disseminating broadband infrastructure in rural areas.

The description is based on data gathered as part of a multi annual process. Parts of the material have been published in two conference papers. (Skogseid, 2005; Skogseid & Hanseth, 2005)

The development of broadband in Sogn og Fjordane have been a major initiative involving a number of public and private organizations. Without their initiatives, interests and support the advances of broadband in Sogn og Fjordane would not have been the same.

Sogndal, October 2005

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1 INTRODUCTION

The region Sogn og Fjordane is located in the western part of Norway, covering an area of 18,634 square km and with a population 110 000 inhabitants (equals about 6 per square km). The region is characterised by a harsh nature with glaciers, mountains (>50% is considered inhabitable mountain areas) and fjords dividing the populated areas.

Together this makes the region one of the most challenging areas to develop, in particular with regard to broadband infrastructure. The cost of cabling the whole region is too high to be of any commercial interest. As a market the region is too small and difficult to develop given its topology. The national broadband plan put forward by the government takes into account the result of the liberalisation of the telecom market, there are therefore no actors that ensure access to all at a national level. Broadband development is based on market forces. To provide broadband to the public sector, businesses and inhabitants alike in a region of Sogn og Fjordane's nature is a challenge.

To meet this challenge a number of National, regional and local initiatives have been taken; this study explores some of the initiatives in the region. In Sogn og Fjordane the development has been carried out through a regional initiative and more than 10 different local initiatives. In part these have been supported by the National stimulation fund for public sector service delivery whereby stimulating market demand for Broadband. Below there are examples of National, Regional and Local initiatives covering the period from 1996 to present day. These initiatives have been very successful and the region now has a broadband coverage of 74.25%¹.

The maps below show the dramatic development in broadband coverage at national level from 2003 to August 2005.

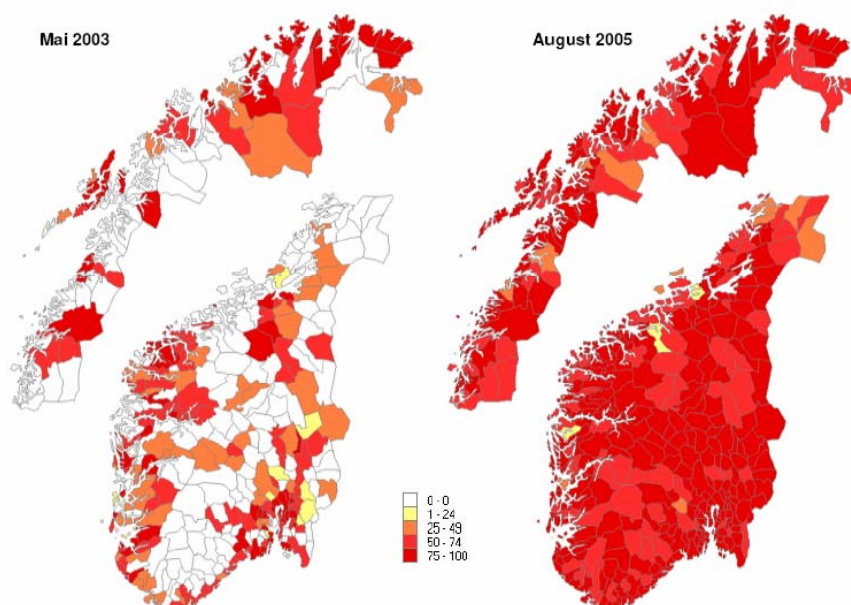


Figure 1 Estimated broadband coverage – August 2005 compared to May 2003²

¹ www.jara.no current coverage is 74,25% while if we include planned developments the coverage is 79,53%.

² Source: (Teleplan, 2005) Bredbånd – dekning og tilknytning (in Norwegian)(Broadband – coverage and penetration)

2 HØYKOM - A SUPPORT INITIATIVE FOR BROADBAND BASED, INFORMATION INTENSIVE eGOVERNMENT SERVICES – NATIONAL INITIATIVE³

In this section we briefly describe the Høykom initiative and how it contributes to broadband development in Norway.

The Norwegian Government has expressed a clear intention to promote the development of a coordinated and user-adapted public sector. The Government has two overall goals in its modernisation process: Making the general public's interaction with the authorities easier and freeing resources which may strengthen the welfare state. In the Government's efforts to reach these goals the Høykom programme plays an important role by supporting public sector organisations that wish to utilize broadband intensive eGovernment services within the scope of a time limited project.

The Norwegian Høykom programme is at present in its third period of operation. The programme was initiated in 1999, initially for a period of three years (1999 - 2001). Its third and current period of operation runs from 2005 - 2007.

Høykom has over the years provided financial support for more than 400 projects on a shared financing basis. Høykom sustains projects initiated by the public sector with up to 50 percent of total project costs. During the life span of the Høykom programme this support amounts to more than 45 mill Euro and has led to a total project volume of more than 130 mill Euro.

The 2005 budget of Høykom was approximately 10 mill Euro. The programme budget is decided on an annual basis and the budget is expected to be the same for the next two next years. This means that in the period 2005 to 2007 the programmes total budget is expected to be close to 30 mill Euro. With Høykom financing 50 percent of the total project costs this implies that the total project volume will be approximately 60 mill Euro.

Høykom is expected to be continued as a programme on its current level, and measures will be taken to transfer best practice experience established in Høykom projects into public e-services and governmental practice on a broader level. Measures will also be taken to disseminate the large quantity of knowledge and insight into eGovernment related issues that have been built up in the programme during its time of operation.

There are six themes in the Høykom programme which are, Lighthouse, School and education, Municipal governance, Health / Social (56 projects), Høykom School and Høykom Rural

One of the great effects of the Høykom project is that when the demand for broadband is from the public sector, this ensures that there are high capacity lines in the community for the private sector to exploit in order to bring broadband into homes and businesses. In addition the public sector who are the main customer are in a position to negotiate line usage for businesses and homes.

³ www.hoykom.no

3 REGIONAL INITIATIVES AND OVERVIEW

3.1 *Breibandsforum Sogn og Fjordane*⁴

Breibandsforum Sogn og Fjordane (BBF) is a network organisation, initiated in 2001, in response to the increasing interest and need for broadband infrastructure in the region.

BBF is a task force that places focus on establishment, development and utilization of broadband infrastructure in local communities. BBF initiates and participates in a number of activities, such as; information meetings and an annual conference, surveying the availability of broadband infrastructure, and participating in a number of externally funded broadband projects focusing on the utilisation of the network for provision of services or education. The national broadband plan says that infrastructure development must be based on market forces. By ensuring the information flow and exchange of experience the forum is supporting the demand side and thereby strengthening the demand for broadband service, the aim is to have a competitive market in most parts of the region.

3.2 *Available broadband infrastructures in the region*

In 1998 at time of deregulation, access to broadband infrastructure in the ‘Sogn & Fjordane’ region was very limited, the regional college and research institute along with the regional hospital had access to broadband capacity, some enterprises had access to leased lines for specific purposes and used ISDN for email and internet access. At the same time in urban areas there were a number of broadband alternatives from both local and national providers.

An overview over all the broadband initiatives and offers available in the region is updated regularly; last in June 2005. Five different public sector initiatives, one public- private partnership and thirteen commercial companies are providing broadband services. At most one municipality has five different commercial providers and the largest municipalities have each four to five providers but still not all parts of the municipality are covered. Looking at the municipalities the coverage varies from 25.5% to 97.5%⁵. In most cases it is only the central parts of the municipality where the main agglomeration is covered. Most of the municipalities have communities that are so small and difficult to reach that they have no commercial interest – and will therefore not get access to broadband based on market forces – in these areas it is particularly important to look for alternatives.

All the municipalities have at least two commercial provider, the national provider Telenor are present in all 26 municipalities, and the regional provider ENIVEST is present in 20 municipalities. But for many of them it is only the central parts of the municipality where the public sector organisations are located that are getting a broadband connection.

Three of the providers are national providers, the rest are local companies providing broadband access. The three national providers all own independent infrastructure in the region, while there are providers delivering access services on top of the existing infrastructure provided by Telenor’s network and these are mainly providing ADSL services. This means that the spread of the connectivity is dependent on the speed that Telenor use to upgrade their phone switches to allow for ADSL communication. Telenor have no plans to upgrade all switches, the cost will be too high and will not be commercially viable. The other

⁴ <http://www.it-forum.no/pub/menu/mid9-40.asp>

⁵ www.jara.no

providers are either installing their own or utilizing existing fibre among other in collaboration with local energy companies and are supplementing with radio link to connect areas that are not so easily wired. Municipalities that are being served by a local provider have usually a larger reach, that is are reaching larger numbers of the population. Some of the local/regional companies are specialising in broadband and internet services to others this is only a small part of the total offer.

One of the local providers is planning to provide services in all municipalities but is currently percent in 20 of the 26 municipalities. This is the local provider with the highest ambition, and they have started to buy-up smaller initiatives. This company started providing broadband services using radio-link, but the company and their customers were not satisfied with that so they are now changing to ADSL where appropriate and are collaborating with a large local electricity provider utilizing their fibre spun on electric carrier lines for long distance communication.

Of the public sector initiatives there are three municipal networks covering a number of the municipalities with the aim to collaborate with regard to broadband access. These three public sector initiatives together with the county municipality provide 54 schools from primary to high school level with broadband access with a capacity of 2MB or more. 93 other schools at primary and secondary level have ISDN access or equivalent.

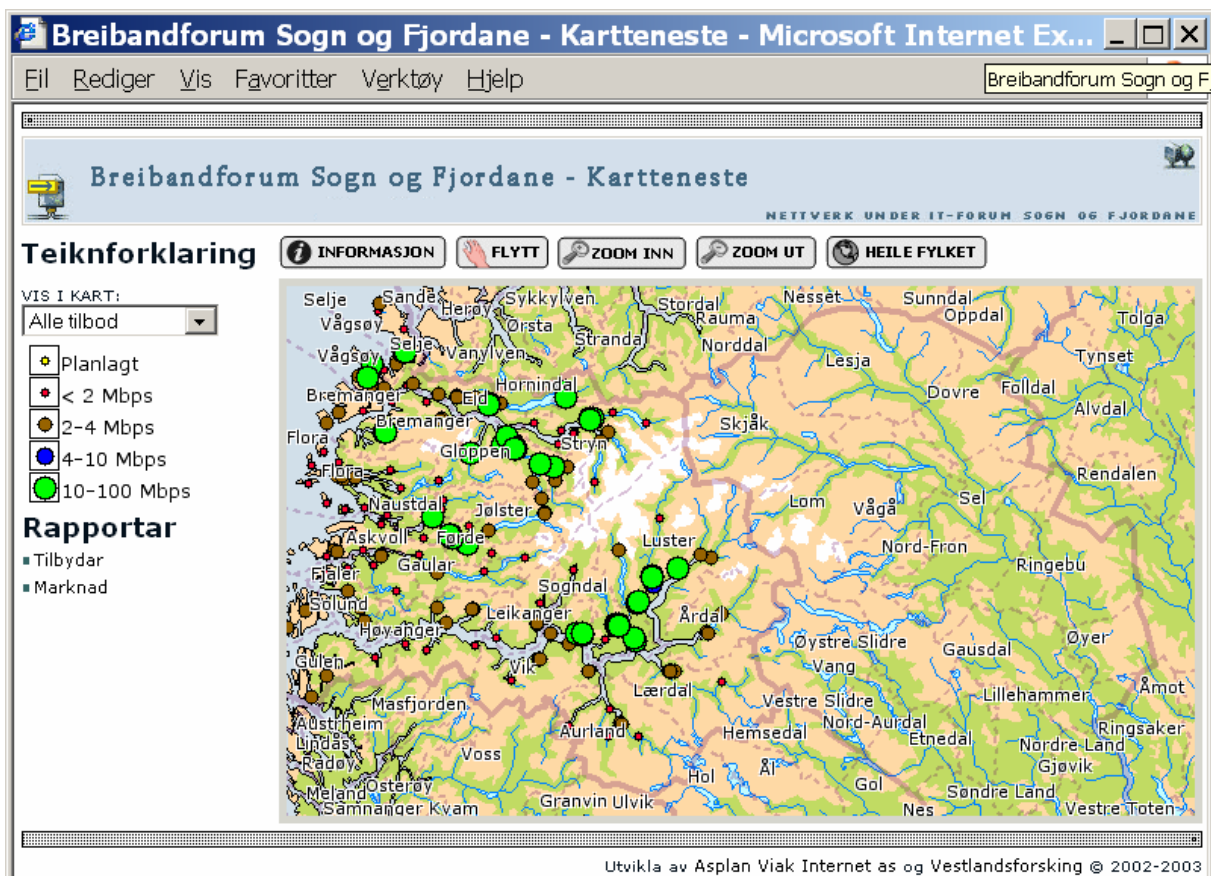


Figure 2. Map based interface showing access points and broadband capacity⁶

The three public sector suppliers are in the process of or have recently negotiated with providers of access to the national infrastructure. In these negotiations they are also

⁶ <http://kart.it-forum.no/>

negotiating for access that can benefit businesses and inhabitants. As an example one of the public sector networks have got an agreement that the access provider will establish at least one ADSL access point in the centre of each community.

The following lists the existing national and local broadband providers available in Sogn og Fjordane. Then follows a more in depth description of the history of two of the local providers of broadband access to internet.

National broadband providers with own infrastructure in the region

- Uninett
- Telenor
- Catch
- DataGuard as

On the infrastructure provided by Telenor there are a number of operators who deliver access services these are.

- Bluecom
- MTU Link
- DataGuard – have own infrastructure some places in Sogn og Fjordane
- Tiscali
- Catch – Have own infrastructure some places in Sogn og Fjordane

Regional Broadband providers

- Kommunenett Nordfjord – Public sector initiative between 7 municipalities develop common services and to ensure access to broadband infrastructure.
- Kommunenett Sogn – Public sector initiative between 8 municipalities to ensure access to broadband infrastructure.
- Sunnfjord nett – Public sector initiative between 10 municipalities to ensure access to broadband infrastructure.

The table below lists all the local initiatives with a short description of their main characteristics.

Table 1 Overview of local broadband initiatives in the region ‘Sogn & Fjordane’ as of March 2004

Initiative	BB since	Owners/ involvement	Infrastructure	Users/Use	Operation	Coverage
Aurland & Lærdal breiband AS	2003	Ltd owned by 2 Municipality + 2 el. Suppliers	Existing cable-TV & ADSL & wireless	Private and businesses	Internal operation	Aurland most developed
Datapart AS	2002	Ltd, privately owned	Wireless & ADSL	Private and businesses	Internal operation	Luster & Sogndal
Enivest AS	2000	Ltd. owned by 4 municipalities and 3 el. Suppliers	ADSL & Wireless	Private and businesses	Internal operation	Nine municipalities
Firdanett AS	2000	Ltd company owned by 1 el. supplier	ADSL & Wireless	Private and businesses	Internal operation	Gloppen
Jølster Breiband AS	2002	Ltd, privately owned	Wireless	Private and businesses	Internal operation	Mainly Jølster
Kapasitetslaget AS	2000	Ltd. Public private partnership	Fiber	Businesses & public sector	No employees use the network	Sogndal, Leikanger, Luster

PC Support	?	Ltd company	DSL	Private and businesses	Internal operation	Hornindal
SiCo Data	?	Ltd company	ADSL	Private and businesses	Internal operation	Stryn
ViaVest AS	2000	Ltd. joint venture between companies	wireless leased lines from Telenor	businesses	Internal operation	Stryn
Vik IT-Partnar AS	2002	Ltd, privately owned	wireless	Private and businesses	Internal operation	Vik Balestrand in coop. w el. supplier
Zet.no AS	1998	Ltd company	Wireless + fiber	Private and businesses	Internal operation	5 towns
Årdalsnett AS	2001	Ltd company 12 local owners	existing cable-TV & wireless	Private & businesses	Internal operation	Årdal & Lærdal

Each of these initiatives covers only a part of the region ‘Sogn & Fjordane’ and all are the result of local initiatives. The Enivest company is the only one that can be considered a provider with regional coverage.

Several of the initiatives have been supported by Høykom funding in parts of their lifetime or have had public sector as customers and in that way have been connected to the Høykom initiative.

The next section describes two of these bottom-up local initiatives in greater detail.

4 BOTTOM UP INITIATIVES

Several of the initiatives above are what we call bottom-up initiatives where the users, businesses and public sector work together to ensure access to broadband infrastructure. Below we describe two such initiatives, both started as public-private partnerships, one developed into a commercial provider the other remains a public-private partnership.

4.1 Kapasitetslaget – Sogndal municipality

Sogndal is one of the main agglomerations in the region. It is the home of the regional college and research institute who had prior access to broadband infrastructure. The municipality has about 6,600 residents and an additional 2,000 students during the school year. Sogndal has a diverse business structure. Agriculture is important, and so are the manufacturers who use local raw materials in their products, such as ‘Lerum Conserves’, which turns fruit and berries into preserves.

As the college has been growing it has been located in many buildings throughout Sogndal; a broadband infrastructure between these buildings has been built over the last 10-15 years. This infrastructure consisted of leased lines from the national telecom provider Telenor, and lines owned by the college itself and the municipality. When tele-liberalisation occurred in 1998 the whole infrastructure was purchased by the college and the municipality.

In the period from 1996 to date the two largest public organisations in the region have participated in several projects together, looking into ICT for the delivery of public services - eGovernment. In 1999/2000 the need for a better, faster infrastructure became apparent to be able to provide their services. They needed high capacity access to the internet to provide

services at regionally and nationally. The services were generating heavy traffic both in the form of large files and the number of requests, e.g. norge.no, which has approximately 30,000 hits on its website every day. For the individual organisation the cost was considered too high.

The main challenge with regard to access to broadband infrastructure is the cost of renting capacity on the transport network connecting local providers to the national/international grid. To rent a 2Mbit/s connection is 40 times as expensive per bit as the rent for a 622 Mbit/s (Teleplan, 2003), accordingly it is a discount based on quantum. This is the primary reason why access can be more expensive in rural areas compared to urban areas. There is accordingly possible to get a discount if local actors collaborate and rent higher capacity at a low cost per bit compared to that each of them rent low capacity lines at a high cost per bit. The two public organisations along with their regional partners saw an opportunity to be able to get sufficient internet access at lower cost by collaborating between themselves and with other actors in the region.

The two regional public sector organisations applied for public funding through a national program (HØYKOM⁷) and managed to secure the initial funds for the initiative, focusing on delivery of public services and on connection to providers of tools and services. Toward the end of the project the joint venture company 'Kapasitetslaget i Sogn AS' (KL) was established, to continue the work. Twelve private companies joined into the efforts together with the local energy company 'Sognekraft', the college, the research institute, and regional public sector organisations in this effort. Actors were approached to join KL for a number of reasons, the main being expressed interest and need, access to knowledge and infrastructure.

Having this combination of owners ensured access to both knowledge about how to operate a broadband infrastructure and access to available infrastructure that could be utilized in the access network, together this was important to ensure the success of this development. KL has been able to rent and make use of existing fibre infrastructure owned by the municipality and college this was the basis for the development in Sogndal. KL provides the backbone fibre infrastructure to the internet; they do not provide any other services. Provision of other services has been left to the users of the infrastructure. The organisations that want to connect to the infrastructure can do so using radio link, provided by a service provider in the network or by connecting to the backbone fibre at their own cost. The access network was extended to two neighbouring municipalities Leikanger and Luster in 2002. The 20 km line to Leikanger from Sogndal is rented un-terminated fibre lines from a local energy company. A new 30 km power and fibre line has been installed to connect Luster, and two local energy companies are renting out un-terminated fibre to KL. In summer 2003 a new piece of infrastructure was installed to connect Kaupanger, and it is owned by a local energy company.

The collaboration between KL and the local owners of the infrastructure has been a win-win situation. The win-win situation is based on the best possible utilisation of already available installed-base. Compared to traditional top-down diffusion of infrastructure development this approach was quick and it was instrumental to keep to cost at a minimum and to be able to provide broadband services as soon as possible. The access network is an ensemble of radio

⁷ www.hoykom.no

network, dedicated data cables owned by KL, the municipality and the college, and of unutilized fiber rented from the energy company.

Presently more than 30 companies receive broadband internet access through KL. One of these are the national portal norge.no which was located in the area because sufficient broadband capacity was available, in addition to the availability of skilled workers and the low cost of office space. Several new companies have been able to locate in the area due to the network capacity; examples of these are 'Asplan Viak Internett' and ArtsPages.

KL's main purpose was to negotiate inexpensive internet access and to stimulate the building of the local access infrastructure. They aim at coordinating the development of the ICT-infrastructure, and negotiating common internet access for all partners. KL negotiates access to the national infrastructure at regular intervals. In negotiating they achieve sufficient access at all times at an acceptable cost, dependent on the current needs of the customers. The experience is so far that working jointly in this way has led to cheaper and faster access for all the companies connected through KL.

4.2 Firdanett – Gloppen Municipality

Gloppen is another of 26 municipalities in the region; it has a population of 6000. The modern history of Gloppen is one of decline. In the past employment was in the agricultural sector and in the textile industry. The textile industry has been closed down. Farming is still an important industry (SSB, 2002), but currently it is the public sector that employs the most people. The development of the local broadband initiative Firdanett is the result of several interacting processes.

A Gloppen based ICT firm, 'Datainstituttet as', had several customers who wanted to buy ICT services such as backup, printing and server space. Several of these customers were located in the same building as Datainstituttet, and to these customers the services were made available through a new Local Area Network (LAN) established in 1996. Due to regulations in the law, it was not possible to expand the LAN to customers outside the building. When the tele-liberalisation took place in 1998 the laws were changed and the LAN was expanded to other customers outside the building. This LAN and its services formed the basis for the development of the broadband network.

To be able to improve the handling of the investments needed to develop the infrastructure, a new company, 'Gloppen IT nett' was established. 'Gloppen IT nett' was a collaborative effort between Datainstituttet, the chamber of commerce, the municipality, and the local energy company (Gloppen-kommune, 2000), and was equally owned by the partners. The company continued to develop the LAN into a full broadband access network. In collaboration with the municipality they secured public funding through a national program (HØYKOM) to be able to develop the network to include all public offices. The project was important to expand the network to get better coverage throughout the municipality. The development of 'Gloppen IT nett' is considered an exemplary model (Samferdsledepartementet, 2002) for public-private partnership when it comes to development of broadband infrastructure.

The operation of the ‘Gloppen IT nett’ was handled by Datainstituttet. After about a year, the owners could not agree on a joint financial and strategic plan for the company. Datainstituttet sold their shares to the regional energy company. As part of the reorganization they separated access from services. The services were transferred back to ‘Datainstituttet’ who included then in their line of products and services. ‘Gloppen IT nett’ was refinanced and its name was changed to Firdanett AS. Firdanett is mainly owned by the local energy company with the chamber of commerce and the municipality as minority shareholders. Firdanett has two employees, one technician and one salesman.

The local broadband infrastructure consists of a mixture of the early LAN, supplemented by fibre connecting the main buildings in the center Sandane and radio transmitters / receivers to reach communities other places in the municipalities. Firdanett has access to national infrastructure through a 6 Mb connection through the national provider Telenor. In the case of Firdanett there did not exist an installed-base that could be utilized in the same way as in the KL case. The cost of putting a fiber infrastructure in place was high and there was no short-term payback from the investment. This was one of the reasons for the refinancing after Datainstituttet withdrew from the initiative.

Firdanett offers broadband internet access and IP telephony, and Datainstituttet and other service providers offer their ICT services to the businesses connected to the network along with other service providers such as accounting.

As a result of this local initiative, 55 companies and 85 households receive broadband internet access [2003 figures]; despite the absence of the national provider Telenor, which at that time did not offer broadband to the households and the small businesses in the community. Co-operation between the public and the private sector, with the private sector as initiator, is characteristic for Gloppen (Gloppen-kommune, 2000). Some spin-off activities are the Sandane Business Garden, which is offering an innovative environment for knowledge based firms and incubator facilities for start-ups. The establishment of a call centre with initially 40 jobs (it has been downscaled quite a bit recently), and a company providing internet based services related to digital images, Eurofoto, with eight new jobs are direct results of the broadband initiative in Gloppen.

In March 2004 Firdanett merged with another broadband company Eninvest. Eninvest is in part owned by the same energy company; the effect of this merger is not yet clear and will not be further addressed in this paper.

5 CONCLUSION

This report gave an overview of National, Regional and local initiatives, both public and private sector driven. Two very successful developments of broadband infrastructure in rural communities based on local bottom-up initiatives were presented in detail. In the two initiatives different factors have been important for the development; these are summarized in the table below.

	Kapasitetslaget	Firdanett
Strategy	Ad hoc. Needs in public sector and business community	Ad hoc Needs in local business community
Bandwagon	General increase in demand for high speed	General increase in demand for high speed

	internet access. No national provider in area	internet access. No national provider in area.
Actors	Regional public sector Enterprises College & research	Local public sector Enterprises
Installed-base	Municipality and college owned WAN Un-terminated fiber along electric cables Experience running broadband networks Large organizations with a knowledgebase	Operational LAN. Many small organizations with no knowledgebase. General ICT skills
1 st adopters	Public sector (number of accesses) + private companies (quantity of data transferred) primarily the 12 participating in the development	Delivery of services between connected enterprises in LAN/WAN, they also needed Internet access
Infrastructure	Rented fiber from municipality & college , rented un-terminated fibre lines (dark fibre), Wireless links	Operational LAN and WAN technology using fiber. Radio and wireless links

Table 2 Important factors contributing to the development of the infrastructure.

Both these instances are examples of successful developments, they both reached the aim; providing broadband access in their local communities. The purpose of presenting both cases is to illustrate the fact that a market driven establishment of broadband infrastructure in rural areas needs to take local specificities into account, cultivating the infrastructure, building on available installed-base, rather than copying the top-down approaches used when developing traditional telecom infrastructure. This includes the needs of potential first adopters, existing infrastructure (installed-base) to build upon, local organizations that can take the responsibility of being service provider (network operator).

The successful cultivation of such infrastructures requires pooling of resources through the use of the installed-base. Such cultivation processes are dependent on the local specificities and a closer collaboration between these two initiatives would probably not give many benefits. If more focus was on replication of solutions and one uniform standardized infrastructure then the upfront costs would be higher. Further the focus on quick solutions to meet the needs of the first adopters would have lower priority. It would become more expensive to build the infrastructure, and it would take more time. Traditional top-down telecom strategies would be less focused on satisfying the specific needs of the early adopters and rather plan for the masses of regular users. This implies that it would take more time before users would use the infrastructure and generate income to those building it.

If there had been no local initiative then it would have taken much longer to get broadband access in these communities, with the risk of companies locating other places and losing job opportunities. Other initiatives in a different setting will face many of the same issues, at the same time as there will be differences. Also the farmer takes local conditions into account when considering what to grow in different places. The same goes for the “farmer” who cultivates locally initiated broadband access.

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