

FORTH VALLEY & LOMOND LEADER
COMMUNITY STUDY TOUR TO SWEDEN

30TH AUGUST – 2ND SEPTEMBER 2011

FINAL REPORT



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Supplementary referenced material: Delegate Briefing Pack and IT Norrbotten brochure.

1. Executive Summary

The Study Tour was designed as a market education initiative – raising awareness of the potential benefits and the deployment challenges for high quality local broadband access networks.

Under the auspices of the Forth Valley & Lomond LEADER initiative and with additional support funding from DCMS, a group of 10 delegates from Stirling and nearby rural areas undertook an intensive 3-day visit to local access networks in Sweden and met with broadband deployment experts, local network operators, systems providers, health service practitioners and civic leaders.

This report summarises the Study Tour, captures the key points of learning and records individual delegate experiences. The report concludes with a summary of key issues that will be the focus for further work within Forth Valley and Lomond (FVL) communities.

A separate 20-minute video captures some highlights of the Study Tour and is available on-line.

On behalf of the delegates, the Study Tour leaders, Marit Hendriks and David Brunnen (Groupe Intellex), express their deep appreciation for the generosity and goodwill of our many hosts in Sweden and particularly for their openness in answering the very many questions raised by delegates.

2. Background and Objectives

The aims of the study visit, (as described in the invitation to tender issued by FVL LEADER) were:

To explore how communities, charities, enterprises and public sector bodies in a leading NGA/NGB European nation make use of superfast broadband and:

- To meet with and learn from others about how local NGA has been established.
- To understand the business cases that have been used to establish local NGA networks.
- To understand the enabling environment provided by regulators and various layers of government to assist the establishment of NGA.
- To experience NGB in action in a number of locations and to learn about how NGB can be used to deliver improved and more efficient rural goods and services.
- To return with a high quality overview and experience of all of the component parts of well functioning NGA /NGB networks including demand generation.

To create a body of knowledge and practical examples in a mixture of video and written report formats that can assist participants, and be shared with those that do not go on the study visit, to take action and put together feasible business cases in the FVL LEADER rural area.

Groupe Intellex responded to FVL's requirements with the itinerary given in Section 4 plus a preparatory briefing for all delegates and a proposed de-brief meeting following acceptance of this report.

Sweden ranks in second place, also unchanged from 2008. It displays very high performance on all three sub-indices. With 90 per cent of the population using the Internet, Sweden is among the top five countries online, along with Iceland, Norway, the Netherlands and Luxembourg. Moreover, the country is among the world's top ten in commercial fibre-to-the-home (FTTH) penetration.¹⁰ Such extensive fibre deployments have been achieved through a successful public-private strategy that has involved both private operators and local authorities.¹¹ Mobile-broadband penetration is among the highest in the world (after the Republic of Korea and Japan). Recent data show that in Sweden there are now almost as many mobile-broadband subscriptions as fixed-broadband, and that mobile data traffic continues to grow strongly, with an increase of just over 90 per cent in the last year.¹² This indicates that mobile-broadband uptake and usage is matching that of fixed broadband.

The selection of Sweden for the Study Tour was based on research in 2010 and an exploratory 'pathfinder' visit in February 2011.¹

Sweden's leading position in the development of high quality broadband access has since been validated by the recently published ITU Report, '*Measuring the Information Society*'.² (See inset)

The overall result placed Sweden second only to South Korea and this position was consistently reflected in many sub-sets of this multi-factor analysis.

The ITU analysis also demonstrates that mobile broadband and local access fibre networks are complimentary and, as noted elsewhere, may be regarded as inter-dependent.³

3. Delegates

FVL LEADER selected delegates for the Study Tour with guidance from Groupe Intellex.

The overall aim was to include representation from public and private sector interests and from community leaders.

The delegates were:

Angus Annan – Chair, Logie Community Council

Sue Dow – General Manager, National Health Service, Falkirk and Forth Valley

Sandy Frickleton – Economic Development Department, Stirling Council

George Johnson – Callander Enterprise and local community Councilor

Anne-Michelle Ketteridge – Forth Valley & Lomond LEADER

Rebecca Maxwell – Assistant Chief Executive, Stirling Council

Tony Mouldsdale – Stirling Business Panel and director of a local company

Stephen O’Keefe – Technology and Broadband advisor, Callander Enterprise

Peter Sunderland – Chair, Forth Valley & Lomond LEADER LAG

Tony Teasdale – Director, Rural Stirling Housing Association



4. Itinerary

Day 1 - Tuesday 30 August:

Outbound flight (Edinburgh to Stockholm – Norwegian flight DY4464)

11:20 Depart Edinburgh

14:35 Arrive Arlanda, Stockholm – Marit Hendriks and David Brunnen will meet delegates

15:15 Train to Stockholm central station

16:00 Meeting Mikael Ek - Managing Director Svenska Stadsnättsföreningen - Swedish Urban Networks Association.⁴

17:30 Check in Scandic Sergel Plaza hotel.

19:30 Dinner at Fem Små Hus in Gamla Stam. Dinner guests:

Crister Mattson, Senior Adviser at Acreo AB⁵ and Director at Sweden Broadband Alliance,

Anders Flodin, Business Development Director, Digpro⁶

Anders Rockström, KTH Royal Institute of Technology – Centre for Sustainable Communications⁷

Day 2 - Wednesday 31 August:

06.45 Depart hotel - short walk to Central Station for train to Arlanda

09:05 Depart Arlanda, Stockholm (flight SK006 SAS)

10.20 Arrive Luleå

11.00 Visit Lunet - Tomas Sundström CEO Lunet⁸

12:15 Lunet fibre deployment in action

13:00 Lunch in Kyrkbyn (UNESCO World Heritage Site) hosted by ITN Norrbotten and Lunet

14.30 Local hospital - Sunderby Sjukhus - visit for practical demonstration of the network by Maria Lindberg and presentation by Anne-Mari Angeria Marketing Manager IT Norrbotten.⁹

17:30 Check-in Comfort hotel Luleå and free time

19:00 Dinner hosted by ITN Norrbotten and Lunet with guest Yvonne Stålnacke, Mayor of municipality of Luleå, plus briefing for the following day's itinerary

Day 3: - Thursday 1 September

08:00 Leave hotel for airport

09:55 Depart Luleå (flight SK005 SAS)

11:15 Arrive Arlanda, Stockholm

12:22 Rail to Linköping (SJ, Regional, train 269)

14:42 Arrive Linköping

15:30 Visit Utsikt network.¹⁰ Presentation by Iain Perry and Jorgen Svardth CEO Utsikt

17:00 Presentation by Henrik Halvorsen - VP Sales, NETadmin¹¹ at Scandic Hotel and evening dinner hosted by NETadmin with guest Ann-Cathrine Hjerdt, Mayor of Linköping.

20.50 Leave hotel

21:15 Bus to Skavsta airport

22:45 Arrive hotel (Connect hotel, Skavsta)

Day 4 – Friday 2 September

09:00 Breakfast debrief and evaluation

11:25 Return flight to Edinburgh (Ryanair flight FR6635)

12:35 Arrive Edinburgh

5. Observations

5.1 Preparatory Briefing

All delegates met for a preparatory briefing at Stirling on 10th August. The discussion provided the Study Tour organisers with insights into delegate backgrounds and an initial view of the topics that would be of greatest interest.

This preparatory process enabled adjustments to be made to the outline itinerary. Additional guests were added to the dinner meetings and the participation of two local mayors was secured through the good offices of our hosts in Sweden.

Delegates articulated a general concern that complex technological issues might dominate the study tour. To address this issue, all delegates were provided with links to plain-English business guides/handbooks prepared by the FTTH (Fibre to the Home) Council Europe and INCA. These materials were additional to the editorial linkages provided in the advance delegate briefing pack and further background information was supplied to all hosts/speakers in Sweden.

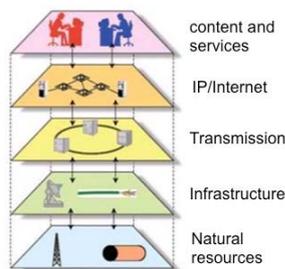
5.2 Swedish Urban Networks Association

On arrival in Stockholm the group met Mikael Ek, Managing Director Svenska Stadsnätöföreningen. His association has 274 members and includes network operators, suppliers, municipalities and other stakeholders.

His presentation provided an overview of the Swedish broadband scene with around 50% of national coverage provided by local urban networks. Municipalities own 85% of these urban fibre access networks – often in conjunction with other local utilities. Across the whole of Sweden, fibre access now accounts for 26%, CableTV 20%, and DSL broadband usage (provided mainly by the former incumbent operator Telia) and has declined to 53% of all broadband connections.

The value chain - divided into five levels

- Competition in a Infrastructure perspective
- Competition in a customer service perspective
- Open networks



Mikael explained the essential details of 'Open Access'¹² designs. He outlined the variety of network models – from full vertical integration through to various degrees of separation for the provision of passive and active infrastructure elements.

He also described the need for flexibilities in provision of services, the choices for operators between offering dark fibre¹³, active access and retail/wholesale service variants.

Source of the picture: PTS

The impact of these Open Access designs is seen in the flourishing competition within the Services/Applications sector. Sweden, with a national population approximately equal only to that of the Greater London area, broadly matches the entire UK in the number of ISPs.

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This proportionally higher level of ISPs in Sweden features fewer national but many more local or regional service providers relative to the UK. In discussion of user needs Mikael Ek pointed out that households often require multiple concurrent connectivity to different services – and broadband capacity needs to reflect the full range of current and future applications including 3D TV streams.

The extent to which older people have embraced high quality broadband can, Mikael Ek explained, be attributed to two factors – the clear enhancement of their property's value and their desire to ensure that grandchildren continue to visit! More generally the enhancement of property values was widely quoted throughout the study tour as justification for upfront 'connection charges' of around £2000 per property.

In this presentation it became clear that a wide variety of business models had developed – and that this diversity had led to the creation within Sweden of management systems with sufficient flexibility to enable different business models together with a wide range of specialist ventures now increasingly focused on export markets.

An additional feature arising from the diversity of local systems had been the creation of a market place for automated trading of dark fibre. This is of particular value to nationwide and international enterprises and telecoms carriers needing to network between many locations with consistent connectivity standards and assured service levels. We also discussed the benefits of dark fibre trading for the mobile sector in the context of deployment of new technologies demanding larger numbers of cell sites.

On behalf of its members the Swedish Urban Networks Association also manages a strong and positive relationship with the national regulatory body, PTS. It became clear in discussion that PTS sees its role in delivery of national broadband policy as an economic growth and societal imperative. PTS drives, for example, considerable efforts to ensure that local operators and municipalities take full advantage of European funding and assists in the preparation of funding applications.

Finally we were given a brief overview of the regulatory/competitive tensions that can arise between local network operators and former incumbents – a topic which would be discussed further during the visit to Luleå.

Learning points:

- **Customer choice and diversity of business models** arising from clear separation of Access and Services.
- **Market maturity** – evidenced by the number of local access networks and emergence of systems and trading platforms.
- **The critical role of the regulator** in encouraging broadband-enabled economic growth as part of government policy.

5.3 Dinner – at Fem Små Hus, Gamla Stan

The group met for dinner in Stockholm's old town with a pre-dinner address by Crister Mattson of ACREO – a research organization. Also present were Anders Flodin of Digpro – a venture specializing in digital mapping of network assets – and Anders Rockström from the Centre for Sustainable Communications at KTH Royal Institute of Technology. The guests circulated during the event to ensure that all delegates were able to explore a range of topics.

Crister Mattson described his current work – a report delivered that day to the Swedish government on the societal and community benefits of broadband. This report is a follow-up to

an earlier substantive work on the national economic growth benefits of broadband infrastructure investment. The new report is not yet in the public domain (awaiting approval) but may be expected to become available in English translation within the next two months.

A key focus of the new report is an assessment of '*un-captured values*' – i.e. the values of broadband investment that are not simply or conveniently accounted for in terms of Telecoms sector revenues and market shares.¹¹⁴

Delegates were left in no doubt about the financial viability of high quality local access networks and our other guests added further information on the use of wireless in extreme rural environments and the value of digital mapping as a vital part of deployment planning and operations.

Learning points:

- '**Un-captured values**' – the need to understand the wider economic and societal benefits and to ensure that these are articulated in seeking public sector funding.
- **Risk-reduction** - the value of good planning and operational standards – including collaboration with other utilities and road/rail construction
- **Knowledge Sharing** - the ready availability of advice from those who went through these learning curves several years ago.

5.4 Lunet – the local access network in Luleå

In Luleå in northern Sweden the group first visited the local Lunet operation to meet CEO Tomas Sundström and Product Development Manager, Roger Åström.

Economical facts 2010

- Revenue 4 660 000 €
- Income before taxes 750 000 €
- Investments 2010 1 120 000 €
- Profit margin 18,3 %
- Solidity 62,5 %
- ROC 4,7 %
- Total investments in tangible fixed assets 1998-2010 29 300 000 €
 - ✓ There of 2 700 000 € representing government, EU and municipal funding.
 - All funding used for expansion in rural areas (villages).



Lunet originated in 1997 as a subsidiary of the municipal-owned energy distribution company Luleå Energi AB.

In 2007 it transitioned to a 50/50 joint venture between the energy company and the municipality's housing organization, Lulebo AB.

Lunet operates on a strictly commercial basis and currently provides a return on capital of 6.5% slightly higher than the 2010 value of 4.7%



Located at the northern end of the Gulf of Bothnia, the environment features extreme winter conditions – forcing a seasonal pattern to fibre deployment. The network now reaches all of Luleå's districts and 35 of the surrounding villages within the municipality.

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A key feature of the Lunet business model is an intense focus on their local identity as a point of differentiation from the former incumbent operators. This local branding is reinforced in all aspects of customer service and in community engagement techniques to reduce investment risk.

As the network is extended to outlying areas, Lunet seeks local champions who can identify the benefits of fibre and coordinate demand amongst small communities. This process for demand stimulation is an essential part of investment risk reduction – avoiding the perils of low take-up rates after committing to costly infrastructure deployment.

The Lunet network model requires absolute separation of the Access business from the provision of higher and competitive level of Services provision. Lunet offers Passive (dark fibre) and Active connectivity for which customers pay an initial charge related to local deployment costs and a relatively small monthly fee related to their choice of capacity. Customers additionally pay Service Providers directly – with a wide range of competing options for Telephony, Internet and TV.

The conventional Active network provision allows for Services operating at 100Mb/s (both upload and download) but all new provision allows for the use of future 1Gb/s services when these become available.

In those parts of the area where fibre is not yet available, Lunet provides connectivity via DSL over copper unbundled by the former incumbent Telco's. The dark fibre business (primarily for business customers, mobile operators and other service providers) is a significant revenue and profit contributor but has also been instrumental in lowering overall enterprise costs and making the area attractive for inward investment and start-up companies.

The provision of symmetric services has resulted in a noticeable change in traffic patterns – in aggregate the area generates more data traffic than it receives.

The development of the FTTH network, its gradual extension to outlying areas and the levels of investment from EU funds were discussed in depth. Lunet has recently been the focus of an 18-month investigation by the Swedish competition authorities - triggered by former incumbent complaints. The process has concluded with a clean bill of health and dismissal of the complaint but has usefully identified a few areas where more detailed cost accounting is recommended.

The challenges of capital investment were explored by the study group with recognition that whilst the passive infrastructure – ducts and fibre in the ground - may be expected to have a considerable life (well in excess of, say, 30 years) the active equipment needs to be refreshed at intervals of around 5-7 years. Incremental network deployment (now spread over more than 10 years) is leading towards a 'rocky' re-investment programme that must be anticipated in the business model.

Following the presentation at Lunet's offices the study group moved to an outlying area where fibre deployment was underway. The group observed a fibre blowing operation and discussed the challenges of digging and fibre-laying techniques where extreme winter conditions cause shifts in soil levels and strain on ducts and cables.

Learning Points:

- **Local Identity and Community Engagement/Leadership** – the value of being local, encouraging community involvement in deployment plans and development of locally relevant applications services.

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- **Open Access and competitive positioning** – the significance and benefits of openness and clarity in accounting practices to demonstrate market fairness and customer choice of Services.
- **Symmetry** – the benefits of symmetric (upload/download parity) for future services development and the innovation impacts derived from user-generated content particularly for very small businesses.

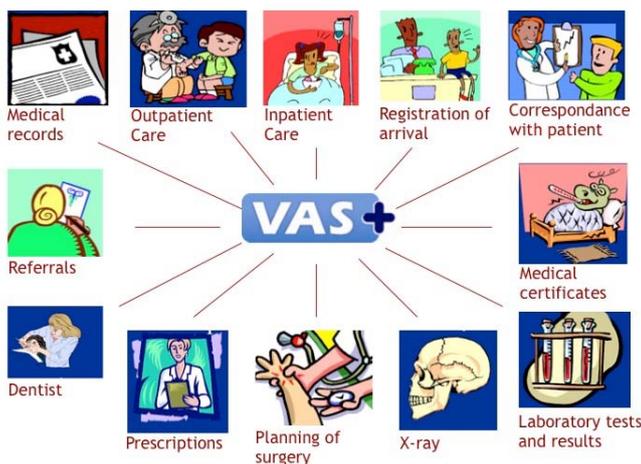
5.5 IT Norrbotten and Sunderby Sjukhus

Following a lunch hosted by Lunet and IT Norrbotten, the group moved to the local hospital for presentations covering eHealth applications and the regional public services network.

Norrbotten County covers the northern part of Sweden and straddles the Arctic Circle. From a health perspective the area includes 5 hospitals, 33 healthcare centres and 34 dental clinics. The Health services employ around 7000 employees serving a population of just over 250,000. The area is vast – 25% of the land area but on 2.8% of the population.

A presentation by a consultant dermatologist culminated in a live demonstration of remote consultation. The practice of involving local GPs in specialist consultations via video-conferencing was originally intended to reduce appointment waiting times, travel costs and overnight hospitalization – particularly in the winter months when road conditions are severe.

The video equipment supplied to GPs includes flexible camera equipment to enable close inspection of affected areas. The GPs network connections are wholly within the secure health domain – a secure virtual private network within the much larger IT Norrbotten Public Service Network. An unexpected but significant benefit of this change in clinical practice was that GP's are now directly involved alongside the patient in learning more of the specialist consultant's work and approach.



Study group delegates were impressed by the clarity of imaging within the current system and the prospect of future 3D TV developments that are expected to add further value to remote diagnosis and treatment.

The discussion covered additional benefits in medical training, surgical mentoring and access to very distant specialists for rare conditions.

The availability of the core network had enabled the development of a comprehensive system covering all

aspects of health and social care.

Moving on to a wider discussion of IT Norrbotten Maria Lindberg and Anne-Mari Angeria discussed the broader eHealth, Education and Administrative benefits of the network.

Examples included the provision of specialist minority language classes for children (satisfying the citizen right for mother tongue tuition), the ability to connect mobile clinics (e.g. for breast cancer screening) in remote settlements, and the administrative savings derived from reduction of travel between local municipal offices. From a social services perspective the example given showed the convenience of family conferences to agree care plans for elderly relatives.

The IT Norrbotten backbone network has additionally played a significant role in the development of local access networks and enterprise. IT Norrbotten is an active member of the dark fibre trading platform coordinated in Stockholm by the Swedish Urban Networks Association.

Learning points:

- **Public Service Networks** – envisioned as serving *all* parts of the public sector and not fragmented into silo's for education, health etc.
- **Practice Development** – the challenges of encouraging professionals to adopt new methods of working.
- **Forward Planning** – the need to specify network provisioning to allow for uncertain future needs.

Dinner, hosted by Lunet and IT Norrbotten, included discussion with Lulea's mayor, Yvonne Stålnacke. Yvonne's role as Chair of the municipal-owned IT Norrbotten venture illustrated the very close and beneficial links across the public and private sectors.

5.6 The Utsikt Bredband Network

Relocating from the far north to southern part of central Sweden, the group travelled by air and rail to Linköping, 200km south west of Stockholm. The local Utsikt network is a subsidiary of a large municipality-owned multi-utility, Tekniska Verken AB.

The CEO, Jörgen Svärth, and business development manager, Iain Perry, explained the evolution of the business over the past 16 years and the context of city-owned utilities for energy distribution, water, waste disposal, district heating and biogas fuel production. Local Mayor, Anne-Cathrine Hjerdt, later explored this municipal enterprise context in greater depth.



The Utsikt business differs from networks previously discussed partly in its origins as a 'dark fibre' provider for business customers and for its more complete packaging of broadband access and services for household consumers whilst not in any way restricting their choice of service providers.

The single invoice presented to consumers includes the Service Provider's charges and the Utsikt network gains a 'wholesale' fee for Service Providers' use of the network.

The provision of dark fibre links for business and public sector users remains a significant and profitable part of the business. Utsikt also provides a high quality broadband network for use by over 7000 university students – with special arrangements for service provision to this transient population.

Another key feature of the Utsikt deployment plan is found in joint collaboration with property owners. The Utsikt deployment team often arrange for customers to complete the installation of the final fibre link into premises - i.e. the last 50 or 100 metres although sometimes longer – with a complete package of support, training and materials.

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Within this collaborative package Utsikt ensures that standards are met. The fibre remains the property of Utsikt but the property owners may, for example in large estate developments, negotiate reduced connection fees to reflect their 'in-kind' contribution. This process speeds up deployment, further reduces investment risk and bolsters customer commitment/take-up. The property owners (particularly housing associations for multi-apartment buildings) also deal with internal network distribution.

Given that the 'civil' costs of laying fibre cable are estimated to be around 70-80% of overall deployment costs, these 'in-kind' contributions are a key part of the community engagement plan but it does, of course, depend on a network design that enables local fibre interconnection to the local neighbourhood hub – a condition that does not currently apply in the UK where BT's 'fibre to the cabinet' model is designed to use copper connectivity for the 'first mile' link from the premises.

As an example of the network's inherent flexibility the 'LAN-Party' concept was explained. A householder or venue manager (e.g. a community hall) normally using, say, a 10Mb/s fibre access could request at any time a short-term capacity expansion to 100Mb/s for the duration of a special event such as a 'multi-player gaming party', local sports, conferences or a family occasion requiring video streaming. Such requests are easily facilitated by the customer service desk via the network management software and are typically satisfied within 15 minutes without any requirement for any physical technical support.

The group toured the Utsikt Network Operations Centre – noting the cost efficiencies of integration with other utilities and the remarkably low level of operational staffing required in this highly automated low-maintenance design. The group also saw a demonstration of high definition IPTV – an increasingly popular TV solution for broadband customers that offers potential for innovative local/community programming ventures.

Learning Points:

- **Local Leadership and Collaborative Deployment** – the value of engaging with property owners for fibre installation work
- **Business users as foundation** for network development – the early deployment of dark fibre as a product offering to local businesses provides stronger revenues and profits to sustain the less profitable household/consumer sector.
- **Utility Integration** – the advantages of seeing high quality broadband as a basic utility (requiring many of the same deployment and operational skills) and working closely with these public services.

5.7 Linköping – a presentation by the city's mayor, Anne-Cathrine Hjerdt.

Anne-Cathrine gave an overview of this thriving city with a population of nearly 150,000 and over 7,000 university students.



City's approach to broadband expansion

- The municipality works actively with broadband providers to stimulate and encourage further broadband expansion
- IT infrastructure is a mandatory part of the municipality's plan and construction process
- Market forces shall prevail in densely populated areas, but in sparsely populated areas municipality actions are needed
- Openness and diversity is a fundamental requirement when the municipality finance the construction of (fibre) broadband networks

In a rapidly expanding environment (700 new businesses last year) and with a relatively young population, the mayor explained how the municipal utility enterprises were key to growth, lower taxes, administrative efficiency and the development of many innovative high-tech ventures.

Broadband was, of course, just one of many municipal ventures but is considered as vital to both economic growth and societal development.

The success of the municipal Utsikt venture had led to commendation by the regulator PTS (Swedish equivalent of Ofcom) as a fine example of how cities can take action to give households and businesses access to high quality broadband.

The group discussed the similarities and differences between Linköping and the Stirling/FVL area. It was noted that the city was focused on ensuring that surrounding rural areas were also provided with the same access capabilities as the city centre and business parks.

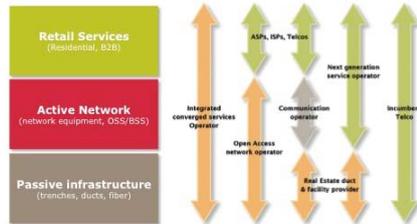
Learning Points:

- **Municipal Enterprise** – the value (both in fiscal and environmental gains) of coordinated utility operations.
- **Economic Growth** – high quality broadband access is seen as an engine for innovative enterprises and the smooth running of the community.
- **Regulatory encouragement** – the value of support from PTS in facilitating EU grants and in encouraging broadband priorities in the local (and national) policy agenda.

5.8 NETadmin Systems – Presentation by Henrik Halvorsen – VP Sales

NETadmin's, Henrik Halvorsen - a frequent visitor to the UK and a regular speaker at NextGen Events, gave the final presentation of the Study Tour.

NETadmin | Support for multiple business models



Henrik illustrated how the economic viability and sustainability of local network operations was dependent on first-rate fully automated processes to deal with the complex mix of customers' and Service Providers' requirements alongside the technical challenges of network deployment and operations.

In essence the NETadmin management design enables full and convenient customer choice (for

example fully automated switching between services) and also matches the network capabilities to the complex technical protocols specified by Service Providers.

The NETadmin designs are also central to delivering a wide variety of business models adapted to local requirements and regulatory policies. This inbuilt flexibility required clear design insight and an understanding of the challenges facing new market entrants. The systems, as developed, reflect the experience gained from more than a decade of advanced broadband development in Sweden.

It is significant that Sweden's advanced position in the deployment of high quality broadband networks has led to the development of specialist expertise across many disciplines – and NETadmin represents an example of the international export potential of this sectorial growth.

The study group thoroughly appreciated this concluding presentation as it explained how much of what they had seen during the tour was attributable to first class operational management design – a theme that was not confined to the broadband experience.

Learning Points:

- **Choices and Options:** there is no 'one-size-fits-all' solution to rural and urban broadband requirements, and network operators as well as customers benefit from the design choices now readily available.
- **Wider benefits:** the growth of new business ventures (across all sectors) stimulated by these network challenges should not be under-estimated. This is evident not only in broadband network ventures such as NETadmin but can also be seen in many small and micro businesses operating in rural locations and re-purposed farm buildings. These ventures remind us of the 'un-captured values' described by Crister Mattson at the start of the Study Tour.
- **No need to re-invent:** whilst the challenges for rural and urban Scotland may seem to be significant, the expertise now readily available can be utilized to (a) dispel investor fears of complexity and (b) fast-track new local operations to success.

5.9 Departure Debrief

The Study Group travelled back to Skavsta airport for their final night in Sweden and this afforded time for a group discussion at the hotel after breakfast and before transitioning to the departure area. Delegates completed evaluation forms, discussed their impressions of the study tour and raised questions reflecting their specific interests.

- Some delegates would have appreciated a higher technical content during the tour and others would have wished for more detailed analysis of the economics of network operations – particularly in the treatment of additional capital requirements for renewal of active equipment.
- Additional detail on usage patterns – answering the questions about needs that justify the capacity provision – would have been helpful but most delegates agreed that future-proofing the access network was a fundamental step towards enabling new, as yet unforeseen, applications.
- Not all delegates had sufficient time to fully absorb the documentation and linked materials provided in advance of the visit.
- Delegates also suggested that inclusion of visits to households and very small communities would have added useful information.
- All delegates found the tour to be inspirational and ‘an eye-opener’ – and few were concerned that the specific culture of Swedish community life did not map directly onto the prevailing Scottish environment.
- Several delegates commented on the significance of local municipal leadership, the importance of public-private partnerships and the need to engage directly with communities.
- The disconnects in the UK between Health and Social Services provision were understood not to be such a challenge in Sweden with greater municipal involvement in health provision. Similarly the need to make better use of public service networks and to seek greater integration of Intranets to provide a critical mass case for investment of the scale seen in Northern Sweden was seen by some as a priority for Scotland
- Delegates also identified the need for broader awareness amongst communities in respect of UK broadband plans – particularly those planned by the incumbents but also those sponsored by local groups.
- Delegates had struggled to understand the critical role of dark fibre provision (mainly for larger business users) in enabling network expansion to households. This point taken with the ongoing (and ‘innovation inhibiting’) debate about ‘how much capacity is really needed’ and the clear distinction between well-planned Swedish cohesiveness and the UK market regulatory fragmentation, reminded delegates that there are many layers of detail that need to be ‘peeled back’ to gain a fuller understanding.
- Some delegates had found the pace of the tour (and the amount of travelling) challenging but all agreed that it had been a thoroughly worthwhile experience.

From an organisational viewpoint the delegates were thanked by the study tour leaders for the enthusiasm with which they had asked questions at every turn – and it was reported that the host organisations, speakers and guests had been impressed with the engagement of the study group, even though at times ‘it had wrecked the flow of their presentations’!

6 Summary

For all delegates, the experience of this study tour has probably raised more questions than answers – but that is the nature of discovery.

Some of these questions are concerned with the fundamental policy direction and purpose of local government – particularly in the area of municipal enterprise – and the critical role of the regulator in delivering government policy.

Other questions concern the cause and effect of community cohesion and collaborative endeavor – and how these might best be addressed in the Scottish context.

And yet further questions at a more-detailed technical and commercial level indicate the discovery of opportunities (for example in ‘dark fibre’ trading) that might previously have not been considered.

For reference a summary of the topics raised *prior* to the Study Tour is included in the Delegate Briefing Pack and the ‘Learning Points’ from each part of the Study Tour are reproduced below.

A 20 minute video summary – capturing just a few moments from this intensive experience can be found at: <http://www.youtube.com/watch?v=N7k8gU377oM>

The following PowerPoint presentations are available on email request to: StudyTours@Groupe-intellex.com

Swedish Urban Networks Association
Lunet – the local network in Luleå
IT Norrbotten and its Health Services
Utsikt – the local network in Linköping
Linköping Municipality
NETadmin Systems AB

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Learning Points:

(Listed in order of appearance)

- **Customer choice and diversity of business models** arising from clear separation of Access and Services.
- **Market maturity** – evidenced by the number of local access networks and emergence of systems and trading platforms.
- **The critical role of the regulator** in encouraging broadband-enabled economic growth as part of government policy.
- **'Un-captured values'** – the need to understand the wider economic and societal benefits and to ensure that these are articulated in seeking public sector funding.
- **Risk-reduction** - the value of good planning and operational standards – including collaboration with other utilities and road/rail construction
- **Knowledge Sharing** - the ready availability of advice from those who went through these learning curves several years ago.
- **Local Identity and Community Engagement/Leadership** – the value of being local, encouraging community involvement in deployment plans and development of locally relevant applications services.
- **Open Access and competitive positioning** – the significance and benefits of openness and clarity in accounting practices to demonstrate market fairness and customer choice of Services.
- **Symmetry** – the benefits of symmetric (upload/download parity) for future services development and the innovation impacts derived from user-generated content particularly for very small businesses.
- **Public Service Networks** – envisioned as serving *all* parts of the public sector and not fragmented into silo's for education, health etc.
- **Practice Development** – the challenges of encouraging professionals to adopt new methods of working.
- **Forward Planning** – the need to specify network provisioning to allow for uncertain future needs.
- **Local Leadership and Collaborative Deployment** – the value of engaging with property owners for fibre installation work
- **Business users as foundation** for network development – the early deployment of 'dark fibre' as a product offering to local businesses provides stronger revenues and profits to sustain the less profitable household/consumer sector.
- **Utility Integration** – the advantages of seeing high quality broadband as a basic utility (requiring many of the same deployment and operational skills) and working closely with these public services.
- **Municipal Enterprise** – the value (both in fiscal and environmental gains) of coordinated utility operations.

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- **Economic Growth** – high quality broadband access is seen as an engine for innovative enterprises and the smooth running of the community.
- **Regulatory encouragement** – the value of support from PTS in facilitating EU grant applications and in encouraging broadband priorities in the local (and national) policy agenda.
- **Choices and Options:** there is no ‘one-size-fits-all’ solution to rural and urban broadband requirements, and network operators as well as customers benefit from the design choices now readily available.
- **Wider benefits:** the growth of new ventures stimulated by these network challenges should not be under-estimated. This is evident in close-coupled ventures such as NETadmin but can also be seen in many small and micro businesses operating in rural locations and re-purposed farm buildings. These ventures remind us of the ‘un-captured values’ described by Crister Mattson at the start of the Study Tour.
- **No need to re-invent:** whilst the challenges for rural and urban Scotland may seem to be significant, the expertise now readily available can be utilized to (a) dispel investor fears of complexity and (b) fast-track new local operations to success.

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http://www.tekniskaverken.se/om_oss/in_english/
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<http://www.netadminsistemas.com/>
- ¹² **‘Open Access’:**
A term describing local networks where Access and Services are regarded separately – with any Access customer able to make concurrent use of any combination of Services provided by competing Service Providers. In these networks the selection of services (and changes from one provider to another) are usually fully automated processes driven by the customer.
- ¹³ **‘Dark Fibre’:**
A reference to the provision of unlit fibre that enables businesses and network providers to provide their own service designs – for example when a bank or major retailer requires consistent network service standards across all branches. The ready availability of ‘dark fibre’ is a significant contributor to service innovation and has provided many Swedish enterprises with increased flexibility at much lower cost than hitherto.
- ¹⁴ **‘Uncaptured Values’:**
In recent economic analysis in the USA, Australia and across Europe, these ‘un-captured values’ are sometimes termed ‘externalities’, ‘by-products’ or ‘cross-sector benefits’. Similar analysis is frequently used to support infrastructure investment in rail transport networks.