Value for Money and Policy Review of the Metropolitan Area Networks (Phase 1)

Department of Communications, Energy and Natural Resources
Roinn Cumarsáide, Fuinnimh agus Acmhainní Nádúrtha

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Table of Contents

Executive Summary

This is a Value for Money and Policy Review (VFMPR) of Phase 1 of the Metropolitan Area Networks (or MANs) programme. This programme was rolled out by the Department of Communications, Energy and Natural Resources in the period 2003-2005. In short, MANs are loops of fibre optic cable located within cities and towns, designed to link local access networks (or the 'local loops') to national telecommunications networks.

The review covers the 27 MANs built in Phases 1 and 1A. This programme was completed by 2005 at an expense of €78m (Central Exchequer funds). In particular, the review closely examines the MANs built in Cork, Galway, Athlone, Tullamore, Mullingar and Ballina. These were chosen as exemplars of MANs of different sizes in order to provide a more detailed perspective on the operation of various MANs.

This review was begun in September 2006, and formed part of the Department of Communications, Energy and Natural Resources 2004-2008 Scheme of Reviews. It was coordinated by a Steering Group chaired by Ms Úna Nic Giolla Choille (PO).

Terms of Reference

Draft Terms of Reference were drawn up using the revised template circulated by the Expenditure Review Central Steering Committee (ERCSC) in July 2003, and approved by the Departmental Steering Group. These finalised terms of reference (TOR) are set out below.

This review will;

1. Identify the objective(s), (original and revised) of the MANs programme (Phase I) funded through the Department of Communications, Energy and Natural Resources,

2. Examine the current validity of those objectives in the light of developments/trends since 2002 and their compatibility with the overall strategy of the Department of Communications, Energy and Natural Resources,

3. Identify the level and trend of costs and staffing resources associated with each programmes and thus comment on the efficiency with which it has achieved its objectives,

4. Examine the extent to which each programme's objectives have been achieved, and comment on the effectiveness with which they have been achieved,

5. Define the outputs associated with each programme activity and identify the level and trend of those outputs,

6. Evaluate the degree to which the objectives warrant the allocation of public funding on a current and ongoing basis and examine the scope for alternative policy or organisational approaches to achieve these objectives on a more efficient and/or effective basis,

7. Specify potential future performance indicators that might be used to better monitor the performance of MANs programmes. Also to assess whether or not the indicators currently being measured sufficiently measure the effectiveness of the programme,

8. Make recommendations in relation to efficiency, effectiveness and value for money insofar as the MANs programme is concerned.

Scope of the Review

The review also sought to establish the following items of information:

1. Whether the programme was delivered on time and on budget,

2. The levels of use of each MAN,
3. The characteristics of towns that make some more "attractive" for take-up,
4. The cost, per population coverage and per corporate customer. In addition the resources and costs incurred by the Department and local authorities will be considered,
5. The impact of the scheme on competition in the broadband market and the degree to which government intervention was justified,
6. Suggested amendments, if any, to the scheme.

Findings

The review found that the MANs programme made a significant but not unqualified contribution to the development of telecommunications infrastructure in Ireland at a time when there was an identified market failure on the part of telecommunications operators regarding investment in network assets. The immediate take up on the MANs, the uses to which they are being put and the impetus provided to competition in the sector shows the justification for and the value of the State intervention. Moreover, while regulatory developments were critical in and of themselves in this process, the MANs facilitated and enabled many of these regulatory decisions, and provided a critical open access route for competitors to gain access to local markets.

Importantly also, the IDA are unequivocal in their view that the MANs have provided their client customers with much greater choice, service and better prices when it comes to broadband (and telephony) connectivity. On that basis, the MANs have contributed significantly to the competitiveness of regional centres in Ireland and thus their attractiveness to international foreign direct investment, both new and existing. The networks continue to experience growth in use, and have been found to result in significant cost saving to operators, and to have introduced an important degree of competition in the market.

However, this review also finds that the MANs intervention seems less suited to smaller urban centres, whether defined either in terms of outright population or in terms of the level of economic activity. For example, 5 of the phase 1 MANs, located among the smallest of the towns selected, are without a client. The reasons for this seem to revolve around the fact that there is a significant cost to operators to connect

to the MAN and, without a critical mass of population, operators tend to choose not to use the MAN. This does not mean that residential broadband services are not available in these centres. In all cases, such services are now available by means of alternative technologies. Nor does it mean that broadband investment, including MANs are never justified in these locations (see below).

In that context, the ongoing rollout of Phase 2 MANs, mainly in smaller towns (often less than the 9,000 population threshold figure identified in the review) is called into question. This review recommends that the rollout of MANs in those towns for which Phase 2 MANs are planned but which have not yet started work (or have not yet entered legally binding contracts), should be halted pending a formal case by case evaluation. This evaluation should be conducted on the basis of the Capital Appraisal Guidelines from the Department of Finance, and include either a Multi Criterion Analysis or Cost Benefit Analysis, and set out Key Performance Indicators for any future projects. From this evaluation of Phase 1, suitable indicators include the market need, forecast vs actual development cost, forecast vs actual infrastructure delivered, operating costs and revenues, numbers of contract customers on the MAN, and ideally, the effect on the price of connectivity in the given centre. It should also take into account the National Broadband Scheme and the choice of the most appropriate technological solution.

From the development agencies' perspectives, the towns for priority investment are those identified in the National Spatial Strategy (NSS) and the key county towns. Of the towns identified in the NSS as Hubs and Gateways, Tralee and Killarney have been included in Phase 2. Of the county capitals, Trim/Navan and Longford are also included. At the completion of Phase 2, five NSS towns will not have had a MAN constructed: Tuam, Ennis, Shannon, Castlebar and Mallow.

While there may not be an immediate economic argument for the provision of a MAN in these towns on the basis of their size now, there is however a longer term argument that providing this investment now will ensure the provision of high quality services and ultimately secure sustainable economic growth in these towns as they achieve a critical mass of population and economic activity in the future. It is also possible that more suitable solutions may be found for those smaller settlements not judged to

have, or be likely to attain, sufficient scale to require a MAN. The rollout of the National Broadband Scheme will ensure that broadband access is available in all parts of the State.

The review also found that the planning and selection process behind the MANs were less than fully comprehensive. While there was a substantial amount of analysis behind the concept (analysis that was borne out by the effectiveness of the MANs in certain circumstances), the selection process used in deciding which town would receive a Phase 1 MAN was not sufficiently thorough. The Review recommends that future projects be subject to the full rigours of the Capital Appraisal Guidelines, and that robust selection criteria are drawn up before beginning the process of selecting the towns.

Recommendations

As discussed above, the MANs programme proved itself to be a cost effective and appropriate way of delivering infrastructure. The technology solution chosen was appropriate, and it made a significant contribution to inducing competition and greater availability of services within the sector. Equally, the programme caused no apparent difficulties or undue distortion with regard to competition in the market. However, analysis conducted for all post project and expenditure reviews should as a matter of course generate recommendations that serve to improve and streamline policy development and programme design. While some of the recommendations made in this case relate specifically to the MANs programme, others apply, in a general sense, to all capital projects or interventions in the market.

1. While the administration of the scheme has been appropriate and cost effective, the prioritisation of urgency, while understandable in the context of the time, over proper planning at the outset has had a number of important consequences for the project. It should be reiterated that it is standard practice for any such intervention to proceed only after the full application of the Capital Appraisal Guidelines, including full needs analysis, options analysis and documented decision, design and planning stages and that these requirements need to be observed in all policy development instances.

2. The lack of appropriate baseline data, and the nature of the selection procedure for the Phase 1, and particularly for the Phase 1A, MANs, meant that a number of inappropriate locations were selected. Future projects in this sector require a more rigorous planning phase before construction can commence.

3. The lack of a formal review after the completion of the first phase of the MANs, and before the inception of the second, meant that some of the difficulties experienced were overlooked. While the situation was difficult, dynamic and pressurised, such a review would have contributed greatly to the later operation of the scheme. In the case of future such iterative schemes, such a review is highly advisable.

4. Despite the timing difficulties, the Gateways and Hubs selected by the NSS should have received greater and more systematic attention from the MANs programme and this should be the case in any future similar intervention in the communications area.

5. It is clear that, even in the case of the towns selected for Phase 1A, the MANs model is not always the optimal solution. Any future such programme should examine all technical options as part of the assessment process.

6. The telecommunications market is significantly more mature at this point (Q3, 2007) than previously, and certainly more so than at the time of the decision being taken to go ahead with the MANs; the MANs intervention model is no longer considered appropriate in all circumstances. A significant argument exists for new MANs in those remaining NSS Gateway and Hub towns that are destined for significant future development. Consideration could also be given to towns of a significant size and level of economic activity, subject to a clear and comprehensive evaluation process, as set out above. The Department should fulfil its legal obligations with respect to Phase 2 towns but not proceed with any towns for which there is no contract in place until such a time as a full evaluation has been carried out.

7. The fact that MANs exist and have considerable spare capacity should not become a driver of future communications policy and the development of associated programmes in and of itself. While it is logical that this investment be leveraged if possible, further investment directed solely at 'making use' of the MANs would not be wise.

8. Measuring the impact or outcomes of the intervention proved to be difficult as the outcomes are a function of a wide range of factors. However, it was further complicated by the fact that there was insufficient data collected at the planning stage against which progress could be monitored. Consequently, for

future projects in this policy area, more attention should be paid to collecting key baseline data at the planning stage of the project.

9. The lack of a coherent pre project assessment also meant that ongoing monitoring of the scheme was very difficult, if not impossible, in a real sense. Any future project in this sector should have a set of clear and transparent Key Performance Indicators set out at its inception to allow for ongoing monitoring of the programme.

10. The lack of pre planning, and interim reviews in relation to the MANs programme were important oversights. However, even if such controls were in place, the Department must have the facility to terminate the programme if the intervention is judged to no longer be required on the basis of a rational analysis, or indeed in the face of more pressing priorities elsewhere in the communications sector. Any future programme should have an open and transparent mechanism by which it can be closed with a minimum of legal and financial implications for the State, even if that involves a mid life termination clause in contracts.

Chapter 1

This chapter sets out the background and the terms of reference to this Value for Money and Policy Review of Phase I of the Metropolitan Area Network (MANs) projects conducted under the auspices of the Department of Communications, Energy and Natural Resources.

1.1 The Department of Communications, Energy and Natural Resources[1]

The Department's mission statement with regard to telecommunications, as set out in the Statement of Strategy, is to "promote the sustainable development, management and regulation of the communications, energy, marine and natural resources sectors in support of national economic and social policy objectives".

The core goal of the Department with regard to Communications is "to contribute to sustained macro-economic growth and competitiveness and to ensure that Ireland is best placed to avail of the emerging opportunities provided by the information and knowledge society, by promoting investment in state-of-art infrastructures, by providing a supportive legislative and regulatory environment, and by developing a leading edge research and development reputation in the information, communications and digital technologies sectors."

The Department has identified four strategic objectives for the communications sector:

- To place Ireland on a competitive par with key comparator OECD economies in terms of key Internet and communications benchmarks, including price, quality and choice.
- To create a legislative framework that provides for strategically focused, competitive and commercially-aware regulation of the communications sector

[1] All future references to 'Department', unless otherwise stated, refer to the sequence of government department with responsibility for communications policy – from the Department of Public Enterprise (1997-2002) through the Department of Communications Marine and Natural Resources (2002-2007) and finally the Department of Communications, Energy and Natural Resources (Oct 2007-).

and a flexible legal environment to meet business and public service requirements.

- Promote increased Information Society inclusion at both the regional and community-based levels.
- To support the creation of a research entity and a vibrant digital media content industry based around DMDL (Digital Media District Ltd).

In the recent past, for a variety of economic and geographical reasons, the market had not delivered the desired levels of investment in the telecommunications sector in an appropriate timeframe and consequently Government intervention was required by means of a series of interventions in the marketplace. This is a Value for Money and Policy Review of one such intervention: Phase 1 of the Metropolitan Area Network programme under the National Development Plan 2000-2006. This programme was funded via the E-Commerce and Communications measure of the Regional Operational Programme of the National Development Plan.

Metropolitan Area Networks (MANs), are, as the title suggests, networks of high capacity fibre optic cable laid in urban areas. They act as an intermediate loop, providing a physical link to the national network from local nodes on the MAN via backhaul. The programme to invest in fibre optic metropolitan area networks was announced in March 2002. Construction commenced in 2003 with the last MAN of phase I was completed in 2005. The first phase included Exchequer investment of €78m over the years 2003 - 2005. The Department has already commenced construction of a second phase of the MANs at a projected cost of €121m in 92 towns (€74m contractually committed at end 2007). An evaluation of the first phase has been deemed critical in determining whether or not a third phase of MANs should commence, and to suggest amendments to the programme were such a phase to go ahead. Although a number of reviews have been conducted on the MANs, this will be the first VFMPR.

1.2 VFMPR Framework

The Public Service Management Act 1997 and the Comptroller and Auditor General (Amendment) Act 1993 set the background for Value for Money Reviews (VFMRs).

The objectives of a VFMPR are to analyse Exchequer spending in a systematic manner and to provide a basis on which more informed decisions can be made. It is one of a range of modernisation initiatives aimed at moving public sector management away from the traditional focus on measuring inputs to more holistic perspective, examining the efficiency and effectiveness with which interventions operate. VFMPR topics are proposed by each Department and Office, in consultation with the Department of Finance, and are subject to the approval of the Government for each three-year cycle of Reviews.

1.3 Review Team

As required by the Department of Finance guidelines for the review process, a Departmental Steering Group has been established in DCENR since the establishment of the Department in its current form in 2002. The membership of this group is as follows:

Una Nic Giolla Choille, Principal, Energy Planning and Co-ordination Division
Niall Kelly, Head of Internal Audit
Kieran Duffy, Assistant Principal, Communications (Development) Division
Susan McCarthy, Corporate Finance & Planning
Richard A. Browne, Assistant Principal, Staff Development
Thomas Wickham, Value for Money Unit (Secretary)
John Rice, Assistant Principal, Communications (Postal & Regulatory) Division

The Steering Committee held its first meeting in September 2006. Terms of reference were agreed in consultation with the Public Expenditure Division of the Department of Finance. The process is overseen by the Central Steering Committee on Programme Evaluation, the chairman of which comes from the Department of Finance.

1.4 Terms of Reference

Draft Terms of Reference were drawn up using the revised template circulated by the Expenditure Review Central Steering Committee (ERCSC) in July 2003, and

approved by the Departmental Steering Group. These finalised terms of reference (TOR) are set out below.

This review will;

9. Identify the objective(s), (original and revised) of the MANs programme (Phase I) funded through the Department of Communications, Marine and Natural Resources.

10. Examine the current validity of those objectives in the light of developments/trends since 2002 and their compatibility with the overall strategy of the Department of Communications, Energy and Natural Resources.

11. Identify the level and trend of costs and staffing resources associated with each programmes and thus comment on the efficiency with which it has achieved its objectives

12. Examine the extent to which each programme's objectives have been achieved, and comment on the effectiveness with which they have been achieved

13. Define the outputs associated with each programme activity and identify the level and trend of those outputs

14. Evaluate the degree to which the objectives warrant the allocation of public funding on a current and ongoing basis and examine the scope for alternative policy or organisational approaches to achieve these objectives on a more efficient and/or effective basis

15. Specify potential future performance indicators that might be used to better monitor the performance of MANs programmes. Also to assess whether or not the indicators currently being measured sufficiently measure the effectiveness of the programme.

16. Make recommendations in relation to efficiency, effectiveness and value for money insofar as the MANs programme is concerned.

1.5 Scope of the Review

The review covers the 27 MANs built in Phases 1 and 1A. This programme was completed by 2005 at an expense of €78m (Central Exchequer funds). In particular, the review closely examines the MANs built in Cork, Galway, Athlone, Tullamore, Mullingar and Ballina. These were chosen as exemplars of MANs of different sizes in order to provide a more detailed perspective on the operation of various MANs.

The review also sought to establish the following items of information:

7. Was the programme delivered on time and on budget.
8. The levels of use of each MAN
9. The characteristics of towns that make some more "attractive" for take-up.
10. The cost, per population coverage and per corporate customer. In addition the resources and costs incurred by the Department and local authorities will be considered.
11. The impact of the scheme on competition in the broadband market and the degree to which government intervention was justified.
12. Suggested amendments, if any, to the scheme

1.6 Methodology

The review contextualises the programme in terms of Government policy and developments in the sector. A background literature review was conducted, examining relevant reports and other documentation and analysing expenditure for the period under review. Secondary data sources were supplemented by ongoing consultation with the Communications (Development) Division, eNet (the managers of the MANs), Magnum Opus (consultants to the Department) and the Central Statistics Office (CSO). A number of the external stakeholders key to the success of the project were also consulted, including communications companies and corporate customers. The Commission for Communications Regulation (ComReg) also acted as a source of

market and trend data such as broadband penetration across time as well as wholesale and retail broadband prices.

A critical methodological problem experienced throughout this review however, is the fact that the MANs are long term investments. The programme is still at a relatively early stage in its life cycle, therefore measuring ultimate outcomes, such as net contribution to economic growth in a particular region, is not possible at this stage. The review therefore concentrates on the inputs, outputs and interim outcomes with the aim of providing an indication of the success, or otherwise, of this programme, with a view to informing future decision making in this sector.

Programme Logic Model:

Inputs: Central government funding for the capital works, local authority funding, the department's consultancy costs and own staff costs associated with this programme.

Activities: Number of grants aided projects identified and funded.

Outputs: Fibre kilometres, drop connections, duct space, timing of project delivery vis-à-vis projections and budget.

Interim Outcomes: The review looks at the number of operators (new to the town) on network (measuring competition), revenues generated by the management services entity (MSE) and the amount of new traffic. The review also considers the trends in broadband penetration and price..

Format of the Review

Chapter 1: Context, Terms of Reference and Focus of Review.
Chapter 2: Background: Policy Environment, Markets and Context (TOR 1&2)
Chapter 3: Programme Progress, Efficiency and Effectiveness (TOR 3)
Chapter 4: Outcomes and Impacts. (TOR 4&5*)*
Chapter 5: Conclusions, Recommendations and Lessons Learned (TOR 6,7&8)

Chapter Two: Objectives

2.1 Introduction

This chapter sets out the context within which the programme under review came into being, the origins of the programme and its aims from the outset. In doing so, the chapter addresses items 1 and 2 of the Terms of Reference. It is set out as follows. Firstly, a brief examination of the benefits of advanced ICT infrastructure is provided, followed by a review of the situation with regard to the telecommunications sector in Ireland at the time of the genesis of the MANs. This is then followed by an examination of the theoretical underpinnings used to justify the MANs intervention (the objectives of the programme in other words), followed in turn by an examination of the current validity of the objectives.

2.2 Benefits of Advanced ICT Infrastructure

Advanced ICT infrastructure is a basic requirement for states wishing to compete on, and integrate with, global markets. Forfás, the state development agency, has in a number of its reports from 1998 to the present, identified advanced telecommunications services as being of critical importance to the country if it is to continue to attract foreign direct investment – a central tenet to the State's industrial policy. It is also identified as being of importance for the promotion and development of indigenous industry.

Furthermore, the agency identified a number of ways in which broadband may enable higher productivity. It does so by:

- "Allowing firms to cast their net wider when looking for suppliers or seeking new market opportunities to increase their customer-base;
- More effectively linking business functions e.g. sales, design, manufacturing, supply chain, stock control, accounts; and
- Empowering employees in the field to add more value for clients in a shorter time."

A number of "societal" benefits of broadband have also been identified by Forfás, namely:

- Improving the efficiency, availability and reach of public sector services in areas such as health, education and other government services;
- Enhancing the quality of life for consumers, through economic, social and cultural development; and
- Enabling for economic and social inclusion for smaller communities

In 1998 Forfás recommended that, in addition to telecommunications liberalisation, up to IR£150m be invested in fibre optic cable to provide an intermediate network, linking national backhaul to local access networks over the next five years and that failure to do so could result in significant job losses and an underperformance in terms of GDP. Conversely, Forfás suggested that by investing to address this infrastructure gap, the economy's GDP could increase by €5.1 billion by 2010. A number of international studies[2] would appear to support these findings.

This review concerned with the efficiency and effectiveness with which the delivery of broadband services has been aided by means of the MANs initiative.

2.3 The Telecommunications Sector in Ireland 1998-2002

From shortly after the foundation of the state, the telecommunications sector in Ireland was dominated by a state owned monopoly. Until 1984, this was part of a Government Department (Posts and Telegraphs). However, in parallel with other developed economies, the State moved progressively towards a liberalised, regulated, market during the 1990s, with the telecommunications operator established as a state owned company (Telecom Eireann) in 1984. The telecommunications market was fully liberalised in late 1998, over a year later than in some other EU countries. This delay proved critical, as is shown later. The state owned monopoly, now called Eircom, was privatised in July 1999.

A dramatic international downturn in the technology sector from late 2000 as a consequence of what became known as the 'dot-com bubble', meant that further

[2] Such as "Measuring Broadband's Economic Impact", US Department of Commerce, 2006

investment was limited in the early part of the next decade. This was a particular problem in Ireland given that liberalisation itself had been delayed, allowing other comparable countries a head start with regard to private sector investment. Importantly, in the years before this, there had been very significant investment in fibre optic cabling and other network infrastructure across the developed world. In Ireland, this investment was largely limited to Dublin. However, after the dot com bubble burst, many of the companies that had invested heavily in fibre went out of business, leaving their assets to be picked up at a significant discount. This meant that fibre access became extremely cheap, very quickly, as these written down assets were put to use by their new owners. However, in Ireland, this cheap access was limited to Dublin, as very little fibre had been laid outside the capital.

This problem was compounded by the fate of Eircom, still by far the largest telecommunications operator in the Irish market. 'Re-financing' by new owners meant that the company was unable or unwilling to significantly invest in its networks. This led to a situation whereby the penetration of high speed residential broadband in Ireland was far lower than in other OECD states in 2002-3, due in part at least to the fact that the service was simply unavailable in large parts of the state.

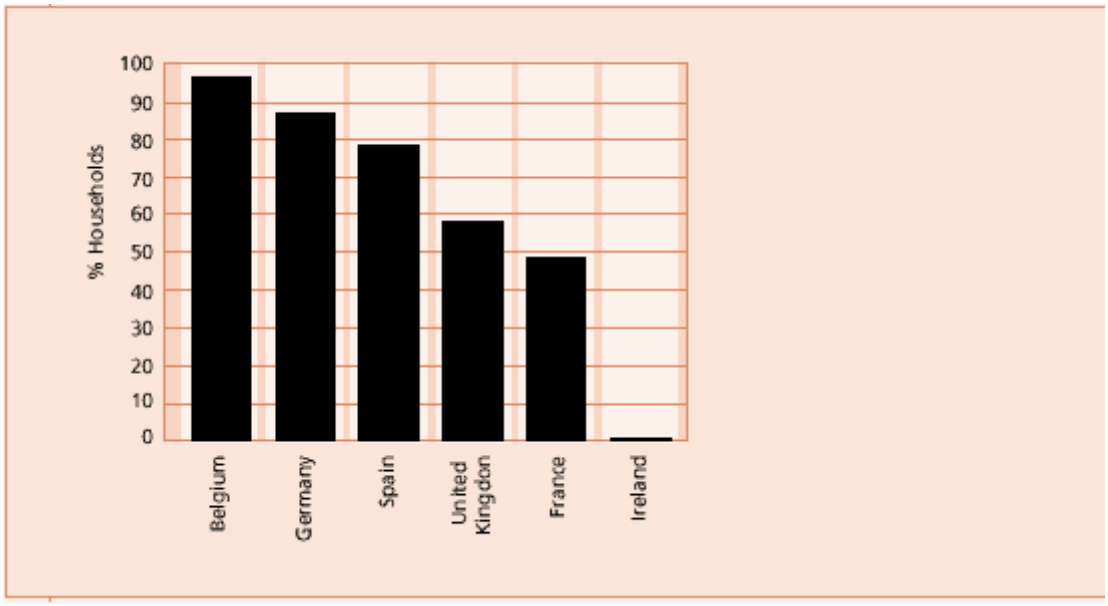
This infrastructure deficit was highlighted by a number of organisations, such as Forfás in its benchmarking studies. In its 1998 report "Broadband Telecommunications Investment in Ireland" noted that "where there is evidence of market failure in the provision of required infrastructures, the government should develop strategies to 'pump prime' the required infrastructures in conjunction with the private sector." In its 2002 update report Forfás commented that "the desired outcomes of world class broadband services and coverage at prices among the most competitive in the OECD still remain to be achieved". It also stated that SMEs and companies located outside of Dublin did not have a positive experience in term of availability and price of broadband services. There was also a lack of competition in the provision of services in the regions and these factors, when combined resulted in Ireland's poor international ranking among OECD competitor countries.

The table below, dating from June 2001, shows Ireland's performance with regard to other OECD countries at that time.

Table 2.1 Broadband Penetration in OECD Countries, 2000-2001

	% Increase in DSL lines (2000-01)	*Total Broadband Penetration*	*Rank (out of 30)*	
			End 2000	June 2001
Korea	53	13.91	1	1
Canada	51	6.22	2	1
Sweden	190	5.52	4	2
USA	37	3.24	3	4
Netherlands	547	2.74	6	5
Austria	79	2.36	5	6
Denmark	164	2.33	8	7
Belgium	114	2.27	7	8
Germany	290	1.03	15	11
France	177	0.59	16	15
Spain	251	0.47	20	19
Italy	108	0.44	19	21
UK	150	0.28	22	22
Ireland	**0**	**0.01**	**25**	**27**

Forfás 2002*DSL Coverage: households in 2001*



Source: OECD 2001, Analysys (reproduced by Forfás)

In this report, Forfás estimated that, due to the changed economic climate at the time, the investment required in broadband would only happen over three to four years in "core" areas and over a longer period in the regions. It suggested that a combination of private sector investment, Public Private Partnerships and state intervention would likely be required. It also highlighted the need for a "certain and conducive regulatory telecommunications environment for broadband investment" and the need for demand side programmes.

The origins of the MANs stem therefore from a Government desire to accelerate provision of and access to broadband services outside of Dublin. The diagnosis was that the critical problem arose from an infrastructure deficit providing access to local networks. In other words, while alternatives to Eircom's national fibre loop existed, there was no competing network available to provide access to these competing systems from the local exchanges or other local nodes. This infrastructure deficit (between national and local) had been identified as a barrier to entry to competitors to Eircom and had resulted in the Ireland's poor performance in terms of broadband availability when compared to other developed countries. The Department, in a submission to the European Commission, stated that "there appears to be an embedded reluctance on the part of the larger players in the market to invest in the requisite infrastructural, marketing, sales and support initiatives, even at entry level DSL." The submission went on to say that "a mere 233 of the incumbent's 1,166 exchanges" had been DSL enabled. (2004) DSL was available in only 40 towns out of a total of 140 with populations in excess of 1,500.

2.4 Government Funding of Communications Infrastructure before the MANs

As mentioned earlier, the communications sector in Ireland was fully liberalised in late 1998, meaning that the provision of communications infrastructure and services was primarily the responsibility of the private companies in that sector. However, through a series of initiatives, the Department co-funded private sector telecommunications companies to the construct of communications infrastructure through the Economic Infrastructure Operational Programme (1994-1999) and the National Development Plan 2000-2006 in cases where it was of the belief that the private sector would not deliver of its own accord. A first call for proposals under the NDP in 2000 was intended to allocate approximately €55m to private companies in

the anticipation that the total investment would amount to approximately €160m. The level of grant aid was set at up to 40% for companies in the Borders Midlands and Western Region and 20% for the Southern and Eastern Region. However, due to the difficulties faced by the global economy and the telecommunications market in late 2000 to 2001, a number of the companies due to receive funding went out of business and others were unable to complete their projects. In total, of the thirteen projects selected under the first round of the NDP, seven were never completed and one was significantly re-negotiated from its original scope and design. This resulted in an under-spend of approximately €20m[3].

A further call for proposals issued in mid 2001, on behalf of the Department of Public Enterprise, for communications/electronic commerce infrastructure projects aimed at promoting the development of the Information Society in Ireland, to be part -funded under the National Development Plan, 2000 – 2006 (See Annex 1 for a summary of the call for proposals). In addition to other programmes, a number of Local Authorities proposed local urban networks, which subsequently came to be known as Metropolitan Area Networks or MANs. These were to act as alternative high capacity fibre loops in urban areas, with access to the fibre being offered on a wholesale basis to private operators to link their national access (or 'backhaul') to local loops (or large business clients).

All proposals were evaluated by independent evaluators Norcontel (Ireland) Ltd in association with its partners, Peter Bacon & Associates, Philip Lee Solicitors and CO-COM. On the basis of the proposals received, Norcontel recommended both the concept and the networks proposed by a number of Local Authorities. The nature and quality of the responses meant that money originally ring-fenced for private sector projects was directed to funding the Local Authority projects. This was due partly to the low number of such private sector proposals (due to the difficulties the sector was in) or to perceived shortcomings in those private sector projects, and partly to the opportunity offered by these local access networks. The Department engaged in a

[3] Annex 1 outlines a history of previous investment interventions by the State in the communications sector

discussion process with a number of Local Authorities on the benefits of these local access networks, and how they might be constructed.

The Government decision of March 2002 to proceed with the MANs was supported by the work and report of the Interdepartmental Working Group on Telecommunications. Established in September 2001, this group issued it's report and set out the Government's guiding vision for the Information Communications Technology sector in March 2002.

The group noted that:

> "The Government wants to see the widespread availability of open-access, affordable, 'always on' broadband infrastructure and services for businesses and citizens throughout the State within three years, on the basis of utilisation of a range of existing technologies and broadband speeds appropriate to specific categories of service and customers. We wish to see Ireland within the top 10% of OECD countries for broadband connectivity within three years".

It went on to say that the State's role should be to provide seed capital because "Government is not in the telecommunications business". There would also be a requirement that Government intervention would attract "the optimum level of private sector involvement and result in open-access and pro-competitive solutions".

While Government approval in March 2002 was premised on the analysis set out by the Interdepartmental Working Group, the report of that Group did not name or select the 19 towns, instead making a reference on the basis that the investment should "enable gateways identified under the forthcoming National Spatial Strategy to achieve a critical mass of development". The 19 towns approved by Government were proposed on the basis of the analysis set out in the Norcontel Report.

Further investment was made contingent on the successful implementation of Phase 1. Following dialogue with local authorities in the northeast this was subsequently expanded to incorporate a total of 27 towns or locations, with an announcement made

in April 2004. The additional 8 MANs were also approved by Government at a later date.

The 19 Phase I towns proposed by local authorities and confirmed by Government for the construction of Metropolitan Area Networks were Cork, Limerick, Galway, Carlow, Kilkenny, Wexford, Waterford, Dungarvan, Clonmel, Athlone, Mullingar, Portlaoise, Tullamore, Roscommon, Ballina, Letterkenny, Carrick-on-Shannon, Manorhamilton and Gaoth Dobhair. Phase 1A included 8 additional MANs which will be included in this review: Dundalk, Drogheda, Carrickmacross, Monaghan, Cavan, Kingscourt, Kiltimagh and Sligo.

The decision to involve local authorities in the process to provide advanced communications infrastructure was considered by the Department and its advisers to be the most appropriate government intervention for a number of reasons:

1. local authorities have responsibility for local planning and needs analysis.

2. local authorities control the roads, access to the roads being the most the most difficult and costly part of building a broadband network.

3. provision of open-access networks is contrary to traditional operators' exclusivity of network, and allows for competition in a way that has not happened before.

4. this model is successfully deployed in other countries (e.g. StockAB in Sweden which the Department had visited, and Palo Alto in the USA).

5. the intervention falls short of government re-entering the actual provision of telecommunications services, leaving this to the private sector.

2.5 Market Failure in the provision of broadband in Ireland

In a liberalised market and in light of the reports produced by Forfás, a legitimate question relates as to whether or not there was market failure in the provision of broadband in Ireland and if there was, should it be addressed, and by what means.

Economic consultants[4] advising the Department identified two separate sources of market failure in the communications sector that may require attention by Government.

At lower levels of output larger firms (for whom broadband access is mandatory or central to their operations and who may be able to obtain internal economies of scale in the usage of the technology) pay high prices for access. This correlates with situation in Ireland in the very late 1990s. Broadband was available, but at a price that could only be justified by commercial operations.

However, at slightly higher levels of demand, the price at which companies (and particularly a monopoly company) would be willing to supply services remains too high for potential customers. This leads to a "broadband gap" - or deficit - stemming from an under investment by the private sector in the provision of broadband services, with the consequence that customer demand is not met. At higher output levels, the cost to the supplier and therefore the price at which the service is supplied, *provided competition is sufficient*, is at or below the price level required to stimulate demand, and growth in broadband provision occurs.

The consultants concluded that there was risk that investment would not take place without State intervention to bridge that broadband gap - either by reducing the level of risk through reducing the cost of the investment that is required or to reduce the "over cost" of supply access to the services at all level below this output. The consultants concluded that finding a solution to overcome this gap required public intervention.

The consultants argued that there were considerable economies of scale facing a services provider if the market grew with very low marginal costs, meaning that the price of access could fall considerably as take-up increases. This, they argued, means that the infrastructure has characteristics akin to a public good and consequently there may be an underinvestment in infrastructure. This is particularly important given the fact that use of the technology is itself an important factor in encouraging further use.

[4] Peter Bacon & Associates, December 2002

In other words, firms do not realise the full potential of broadband until they have started to use it. This heightened risk means that a market failure could materialise that would prevent the growth of the industry even if the difficulty of a lack of competition were overcome. They concluded that access costs needed to be reduced in order to encourage demand and uptake, but that this would not happen until uptake was sufficient to allow for the economies of scale to arise.

From their assessment, the advisers concluded that *"private sector provision of the infrastructure will be restricted to areas where there is a sufficient number of large users who are prepared to pay the high prices"*. This would mean that investment would become targeted primarily in the larger cities, with obvious consequences for the regional balance of employment and economic growth. Additionally they conclude that whilst "*adequate competition – either through market competition or more likely in the Irish case through regulation to enforce the theoretical outcome that competition would produce – is required to reduce prices*" that this in itself was not enough to ensure an adequate level of investment to make low cost provision of services viable for users throughout the state.

The second market failure identified by the consultants was seen to arise due to the central role that broadband infrastructure could play in the development of Ireland along a "desirable path" and the existence of positive externalities meaning that important social benefits would not accrue to private developers, since they could not be charged for. This would also lead to a sub-optimal investment in broadband.

The consultants advised that the MANs programme (Phase 1) addresses the source of the market failure "by providing the infrastructure in areas where the market is unwilling to invest."

In less technical terms, the Telecommunications Working Group Report of March 2002 concluded that "the primary problem is not at the national or regional level. The key deficit is in local access (sic) broadband networks. This results in a lack of availability of affordable 'always on' local level access to high-speed data transmission services". Though not explicitly identifying the problem as a market

failure *per se*, the report sets out a clear case for intervention in these 'middle mile[5]' solutions, namely that while there were a number of alternative national fibre loops available, there were no alternative means of connecting these to the 'local loops', save the network in the hands of the incumbent, Eircom.

2.6 Objectives of the MANs

Critically, there were no single set of specific objectives drawn up for the MANs at this point, rather the problem was comprehensively analysed and the MANs arrived at as the most suitable solution. The Interdepartmental Report set out the Overall Strategic Objective however as being *"Telecommunications are the key to the future and if Ireland moves fast, we have an opportunity to position ourselves to become one of the richest per capita countries in the world by 2020."* The report then sets out the reasoning behind investing as being that a comprehensive and affordable broadband network would;

- Promote internationally trading, technology-based start ups in new economy areas
- Enhance our attractiveness for new foreign direct investment in the ICT area
- Enhance our capacity to retain existing such investment by giving Irish-located companies the potential to remain internationally competitive.
- Protect ongoing productivity growth and competitiveness in Irish industry by reducing costs. Use of broadband and related ICT applications is capable of reducing total costs significantly for industry.
- By stimulating demand, enhance the capacity of existing investment in backbone infrastructures to make a return.
- Disperse low-cost, always-on broadband Internet access across all regions and thereby support Government regional development policy.
- Help create a knowledge and information-based society
- Increase international access to and demand for Irish Internet sites and content on the internet and hence commercial opportunities for eCommerce in Ireland.

[5] The report refers to what became MANs as 'local access' solutions, however they are more commonly referred to as 'middle mile' or intermediate network solutions.

- Bring about real competition amongst telecommunication service providers, reduce consumer costs and enhance choice and consumer control
- Enable gateways identified under the forthcoming National Spatial Strategy to achieve a critical mass of development to support their regional development role in the NDP 2000-2006
- Work towards a fully inclusive information society.

MANs therefore were part of the chosen methodology to bring about the benefits identified above, under a number of different measures (There were a number of other interventions also set out in the Report, including regulatory changes). On the basis of the Interdepartmental report and the subsequent Government Decision, the objectives of the MANs can therefore be summarised as being to;

- Promote investment in ICT infrastructure in regions where the market investment will be insufficient

- Promote the acceleration of the Information society and e-Commerce

- Promote competition in the communications sector

- Improve Ireland's international standing in terms of broadband connectivity

- Address deficit in access to local networks.

One of the most important factors to be considered is that the programme was aimed at larger corporate customers and (on a wholesale basis) telecommunications companies and was not intended to directly provide residential broadband services. Government had also identified balanced regional development as a public policy goal under the National Spatial Strategy (NSS). Government policy identified broadband as a one of a "number of specific elements within these factors, whose

assembly at strategic locations in a targeted manner is vital to foster a wide range of enterprise activity and employment creation[6]".

The NSS came into being to provide an agreed spatial framework for policy development in the state, and identified a number of urban settlements that should be targeted for development. In this regard, and as outlined previously, advanced telecommunications services were identified as comprising a critical component in Ireland's efforts to attract foreign direct investment, for the development of indigenous industry, the promotion of the knowledge economy and as being of critical importance in enabling Government to achieve its regional policy objectives. However, and is discussed later in this review, the NSS was published after Phase I (but not 1A) towns and cities of the MANS had been selected.

There was no Cost Benefit Analysis carried out before the inception of the MANs programme, although the Interdepartmental Report does clearly identify the rationale behind the programme, and the expected benefits to accrue from same. The benefits were expressed in a qualitative rather than quantitative manner however. A formal analysis of the expected costs and benefits of the programme was carried out after it had begun, by private consultants.

2.7 Objectives of the MANs and their Validity and Compatibility with overall Department and Government Strategy

The first term of reference for the review requires a review of the objectives of the MANs. A key question in this regard is whether or not there was a rationale for the State to intervene in the provision of communications infrastructure in a fully liberalised market?

The strategy statement for the Department has as one of its high level goals the objective of optimising the contribution of the communications sector to "growth, competitiveness, innovation, environmentally sustainable and regionally balanced development, and social inclusion." It additionally has set a target of cost effective

[6] Page 36 of the National Spatial Strategy

provision of national and regional infrastructure priorities. Therefore it can be concluded that the objectives of the MANs were also valid and consistent in the context of the Department's overall policy direction.

Public expenditure on ICTs, including the MANS, was identified as being consistent with the objectives of the National Development Plan (2000-2006)[7]. It was also postulated in the NDP that investment in ICT would help continue sustainable economic and employment growth, consolidate and improve Ireland's international economic competitiveness, foster regional development and promote social inclusion.

The objectives of the MANs programme are therefore consistent with an attempt to address a clearly identified need – the provision of broadband in response to an identified market failure - and furthermore the programme was identified as being consistent with general Government policies. The validity of these goals for future policy makers, taking into account market developments since the launch of the first phase, will be dealt with in Chapter 5.

[7] The Department conducted a review of its capital expenditure programmes in 2005

Chapter Three

This chapter examines the inputs and outputs of the project with a view to commenting on the efficiency and economy with which the project was run. Consequently, this chapter will address term of reference 3.

3.1 Departmental Resources

In consultation with the Communications (Development) Division it was established that the first phase of the MANs is estimated to have relied on the following department staff resources:

0.25 of a Principal Officer (PO)
0.75 of an Assistant Principal (PO)
1.0 Higher Executive Officer (HEO)
1.50 of an Executive Officer (EO)

These figures represent a "best guess" estimation of the staff resources used by the Department. As shall be seen later, the staff costs constitute a relatively small proportion of the total project costs (capital and current).

The Department did not have a detailed breakdown of the resources it used in managing the projects on a per-town basis so these costs were allocated on a pro rata basis according to the length of the MAN construction. For the purposes of the review, the total staff costs relating to these personnel were calculated from the fourth quarter in 2001 when the programme was being initially scoped and designed until the beginning of the first quarter 2005 when the work of the division switched its focus to the second phase of the MANs programme. It is assumed for the purposes of this exercise that the following annual staff salaries were incurred: PO at €82,066, AP at €62,058, HEO at €42,893 and EO equivalents at €31,153. For simplicity's sake, it is assumed that all staff have five years service in the grade and salaries are calculated from the Department of Finance Circular 17/2004 of July 2004.

The administration costs were estimated using the Department of Finance formula, which for this purpose calculates that the total staff cost is 187.31% of direct salary cost. This makes allowance for employers PRSI, imputed pension cost and overheads. Consequently, the aggregate figure is €953,816. This works out as €35,326 per MAN or €1,809 per kilometre installed. The capital grants paid for the first phase amounted to €78.25 million and therefore the Department's staff costs amount to 1.22% of the capital grants paid.

3.2 Consultancy Costs

The consultancy costs for the design and construction of Phase 1 amounted to €3,044,910 or equivalent to 3.89% of the total grant paid. These consultancy fees related to the pre-competition phase, the design of the tender process, the design of contract templates to be used across the various local authorities, the design of the drawdown contracts for the pieces of infrastructure that would be common across all networks, technical advice in relation to the design of the Metropolitan Area Networks and the administration of the payments process.

These costs can be broken down over the following categories:

Legal		230,269
Economic/Market Analysis		28,812
Technical/telecommunications consultancy		2,415,352
Administration/certification		370,477
Total		**€3,044,910**

The department spent an additional €1.8 million on consultants in relation to establishing the Management Services Entity (MSE) to manage access to the 27 Phase 1 towns. Whilst not strictly speaking within the terms of reference of the review, the MSE and its operation are integral to the operation of the MANs and consequently these set-up costs can legitimately be incorporated into the analysis.

Taking this into account the total consultancy costs in relation to the project amount to €4.84 million. Of this, €827,000 related to the management of the infrastructure on an interim basis before this function was taken over by eINet.

In total, therefore the administration of the project cost approximately €4.97m or 6.35% of the capital grant paid. On a per town basis, this amounts to €184,000 or €9,432 per kilometre constructed. It was not possible to establish with any degree of accuracy, the actual cost incurred per MAN and so the reviewer has apportioned these costs on a per kilometre basis.

Summary of Costs

Capital grant, 1st Call	€78.25 million
Departmental Staffing Costs	€953,816
Consultancy Costs	€4.012 m

The total grant amounted to €78.25m. The total cost of administering the scheme has come to €4m (excluding the €827,000 spent on interim management). The total cost of the programme, including capital expenditure and total administration costs is therefore €83.25 million.

3.3 Outputs of the scheme

Table 3.1 MANs by location and length

City/Town	Date of Contract Signing	Original Contract Duration (Weeks)	MAN Certification	Original Route Length (km)	Completed Route Length (km)
Cork	10.02.2003	48	13.02.2004	54.00	58.70
Galway	03.02.2003	52	21.04.2007	44.00	51.70
Letterkenny	20.10.2003	43	11.08.2004	18.00	19.50
Gweedore	08.08.2003	26	09.07.2004	4.40	4.50
Carrick-On-Snn	06.08.2003	36	01.06.2005	9.00	10.00
Manorhamiltn	06.08.2003	36	01.06.2005	5.00	5.10
Ballina	04.04.2003	29	05.03.2004	17.30	19.90
Kiltimagh	04.04.2003	29	21.11.2003	3.50	3.50

Athlone	23.05.2003	38	18.08.2004	20.00	20.50
Roscommon	23.05.2003	38	18.08.2004	11.10	12.20
Tullamore	23.05.2003	38	18.08.2004	14.00	14.55
Mullingar	23.05.2003	38	18.08.2004	19.00	20.90
Portlaoise	23.05.2003	38	18.08.2004	14.50	15.25
Limerick	19.05.2003	27	20.04.2005	45.00	63.00
Carlow	04.11.2003	27	11.11.2004	10.00	13.50
Clonmel	04.11.2003	27	28.10.2004	15.50	19.30
Dungarvan	04.11.2003	27	03.09.2004	9.00	9.50
Kilkenny	04.11.2003	27	25.11.2004	13.00	15.26
Waterford	04.11.2003	27	18.11.2004	16.90	20.36
Wexford	04.11.2003	27	11.10.2005	22.00	28.70
Drogheda	09.12.2004	30	16.12.2005	17.50	17.75
Dundalk	09.12.2004	30	16.12.2005	16.50	17.70
Kingscourt	09.12.2004	30	07.11.2005	4.50	4.50
Cavan	09.12.2004	30	07.11.2005	13.00	13.90
Carrickmacross	09.12.2004	30	05.12.2005	4.90	4.90
Monaghan	09.12.2004	30	05.12.2005	17.00	18.50
Sligo	10.11.2004	25	02.11.2005	20.00	24.00
				459	**527**

Source: Magnum Opus Consultants

The eventual outputs in terms of kilometre of network constructed compares favourably to budget. In terms of the length of time taken to complete the networks the performance was less favourable with a number of very significant time overruns. These time overruns can be partially explained by the increased lengths and scale of the networks with some MANs being increased significantly beyond that originally planned for. The network constructed in Limerick ended up being 40% longer than originally contracted for but took approximately 48 weeks to complete instead of the 27 weeks originally forecast. Gweedore was originally forecast to take 26 weeks to complete but eventually took 48 weeks to complete. The increases in route length of the networks generally came about at the behest of the local authorities involved, as they reconfigured their individual projects. In general, these reconfigurations delivered longer MANs, with no significant effect on cost. While costs did not rise significantly however, the time taken to complete the individual projects, in some cases at least, did.

The Department, in order to ensure that there would be a uniformly high and consistent standard of raw materials used in each of the networks arranged that there would be central procurement for key pieces of network infrastructure: duct, sub-duct, fibre optic cable, collocation centres, chamber covers, optical distribution frames and fibre enclosures. This ensured that the Department could take advantage of economies of scale, and pass these on to local authorities and thereby ensure that the unit costs for these inputs did not vary across each network, as would invariably have been the case had the procurement been arranged on a per-MAN basis.

There were a number of variances across these in terms of the quantities delivered to each local authority and those installed although these were deemed by the Department's technical advisers not to be material or could be explained by technical rationale. For example a total of 582 kilometres of fibre were delivered and 556 of these were installed. The advisers explained that contractors for the local authorities ordered additional fibre coils and would then fit them into chambers to facilitate future customer connections.

Table 3.2 Variance in details per MAN

LOCAL AUTHORITY	MAN Town	Length of MAN	Original Length	Requested Grant	Cost – Actual Grant	Grant/Km
CORK	Cork	58.70	54.00	11.45	10.97	186,882.
DONEGAL	Letterkenny	19.50	18.00	3.44	3.25	166,666
	Gweedore	4.50	4.40	0.48	0.54	120,000
GALWAY	Galway	51.70	44.00	8.39	8.97	173,500.
WESTMEATH	Mullingar	20.90	19.00			
	Athlone	20.50	20.00			
LAOIS	Portlaoise	15.25	14.50			
ROSCOMMON	Roscommon	12.20	11.10			
OFFALY	Tullamore	14.55	14.00	11.28	10.66	127,818.
LEITRIM	Carrick-on-Shannon	10.00	9.00			
	Manorhamilton	5.10	5.00			
Leitrim (total)				3.01	2.81	186,092.
LIMERICK	Limerick	63.00	45.00	6.15	6.2	98,412.7
MAYO	Ballina	19.90	17.30			

	Kiltimagh	3.50	3.50	4.19	4	170,940.
NORTH EAST	Dundalk	17.70	16.50			
	Drogheda	17.75	17.50			
	Carrickmacross	4.90	4.90			
	Monaghan	18.50	17.00			
	Cavan	13.90	13.00			
	Kingscourt	4.50	4.50			
NE (Total)				12.1	11.07	143,300.
SOUTH EAST	Carlow	13.50	10.00			
	Kilkenny	15.26	13.00			
	Clonmel	19.30	15.50			
	Dungarvan	9.50	9.00			
	Waterford	20.36	16.90			
	Wexford	28.70	22.00			
SE (Total)				15.34	15.97	149,784.
SLIGO	Sligo	24.00	20.00	4.15	3.81	158,750.
	Totals	**527.17**	**459**	**79.98**	**78.25**	**148,434.**

Source: Magnum Opus Consultants

As can be seen in the table above the average grant paid per kilometre of network produced over the entire first phase was €148,434. What the above table also highlights is the significant variances in the cost per kilometre across the various networks and local authorities. Limerick required the lowest levels of grant aid per kilometre at €98,413 whereas Cork at €186,882 per kilometre required the highest levels of grant aid in terms of network build. There are a number of reasons behind these variances in cost per km. For the most part these refer to the differing cost of laying fibre on different surfaces. For example, Magnum Opus report that the cost per meter of fibre laid on carriageway was as much as three times the cost of doing so on a verge. In other cases, 'special engineering conditions' such as river crossings, crossing railway lines or remedial works added to the cost.

The contracts also provided that a total of 2,792 chambers would be completed over the 27 networks or an average of 6.08 chambers per kilometre constructed. A total of 3,523 such chambers were eventually completed or 6.69 chambers per kilometre

constructed. The increase in the chambers can therefore largely be explained by the increase in the network length over that forecast in the original contracts.

The one element of the networks where the output was less than originally provided for in the contracts was that of customer or 'drop connections' (i.e. the means of connecting end customers to the network). The contracts originally provided that a total of 2,371 such connections would be incorporated into the network designs. The actual outturn was 1,063 drop connections, which is 55% lower than the original target. As regards the impact that this significant variance would have on the project, the advisers to the department counselled that the resources would be more effectively channelled into extending the reach of the networks across the towns as even in the event of drop connections being in place there would still be significant costs to be incurred in actually connecting to the customer. However, e|Net the company managing access to the first phase MANs has contended that the high cost of drop connections means that it is facing difficulties in attracting customers to the MANs. It should be noted that it also contends that the connections built after the initial build was completed have proven to be no cheaper to deliver than standard connections so the "under" construction of the connections as against the original target may not have been such a significant issue.

3.4 Efficiency of the Scheme

A significant element of the administration and consultancy costs of the MANs programme was upfront – designing the programme and agreeing the technical specifications of the MANs. Consequently, the administrative costs as a percentage of expenditure of on a per kilometre basis should be expected to fall in future phases of the programme.

The project was run efficiently and the outturns exceed those budgeted for at no additional cost and indeed at a modest cost saving, despite the time delays, as noted earlier.

3.5 Economy of the Programme

The programme's total consultancy costs amounted to approximately €4 million, which involved administering grant aid of €78.25 million. This was done via contracts with ten contracting agents representing a total of 27 towns.

As noted earlier, €827,000 of the consultancy costs were incurred in order to manage access to the networks on an interim basis between the completion date of the first MANs until the establishment of the MSE. The first handover was in October 2004. The handover was handled on a phased basis and Cork, although one of the first to be completed, was handed over to the MSE in April 2005 – a full six months after the first handover. It would not be unreasonable to assume that this or at least a significant proportion of it could have been avoided had the model of managing access to the networks been established in a more co-ordinated manner with the design and construction phase of the project.

Approximately €370,000 was spent on administration and certification of expenditure for the period concerned or the equivalent of one fulltime HEO and EO for three years. There is probably scope for the Department to conduct some of this work in-house, particularly the certification of claims by local authorities[8]. All other input costs were administered utilising competitive tenders and the centrally procured elements ensured that the economies of scale that the Department could avail of were passed on to the local authorities. In one instance one of the suppliers had difficulty holding its prices for the three-year period of the contract and sought approval to amend them. The Department declined this application.

Crucially, the Department insisted that the local authorities have fixed price contracts with the works contractors and the grant levels to be paid by the Department to the local authorities were based to a large extent on these fixed price contracts. The Department did not pay any grants in excess of the grant levels set out in the contracts with the local authorities.

[8] The procedures have been amended slightly for the 2nd phase projects and the Department has streamlined some of the processes and assumed some work, particularly in relation to amendments to grant agreements that had previously been undertaken by consultants.

Chapter 4

This chapter examines the interim outcomes of the programme and specifically the success or otherwise of the programme in meeting its objectives – whether explicit or inferred.. From this examination key learning points emerge for future (communications) infrastructure interventions. Specifically Term of Reference 4 and 5 are addressed in this chapter.

4.1 Outcomes

As set out in chapter 2, the implicit objectives of the MANs programme were that the MANS and successful use thereof would:

- Promote investment in ICT infrastructure in regions where the market investment will be insufficient
- Promote the acceleration of the Information society and e-Commerce
- Promote competition in the communications sector
- Improve Ireland's international standing in terms of broadband connectivity
- Address deficit in access to local networks.

In order to assess the effectiveness of the project in meeting its objectives, the agreed terms of reference for the review set out that valid performance indicators for the project would include price trends, improved availability and access and competition. Also to be incorporated in the assessment should be Ireland's international ranking in terms of broadband availability.

As regards the measurement of the project outcomes, it is too early to comprehensively and definitively measure the ultimate outcome of Phase 1 as the last of the first phase towns were only completed in late 2005. This programme was designed for the medium to the long term and consequently the impact will only become clear over a similar length of time. By way of example, the evolving and dynamic nature of these projects may be seen in that there has been a considerable increase in terms of the number of customers of the MANs since completion and for example 16 new (or a 27% increase) customers were added in the first three months of 2007. It is, however, still possible to identify emerging trends and learning points at this juncture.

Given that it was not, for commercial and practical reasons, possible to establish the number of residential and company "end customers" that were receiving broadband services from communications companies using the MANs, a proxy for end customer activity on the networks has to be found. For the purposes of this review, the number of communications service providers that utilise the MANs is used as just such a proxy This is done notwithstanding the fact that different communications companies use the MANs for different purposes and not all use them to directly access end-customers - some utilise the MANs infrastructure to fill gaps in their own communications networks e.g. a mobile phone operator such as Vodafone uses some MANs for part of their backbone and to increase the capacity of its network cells. Consequently two locations with the same number of MAN customers does not necessarily mean that the two locations have the same level of competition in the communications sector, or that the same proportion of capacity on each MAN is used.

Table 4.1 Customer Contracts per MAN

MAN Town	Grant €m	Length (Km)	No of Customers	Grant per customer (€,000)*	Km per Customer
Cork	10.97	58.7	14	783.5	4.19
Letterkenny	3.25	19.50	5	0.65	3.90
Gweedore	0.54	4.50	0	N/a	N/a
Galway	8.97	51.70	9	996.6	5.74
Mullingar		20.90	3	918.9	6.97
Athlone		20.50	2	1,351.9	10.25
Portlaoise		15.25	4	502.8	3.81
Roscommon		12.20	1	1,919.0	12.20
Tullamore	11	14.55	2	959.5	7.28
Carrick-on-Shannon		10.00	3	602.3	3.33
Manorhamilton	2.81	5.10	1	949.1	5.10
Limerick	6.2	63.00	13	476.9	4.84
Ballina		19.90	2	1,700.9	8.65
Kiltimagh	4	3.50	0	N/a	N/a
Dundalk		17.70	6	422.7	2.95
Drogheda		17.75	1	2,543.6	17.75
Carrickmacross		4.90	0	N/a	N/a
Monaghan		18.50	0	N/a	N/a
Cavan		13.90	4	498.0	3.25
Kingscourt	11.07	4.50	0	N/a	N/a
Carlow		13.50	3	674.0	3.38
Kilkenny		15.26	1	2,285.7	15.26
Clonmel		19.30	3	963.6	6.43
Dungarvan		9.50	1	1,423.0	9.50
Waterford		20.36	4	762.4	5.09
Wexford	15.97	28.70	5	859.8	5.74
Sligo	3.81	24.00	5	762	4.80
Totals	**78.25**	**527**	**92**		**5.73**

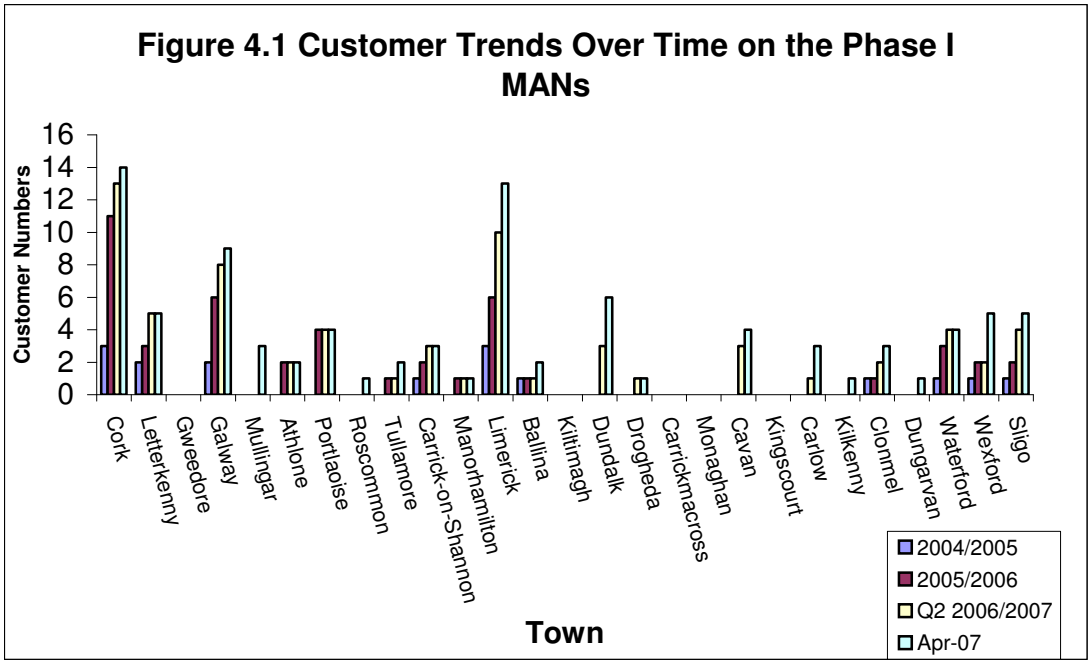
*The grant per customer will obviously change over time as the total number of customers fluctuates. In addition the figures for the Midlands, Leitrim, the Northeast and Southeast were calculated on a pro rata basis based on the length of the MAN as each of these areas had single contracts covering multiple MAN locations.

It is difficult, at this stage, to infer any long-term conclusions from these figures but they do provide some insight as to how effective the intervention has been in the short term in meeting one of its objectives of promoting competition in advanced communications services. As of April 2007, in total there were 26 different customers of the MANs with a total of 92 individual contracts. In the period under review, only one customer was lost.

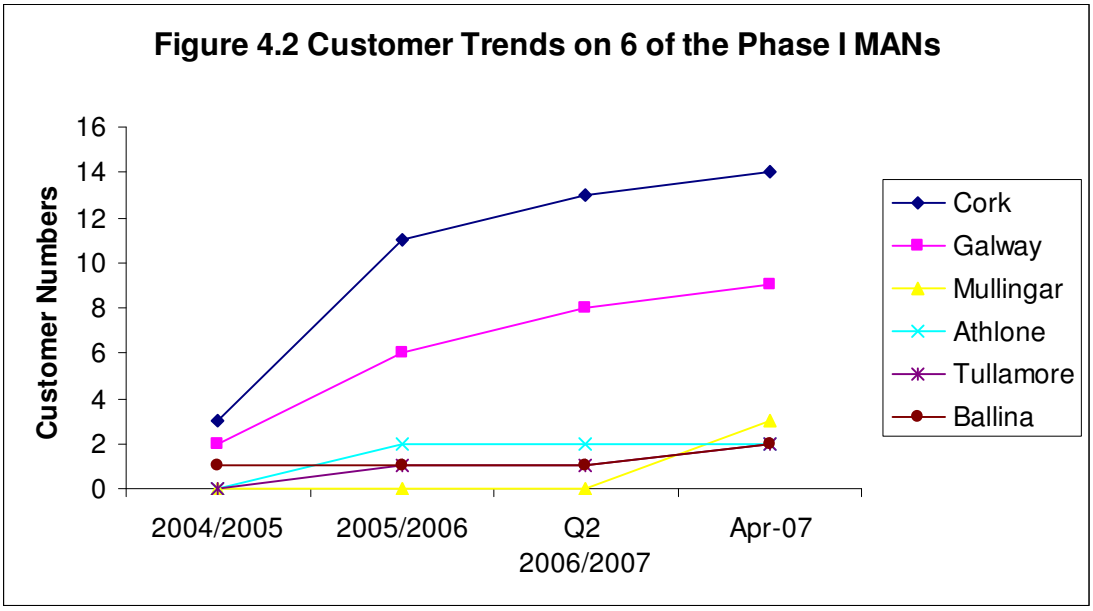
The top 6 MANs in terms of customer uptake account for 55% of the customer accounts: Similarly, the top 6 locations, in terms of population, account for 51% of the customer numbers.

	Location	**Population**
1.	Cork	(190,384)
2.	Limerick	(90,757)
3.	Galway	(72,729)
4.	Dundalk	(35,085)
5.	Sligo	(19,402)
6.	Wexford	(18,163)

4.1.1. Customer Trends



For table setting out customer trends since the first completion date in Phase 1 see Appendix 4.



Figures 4.1 and 4.2 illustrate the differing rates of uptake across the MANs. In turn, this demonstrates the difficulty in inferring the long-term outcome in terms of how the MANs have developed competition. In terms of Cork and Galway, the two largest urban centres in the above subset, it would appear that the MANs tapped into

significant latent demand, as evidenced by the rapid early growth in customer numbers.

Notwithstanding that the customer base is likely to increase there is quite a significant range in the cost per customer in terms of the grant paid. Dundalk, at €422,300 per customer is the cheapest. Leaving aside the five MANs with no customers, the most expensive MAN(s) per contract is Drogheda, which amounts to a grant of €2.54 million per customer contract. There is consequently quite a significant variance in terms of the cost of developing competition across the various MANs. It should be noted that none of this money was or will be paid to the MAN customers but is merely the cost incurred by the state to introduce competitors expressed on a per-competitor basis across the different MANs.

4.2 Explaining Differential Outcomes

The tables above clearly demonstrate that substantial variations exist in the degree to which the MANs in Phase 1 (including 1A) are currently being utilised. Following a series of interviews with customers and prospective customers of the MANs, the single most critical factor identified by the telecommunications operators in their decisions as to whether or not to use the MANs, all things being equal, is the population of the city or town in question.

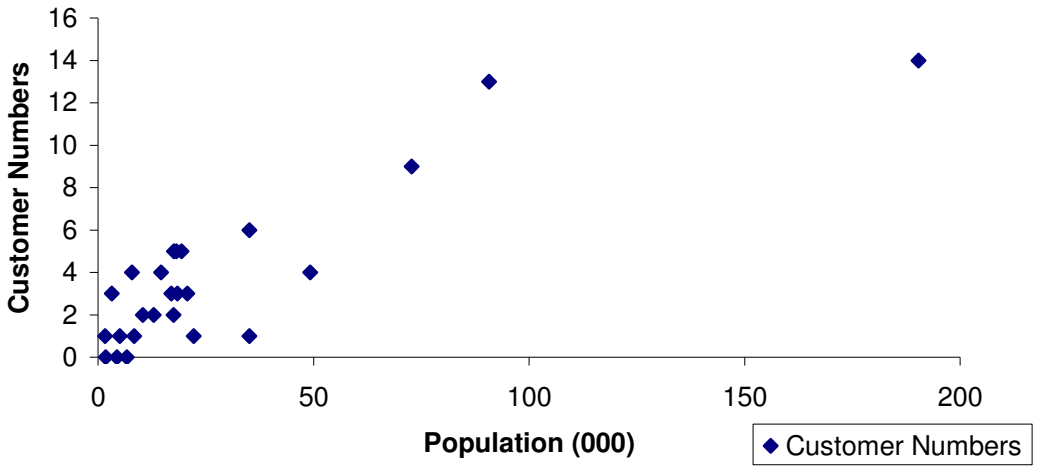
Notwithstanding different business models and different cost bases, operators focusing on the residential end of the broadband market (using the MANs to provide "middle mile" networks) identified towns with typically 9,000 active telecommunications lines as being borderline in terms of making a business case in the short term. A town the size of Portlaoise was identified by a number of the consulted companies as a town that would be marginal in terms of population to establish a business case to launch services.[9] A number of the towns selected for a MAN were below that threshold. It should be noted that, in terms of residential customers, the vast majority of Eircom exchanges that meet this "criterion" are

[9] It should be noted that this will vary across operator depending on the particular business model being pursued and the relative importance of the residential market to the operator.

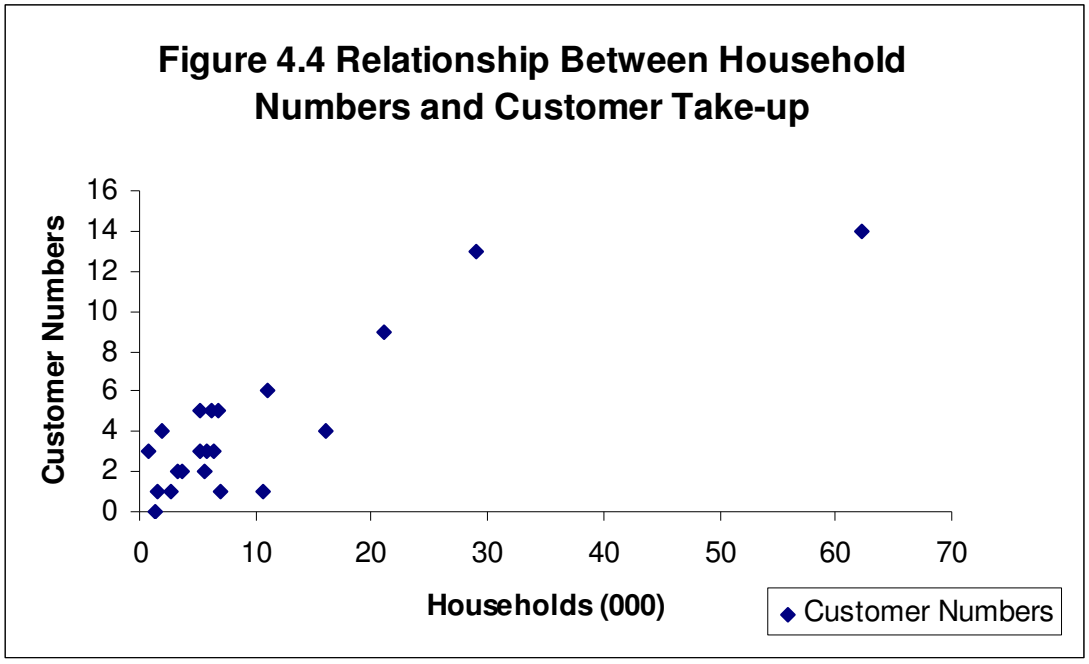
located in Dublin – approximately 50% of exchanges with working lines in excess of 7,000 working lines are located in County Dublin.

The relationship between a town's population and the number of communications companies that utilised the MAN, can be displayed by graphing the correlation between population and the number of customers using the MANs. The next two graphs illustrate those relationships and indicate that that there is indeed a strong relationship between a town's population and the number of customers on its MAN. The relationship also holds true, not surprisingly, between the number of households and the customer numbers.

Figure 4.3 Relationship Between Population and Customer Take-up



The examination of the data to date finds that there is a strong correlation of 0.85 between the number of households in a given town and the number of telecommunications companies utilising the MANs and a correlation of 0.86 between MAN customers and the population of a particular town. This examination is based on 2002 household data and 2006 population data as the 2006 household data is not yet available. This analysis also excludes towns for which household or population data was unavailable. These include Gweedore and Kiltimagh in the case of population and household numbers as they are too small to be identified separately in the CSO data. Additionally, there was no separate household data available for Manorhamilton, Monaghan and Kingscourt.



This correlation between population and uptake means that, generally speaking, the bigger the town, the larger the number of potential customers on the MANs. This correlation or relationship of course does not mean that there is a direct *causal* relationship between the population of a town and the uptake of the MAN by communications companies. A valid alternative explanation could be that the population may be more closely related to the level or type of economic activity in the town and it is this economic/business activity that attracts customers to the MANs and drives the levels of communications competition. In addition, the average number of "connections" to the MANs in the top four MANs is 84. The average for the 12 smallest towns is 4. This once again confirms the importance of scale to the effectiveness or otherwise of a MAN network in terms of developing competition.

This outcome appears to support Forfás' prediction that the take-up of broadband would be concentrated amongst large corporate users and in larger urban centres. While this prediction was based on a scenario where there was no government intervention, it is clear that, even when intervention does take place, economies of scale for providers still ensures that more densely populated or larger urban centres experience higher uptake. It is likely also of course that these larger centres have greater demand due to issues of demography and economic geography. For the moment however, it suffices to say that, while there is widespread broadband uptake,

the uptake of high-end fibre broadband on the MANs would appear to be concentrated in the larger urban centres. The MANs did, however, have the marked effect of immediately bringing down the population threshold at which providers were willing to enter local markets.

Based on the data to date, there would appear to be a number of exceptions to the above population/uptake relationship however. The Cavan MAN (population of 3,954) has four customers or one per thousand of population, whereas Monaghan town (population of 6,250) has no customers on its MAN. The fundamental difference between the two is that the Cavan has a single large company operating in the services sector with a demand for high quality bandwidth. This was confirmed in a conversation with one of the operators offering services in the town. That operator also confirmed that once it had established a presence in the town, it was then in a position to offer residential services because the location of a large commercial user in the town justified the operator's initial investment, after which point the marginal cost of extending telecommunications services to residential customers was then low enough to be justified even in the context of the limited size of the town. Without the MAN and the "anchor tenant" or a single large customer the rollout of these services would not have been economically justifiable for the operator. Similarly, Carrick-on-Shannon, population 3,163 and 850 households, has three communications companies using the MANs to deliver services to end customers, with a large bandwidth end customer also present. Similar situations exist in Clonmel and Letterkenny. In each case, multiple IDA clients are located in the towns.

As at time of writing, there are five towns from Phase 1 and 1A that have no customers on their MANs. These are Monaghan. Kingscourt, Carrickmacross, Kiltimagh and Gweedore.

The Northeast towns were either completed in November or December 2005, almost two years after the completion of the first towns in Phase 1. Kiltimagh was completed in November 2003 and Gweedore was completed in July 2004. It is worth noting also that 4 of these 5 towns were included via Phase 1A, a matter returned to in Chapter 5. Importantly, the relatively late completion date of the MANs in these towns does not however adequately explain why they have been unsuccessful in attracting customers

to the MANs, given that two other towns in the same area (Dundalk and Drogheda) now have customers.

One possible explanation is that none of these five towns had alternative backhaul providers other than Eircom until late 2006. Leaving aside Monaghan, this may have more to do with the populations of the towns – some of which (Kingscourt, Gweedore and Kiltimagh) are too small to be recorded separately in the 2006 Census, with the population of Carrickmacross recorded as 4,387. This will also be discussed in further detail in the next chapter. Monaghan, since late last year, has an alternative backhaul provider – Bytel via the Armagh-Monaghan Digital Corridor co-funded under Interreg IIIa. So far there have been no customers on this MAN. Monaghan does, however, have seven DSL providers in the town and one wireless provider of broadband.[10] Clearly, demand for residential and small scale business broadband in the town has been met by the market, and dramatically reduced (or removed) the demand for access to the MAN by alternative providers.

The five MANs with no customers cost €5.222 million in grants or 6.67% of the total grants paid in Phase 1. The breakdown is as follows:

	€(000)
• Gweedore	540
• Kiltimagh	683.7
• Carrickmacross	702.2
• Monaghan	2,651.1
• Kingscourt	644.9

In addition to the towns that have no customers, five other towns have one customer each:

	Population
• Dungarvan	8,362
• Drogheda	35,090
• Kilkenny	22,179

[10] Source: www.broadband.gov.ie

- Manorhamilton 1,651
- Roscommon 5,017

The total grants paid for these towns amounts to €9.121 million or 11.66% of the grant total for Phase 1. Of these, Drogheda and Kilkenny, by virtue of their scale, would appear to be the more likely to attract further customers.

On the basis of the above summary and based on existing cost structures, it appears that a clear profile can be drawn of successful MAN towns, albeit on a preliminary basis. Such towns are generally large, with a minimum of 9-10,000 people, or have a large anchor tenant. Where MANs have been built in circumstances other than these, there is a strong likelihood that they will remain unused for the foreseeable future.

4.2.1 The Financial Performance of the MANs to Date

While this is not a review of the MSE, e-Net, and how it has performed against its targets, some of the data relating to its performance to date proves to be instructive in terms of the effectiveness of the MANs themselves and would support the earlier assessment in terms of customer numbers.

Whilst the number of customers gives a reasonable indication of the level of uptake on each MAN by telecommunications service providers, each customer will be putting the MAN to different uses and consequently, it may not be possible to infer from raw customer numbers the impact that each MAN has had on the development of competition and the scale of that competition. However to complement the data in relation to the customer numbers, another indicator of the development of competition as a result of the MANs is the revenue generated by the management services entity on each MAN.

As with the customer numbers, it is no surprise that the cities and larger towns are the more important in terms of revenue generation. In 2005/2006 the top four MANs in terms of population accounted for 80% of the total revenue generated over the 27 MANs. In 2006/2007 the four cities accounted for approximately 67% of the revenue generated with Cork at 28.75% and Limerick at 23.4% accounting for significantly

more than the others. However, Letterkenny was the fourth largest MAN in terms of revenue generated (4.75%) – as well as an Institute of Technology it is also home to a number of IDA supported companies operating in the tech sector . Once again, this demonstrates the importance of the business make-up of the town to the success or otherwise of attracting customers to a MAN and indeed to the rationale for MAN investment.

In support of this point, e-Net has claimed that the drop connections are loss-making or have no margins for it, as only companies with a relatively high telecommunications expenditure are likely to consider the MANs as part of their communications solutions. An analysis of the potential customers by e-Net found that 89% of these customers in towns with MANs fall into the SME category. The relatively high cost of gaining access to the MAN obviously has a clear impact on uptake, something that is more serious in those smaller centres that lack a major commercial customer to offset this cost for communications service providers. Critically however, broadband access is now available in a number of these smaller urban centres that lack customers on their MAN. The issue of cost, and the relative scale of those towns chosen, are clearly central to the success, or otherwise, of the MANs, and are returned to later in this chapter.

As of yet, the cost of running the MANs exceeds the revenues that they generate. The company is performing better than budgeted in terms of its operating losses however revenues are not as robust as projected. This may partly be explained by the fact that a number of MANs have only attracted customers in the last financial year and five of the 27 MANs in Phase 1 (and 1A) are still without customers.

e-Net has cited a number of reasons it believes explains the company's performance to date and its failure to meet the budgeted targets for revenue:

- It asserts that the MANs were on average handed over to e-Net 9 months later than had been agreed.

- Its revenue model was predicated significantly on offering products that could secure Government business and LLU business gaining traction. It argues that neither of these has happened. However, with respect to the Government business it claims that Eircom has reduced its prices to match any MAN-based competition which in of itself is a benefit of the MANs not explicitly reflected or quantified in the assessment.

- It claims that the loss making nature of drop connections and the insufficient numbers of them has also contributed to the underperformance of the company to date.

4.2.3 The Importance of Backhaul to Customer Uptake

At the earlier stages of the project, the issue of backhaul – or access from the local network to a communications backbone and onwards to Dublin - was examined as to its impact on the effectiveness of the MANs. All MANs have access to backhaul but some stakeholders were of the view that the lack of alternative backhaul providers to Eircom was hampering the uptake by communications companies of certain MANs.

Certainly, communications companies consulted expressed most satisfaction with the MANs that had more than one backhaul provider, satisfaction which obviously implies or can be associated with higher takeup of these MANs,. Where alternative backhaul providers (mainly ESB Telecom network or BT network) were not available to a MAN and Eircom consequently faced no competitive challenge, the result has generally been that the MAN is under-utilised or not utilised at all.

The solution to a backhaul problem - if indeed one such exists - may include regulatory as well as investment interventions. There would appear to be merit in further examination as to whether or not regulation is required or feasible. In the absence of other networks, customers of the MANs will at some stage need to route their traffic over the Eircom network; therefore resolving the broadband situation

on a piecemeal basis runs the risk of merely displacing the monopoly issue to different parts of the network.

4.3 The Impact of the MANs

While it may not be possible to determine the precise impact of Phase I of the MANs in terms of meeting its objectives, it is possible, through a variety of means, to assess a number of impacts the programme has had and to surmise from these the potential contribution made by the MANs. In brief, these impacts include the contribution made by the MANs to competition in the domestic broadband market, the impact on price, and the impact in terms of regional uptake in broadband

4.3.1 MANs, Broadband Uptake and Prices

In simple terms, the situation "pre-MANs" was that local loop unbundling was effectively non existent outside of Dublin. Before 2003, only one exchange had been unbundled outside the capital.[11] There are now approximately 70 exchanges unbundled with active operators. Half of these are located in Dublin, but of the rest, 19 are connected to MANs[12][13]. Between Q1 2005 and Q2 2007 the number of Broadband subscriptions in Ireland grew from 152,000 to 698,000. In the same time period, the number of 'Narrowband' (dialup and ISDN connections) fell from 664,000 to 403,000.

In a sector this fluid, it is of course almost impossible to prove causality. The MANs went live at a time of great dynamism and change within the ICT industry in Ireland, and in such a changing marketplace, it is very difficult to single out the impact of one intervention. However, the research carried out for this review has revealed that a large number of those companies operating on the MANs have confirmed that, in the absence of the MANs they would not be offering services in those particular towns at all, for the simple reason that the fibre was simply not being made available by the

[11] Per eINet

[12] Some MANs have more than one exchange unbundled and connected

[13] It is worth noting that, out of the total of 1,200 exchanges, the top 70 exchanges account for over 40% of the active lines in the country. The top 250 exchanges account for over 70% of lines. This gives some idea of the centralisation of telecommunications infrastructure within the state – itself of course a direct consequence of the centralisation of population.

incumbent. One of these companies referred to above is now offering services in five locations outside of Dublin. Another company stated that of its 170 corporate customers, 100 of them were on MANs, with the remainder in Dublin. Unsurprisingly, 65% of the customers outside Dublin were located in Cork and Galway.

It is clear that the MANs have made a significant contribution to the development of the sector. The question remains, however, as to how significant this contribution has been in terms of price. Figure 4.1 sets out a chart illustrating the movement in the price of DSL services and charts significant regulatory and investment developments in the sector over the past five years. It also charts the increase in the number of subscribers to DSL services. In determining the impact of the MANs on prices, it should be kept in mind that the price of broadband has been affected by a number of different factors including regulation, the wider economic performance of the country, and competition in the provision of infrastructure. Critically also, the development of services and content on the internet play an important role in driving uptake, but are fundamentally difficult to determine, let alone measure (See Figure 4.1 on the following page for an illustration of the impact of various factors on the price and uptake of DSL broadband services – source ComReg).

For large corporate customers and other service providers, the impact on the cost of access to Eircom's network is similarly difficult to ascertain, as Eircom does not publish a list of prices. The reviewer has therefore had to rely on a series of interviews with stakeholders to gain their perceptions of the impact of Phase 1 on price and competition.

DSL price changes have driven subscriber growth here

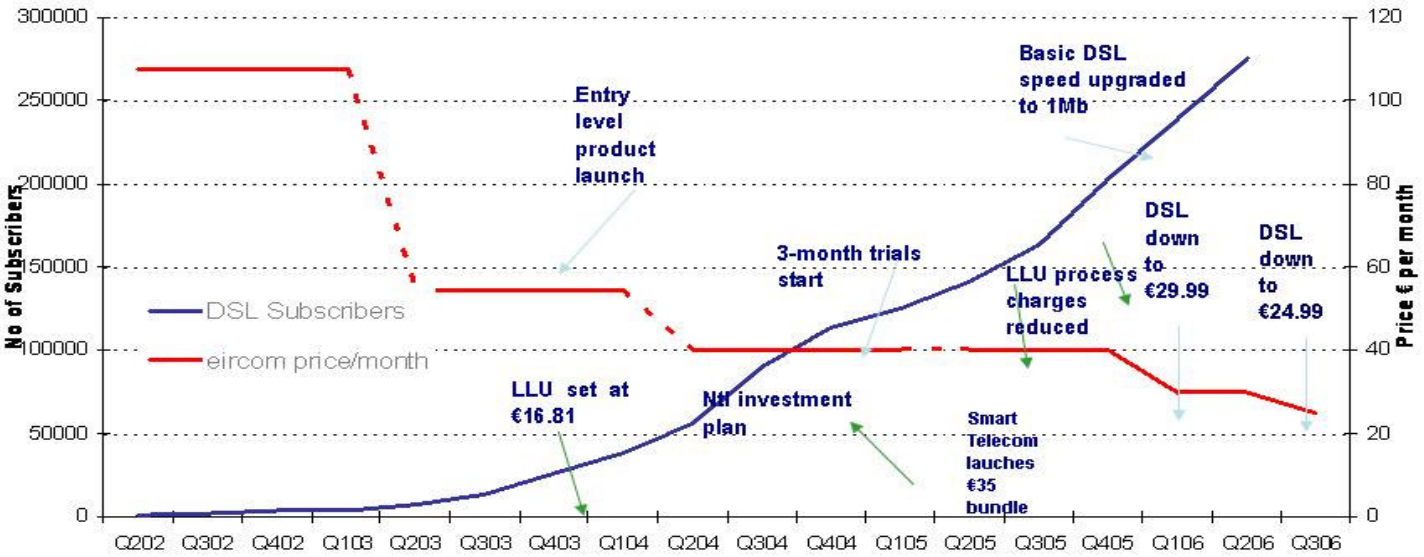


Figure 4.1

Source: ComReg

As can be seen in the figure above, DSL take-up is affected by the price Eircom charges both at retail and at wholesale level as well as other variables such as the investment actions of its competitors and regulatory interventions. The following is a narrative of significant events over the period relating to the first phase.

- The announcement to build the MANs was made in March 2002.

- Construction began on the MANs on a phased basis in April 03 and by end of Q2 of 2003 work had commenced on Cork, Galway, Limerick, the Mayo towns and the five Midlands towns.

- The price of Eircom's entry-level DSL product was significantly reduced in the second quarter of that year (2003).

- In December 2003**,** Eircom announced that it would deploy broadband to every town in Ireland with a population greater than 1,500 people by March 2005 and specifically stated that it would be achieved two years ahead of the Government's plan. It also claimed that its phase two roll-out of broadband will mirror and go beyond the towns identified in the Government's National Spatial Strategy. Eircom also, through a press release asked the Government to focus its structural funding on those rural areas where economically the roll-out of broadband is "unfeasible".

- The first MAN, Cork, was completed in February 2004 and Galway and Limerick, the next two biggest towns had theirs completed in April 2004.. The MSE was established in 2004 and assumed the management of the MANs in that year.

- Eircom formally announced in February 2004 that it had launched its trigger programme and that it would launch DSL in 150 towns with a population less than 1,500 where there was sufficient demand.

- The Government announced its intention to proceed with the second phase of the MANs (which are outside the scope of this review) in June 2004.

Whilst it is difficult to say with any degree of certainty that Eircom responded directly to the introduction of the MANs in specific locations, or more precisely the competition that the MANs would facilitate, it would appear that the MANs did contribute to the company's decisions with respect to DSL rollout. By reacting to the threat of competition and rolling out DSL services quicker than anticipated in towns with MANs, some Local Authorities feel that Eircom may have sated some of the latent demand for broadband within those towns and impacted upon the customer take-up on the MANs in the short term. While the response by the dominant player to the 'threat' of the MANs did help advance the aims of the MANs, and did further the State objectives in the sector, the question remains as to whether or not the same outcome could have been brought about by means of regulation. This issue is discussed in the next chapter.

In terms of the impact that MANs may have had on prices to large communications companies, one company has achieved a price reduction of 76%, equivalent to several hundred thousand euro by using the MAN. This is evidence of the available efficiency gains that could be realised, taking into account the number of different operators in a broad number of regional locations. In an interview with the IDA, the agency confirmed the effect the MANs have had on prices, and expressed the view that the MANs have been a key driver of competition for communications services and consequently improved its clients' options in terms of price and choice.

4.3.2 Impact on the Price of Broadband for Government.

One sector where it has been possible to get firm information on prices is the public sector. Before the introduction of the MANs, Eircom charged approximately €13,000 for a 2Mb/s link to areas such as Sligo and approximately €11,000 for similar links to Cork and Limerick[14]. The price per megabit has come down significantly since the introduction of the MANs. The Civil Service Training and Development Centre (CSTDC) was of the view that the construction of the MANs has introduced new

[14] In discussion with CMOD

players to the market and has enabled operators other than the incumbents to compete for government contracts where previously this was not the case. Examples of the uses to which Government agencies are putting the MANs include HEAnet's provision of 10Gb/s broadband to UCC and CIT in Cork and one company is providing 1Gb/s broadband to hospitals in the city. The view was also expressed that an end customer would need to be demanding 10Mb/s or above to make it worth while to connect to the MANs.

While, for large customers, according to CSTDC, access to broadband has never been an issue, price and resilience has. This, CSTDC contends, has been partly addressed by the introduction of the MANs. A significant impact of the MANs has been that they have facilitated companies to compete for Government telecommunications business where otherwise they would not have had the necessary infrastructure. They have had an impact on the price of the broadband communications. They have also posed a competitive threat to Eircom.

In a consultation with the communications industry, some companies expressed the view that the price of access to fibre on the MANs was expensive compared to the prices that they would expect to pay for similar products in Dublin. They expressed the view that a fibre pair on a MAN costs in the region of 40 to 150% more than in Dublin. Specifically, one company cited that it could access fibre at €1 per metre on certain networks in Dublin (the T50) whereas the cost of fibre on a MAN costs €2.54 per metre.

A number of operators have also expressed an opinion that further investment in the existing MANs by extending the reach of the networks nearer to the potential customers would be of greater benefit than proceeding with constructing MANs in the smaller towns. While there may well be a potential benefit in this idea, it also has the potential to crowd out private sector investment and there are possible EU State Aid issues that may arise from such an approach. In and of itself however, that is not sufficient reason to rule it out – the delivery of benefits of this type being the point of these networks in the first place.

4.4 Impact of MANs on Regional Development

As mentioned previously, an implicit objective of the Phase I MANs was to address regional market failure in broadband provision in Ireland, 'pump priming' by creating alternative middle mile networks, linking local exchanges to alternative backhaul in 27 locations around the country. As already noted, the programme has met with considerable but not unqualified success. This section takes the following format. Firstly, the results of a series of interviews with development agencies and companies operating in areas outside of Dublin are presented. Secondly, the relative congruence of Phase I of the MANs with the NSS is examined, and lastly, the issue of the less successful MANs are discussed.

The development agencies have been and continue to be very supportive of the programme. The IDA is aware of a number of its clients, currently located in towns with MANs, that would not have located there in the absence of the networks. In the experience of the IDA, companies looking to locate investment abroad would typically look at a number of locations around the world, and compare each on the basis of a number of factors, not least infrastructure. In many cases, the absence of resilient and redundant[15] communications networks means that locations are not even considered for investment.

Therefore, the IDA regard high quality and resilient broadband services not as a 'selling point' *per se*, but a prerequisite – its clients and prospective clients expect that there will be competitively priced alternative providers of broadband services available to them. Additionally, the MANs also facilitate some of its clients to expand their businesses; the IDA cited a company in Mullingar as an example of this. Importantly however, a brief sample of larger towns, currently without MANs, shows that in each case, there are now seven different DSL providers offering broadband to residential and business customers. Castlebar, Tuam, Ennis, Mallow, Killarney and Shannon are each without a MAN, but seem to have overcome the initial market failure in terms residential broadband at least. This issue is also returned to in Chapter 5.

[15] Essentially, many information driven industries require two independent broadband connections in case one suffers a fault.

According to the IDA the benefit of the MANs for its business is evident in the overall attractiveness of the respective regional locations and the associated increase in service offering and capabilities. It has identified a number of specific deliverables that the MANs deliver for it;

- They help to establish regional locations on a level footing with the large urban centres with respect to availability and resilience of the telecommunications product offering. The agency contends that prior to the MANs initiative there was only limited capacity and bandwidth (single lines) into regional locations, which hampered social and economic development in many of these centres;

- The MANs support the development of IDA's existing client base into additional functions and activities that have high bandwidth requirements. Prior to the construction of the MANs, the development to this type and level of activity could not be supported from many regional locations. As previously mentioned, the MANs enable IDA client companies to expand their activities in Ireland and support the development helps support ongoing efforts to attract and retain high value added ICT and knowledge economy jobs in regions that companies may not otherwise even consider.

- MANs, according to the IDA, have facilitated improved and more competitive backhaul offerings in regional locations and there has been significant improvement in the use of backhaul to regional locations due to the provision of an alternative middle mile link, arising from the provision of the MANs;

- MANs have facilitated and advanced the service offering of regional locations to potential new Foreign Direct Investment clients. By doing so, it has increased the options open to IDA and its clients. The availability of the MANs in regional locations has resulted in the establishment of new Telecom providers with enhanced service and product offerings regionally.

The IDA did emphasise the need to continually evaluate the MANs infrastructure "against the latest available infrastructure" with a view to ensuring that it is in a position to facilitate the provision of the next generation telecommunications technology. In addition, the continued rollout and efficient management of this infrastructure is essential for regional locations to further develop the knowledge economy.

As already noted, the National Spatial Strategy (NSS) was published after the 27 towns in Phase I of the MANs had been named. The relationship between the two is shown in the table below. Seven towns or cities identified in the National Spatial Strategy as locations for future development (as either 'hubs' or 'gateways') did not have a MAN constructed in the first phase of the project (Dublin being one). Furthermore, of the 27 towns covered by the investment, twelve are not NSS towns.

Table 4.3 National Spatial Strategy and MANs Phase 1

		MAN Town?
Gateway Towns	Letterkenny	Yes
	Sligo	Yes
	Dundalk	Yes
	Dublin	No
	Galway	Yes
	Limerick/Shannon	Yes/No
	Waterford	Yes
	Cork	Yes
	Athlone/ Mullingar/ Tullamore	Yes
Hub Town	Monaghan	Yes
	Cavan	Yes
	Ballina	Yes
	Castlebar	No
	Tuam	**No**
	Ennis	**No**
	Kilkenny	Yes
	Wexford	Yes

	Tralee	No
	Killarney	**No**
	Mallow	**No**

The towns named in the NSS, but not due to have a MAN built under Phase 1 were as follows;

	Population
• Dublin (Greater Area)	1,045,769
• Castlebar	11,891
• Tuam	6,885
• Ennis	24,253
• Tralee	22,744
• Killarney	14,603
• Mallow	10,241

The NSS was published after the investment in Phase 1 had been announced. The reasoning behind the decision to proceed with Phase I as originally conceived was that either contractual arrangements had been entered into, or the design was at an advanced stage. In each case, amending or adding to the scheme would have substantially slowed the roll out. It should be pointed out however, that while Phase 2 involves the construction of MANs in several more of the NSS towns, there remain several towns without a planned MAN, even after Phase 1A and Phase 2 are taken into consideration[16]. Perhaps more pertinent for this report is that the Phase 1A MAN towns were selected after the NSS was published, but yet only 4 of the towns selected in 1A are either Gateways or Hubs in the NSS.

In sum, it is clear that there are two central lessons from this review for the MANs and regional development. Firstly, as set out above, a number of the Phase 1 MANs remain without customers. One of the key narratives to emerge from the analysis has been the importance of an "anchor tenant" or an end customer in a town, whose

[16] See Annex 4 for an illustration of how Phase 1 complements the National Spatial Strategy and a list of the principal county towns and their status vis-à-vis the first phase of MANs.

demand for high quality broadband provides economies of scale for telecommunications companies wishing to also serve the domestic market. These large customers have the ability to act as a magnet for telecommunications companies and can justify the business case for operators to roll out services in towns that would otherwise not meet the criteria for investment. Equally, the selection of a town with sufficient scale in the first place can deliver a similar effect. In other words, the MANs are successful where they meet a critical mass of population and economic activity. In those cases they have, and can continue, to make a real contribution to pushing competition in the ICT market, and there appears a real prospect that demand will continue to exist in the future for other prospective uses to which these loops can be put.

Secondly, it is also clear that the MANs, in and of themselves, cannot deliver universal broadband access. In reality, they appear more successful when viewed as enabling infrastructure to promote development in regions that have already achieved critical mass. Recent census figures (2006) bear this out. These figures support the argument made at the inception of this process that larger urban settlements, and regions in their hinterland, would experience little difficulty in accessing broadband services once the market matured. However, those regions of the state characterised by smaller urban settlements, relatively greater reliance on declining primary productive sectors and an older demographic structure have yet to see the levels of broadband penetration (and availability) that other parts of the State have experienced. The fact that Phase 1 MANs have experienced significant difficulty in attracting customers in smaller settlements draws into question the wisdom of attempting to use them as regional development tools in these circumstances in the first place. The underlying structural or geographic problems which prevent or dissuade the private sector from providing a service can also apply to a MAN. Conversely, as has also been shown, should sufficient demand exist in the first place, the private sector will now provide a broadband connection, whether a MAN exists or not. In these circumstances, high end architecture like the MANs are clearly not the appropriate solution (or are even required) to ensuring connectivity in all cases. The forthcoming National Broadband Strategy appears a much more suitable means of extending broadband availability in the type of region, and the size of town, where the MANs have experienced significant difficulty.

4.5 Conclusion

The lessons learned with respect to the first phase of the MANs are, first and foremost that scale is important to the successful uptake by communications service provider. Consequently, notwithstanding the relatively early stage of the project in terms of measuring its impact and the fact that the MANs could potentially be put to use in ways not currently envisaged by policy makers, the first phase would appear to have been a mixed success. In those larger urban centres, the four cities and larger towns, the MANs appear to have provided a vital boost to the market at a critical time. In terms of takeup and the promotion of communications competition – the largest four cities account for approximately 70% of the revenue generated on the MANs by the management services entity. Importantly also, the IDA are unequivocal in that the MANs have provided their client customers with much greater choice, service and better prices when it comes to broadband (and telephony) connectivity. They have contributed significantly to the competitiveness of regional centres in Ireland and thus their attractiveness to international foreign direct investment, both new and existing.

Conversely, there are five MANs with no customers. There is a distinct possibility that at least some of these will never be used, not least in the context of a still rapidly developing market offering new technical solutions to overcome the network issues, such as wireless and 3G broadband. In addition, another five towns have only one service provider using the MAN – calling into question whether or not an entire MAN was required for such towns or whether there was an alternative solution that would meet the demand.

This immediately calls into question the process that was used to select these towns. It is already clear that the MANs were not the ideal solution for all settlements, a matter discussed in greater detail in the next chapter. However, it is also clear that the MANs continue to play an important role in the delivery of broadband services to customers in a range of urban centres across the country. In that context, another critical issue dealt with in the next chapter is the future of the MANs intervention with regard to the methods to be used to select future candidate towns. While the Interdepartmental report sets out, in great detail, the reasoning behind the construction of the MANs and

a variety of methods to be pursued to keep costs to a minimum, it does not engage with the choice of towns, which has proven to be a central issue.

Lastly, it is also unclear that, having chosen the MANs solution, sufficient care was taken to ensure that the design could be, and was, rolled out as efficiently and effectively as possible despite the use of fixed price contracts. It is precisely these oversights that the Capital Appraisal Guidelines were drawn up; careful application of these in the future would prevent many of the issues that have arisen with regard to the MANs.

Chapter 5 Conclusions, Lessons Learned and Recommendations

This chapter sets out the conclusions and key lessons learned with respect to the first phase of the MANs programme. Specifically, it addresses term of reference 6, 7 and 8. It also makes a number of recommendations to be considered in light of the above findings.

Before considering these issues however, two related themes require exploration in order to provide context for same. These relate to broader developments in the sector, and to the role and changing powers of the regulator.

5.1 Communications – A Rapidly Evolving Sector

As already mentioned, the communications sector in Ireland experienced dramatic changes in the period in question. The sector was characterised in the main by late uptake in residential broadband and a substantial deficit in investment by comparison with other OECD countries. The success, or otherwise, of the MANs can only be judged in this context. The nature of the sector and of the MANs intervention means that proving causality in an absolute sense is almost impossible. In introducing the programme the Department ran the implicit risk that if the MANs were successful (and the private sector, on achieving initial success, reacted by investing elsewhere in the sector), the argument could easily be made that the MANs were not, in fact, necessary at all. In other words, the nature of the MANs intervention, supporting competition in an oblique way (by creating a link between alternative national backhaul and local networks) meant that the MANs, if successful, would work in such a way as to occlude the underlying reasons for the growth of the sector.

There have been a series of important developments in the communications sector in Ireland since the launch of Phase 1 of the MANs programme however. The Irish economy has continued to grow and the incumbent, Eircom, has responded to competitive threats such as the investment programme of competitors such as NTL (now UPC) and the MANs programme. There is now widespread availability of DSL-type services in most towns in Ireland from a number of different providers serving

the residential, SME and corporate sectors. The availability of broadband would not appear to be the problem it was perceived to be in 2001/2002 in that there are a number of competing companies offering broadband services in a wide range of locations throughout the country.

As of the second quarter of 2007 the number of broadband subscribers in Ireland currently stands at 698,000, which is equivalent to approximately 16.5 subscribers per 100 population (June 07). The EU average, by the same calculation stands at 18.5 subscribers per 100 (for end March 07 – Irish figure for same period is approximately 14.3 per 100). Of these, 27% are classified as business customers. According to the latest data from ComReg, the basic ADSL product in Ireland compares favourably with other European countries and Ireland is ranked in 5th place in the DSL basket - that is 5 places less expensive than the EU average.

5.2 Role of Regulation

As well as the general investment environment, the regulatory environment of the communications sector has evolved considerably since the launch of the MANs programme. A key concern, publicised both by Comreg and by a number of concerned groups, was the relatively limited powers Comreg had to penalise those industry players that were found to be in breach of various directives.

The regulatory framework for telecommunications is set out principally in the Communications Regulation Act of 2002, and a series of Telecommunications Directives which were transposed into Irish law by statutory instrument in 2003. The telecommunications framework is based on principles of competition law and economics whereby the sector has been divided into a series of fixed and mobile markets and, using competition tools, the regulator must determine whether a market is competitive or whether one or more operator has significant market power. It lowered the barriers to entry to the sector by replacing the existing system of telecommunications licences with a new general authorisation system and changed the way significant market power of operators is determined and regulated. Where a determination of significant market power is made, the regulator is obliged to impose remedies to ensure that the dominant operator does not abuse a dominant position.

Eircom has been found to be dominant in the fixed line market and arising from this a number of remedies have been imposed on the company.

One of the most significant obligations on Eircom is the requirement to open the local loop (that part of the network between the home/ premises of the consumer and the local exchange) to competitors. In other European countries this has been a key driver of broadband rollout. Despite the legal obligation to do so, progress by Eircom in opening its network to competitors was slow. This has had a negative impact on the development of competition during the period in question.

In terms of effective regulation, enforcement is a key element and appropriate remedies and sanctions are essential to secure regulatory compliance. Both ComReg and the European Commission had cited the lack of adequate enforcement measures as an obstacle to the implementation of the regulatory regime. It was in this context that the enforcement provisions of the Communications Regulation (Amendment) Act 2007 were considered. The powers of ComReg have now been substantially strengthened by the enactment of this Act in April 2007. The Act provides for the creation of new summary, indictable and continuing offences by way of secondary legislation for breaches by operators of obligations imposed by ComReg. A range of penalties is provided for, from relatively minor penalties for minor infringements to more serious penalties of up to €5 million or 10% of turnover where companies commit serious violations of the regulatory framework. The aforementioned secondary legislation was enacted in June, 2007. The Act also confers on ComReg competition law powers, similar to those of the Competition Authority, which will allow it to investigate and prosecute anti-competitive behaviour or abuse of dominance in the electronic communications sector. It is worth noting also that Eircom has changed its approach and agreed to new LLU arrangements in September 2007.

5.3 MANs and Market Failure

In 2001 and 2002 the evidence at hand was that the private sector was unwilling or unable to invest in the rollout of broadband services, even with the inducement of State grants. The sector had seen a number of high profile bankruptcies in preceding months, and investment levels in the area were low. The recently privatised owner and

operator of the national telecommunications infrastructure was going through a series of refinancing deals and changes of ownership, and investment in the network was very limited. There was evidence that there was a "gap" in middle mile telecommunications infrastructure and that, without infrastructure competition, many locations around the country would be hampered in their ability to attract FDI reliant on broadband access. Ireland's international ranking in terms of broadband availability and uptake was very poor, and the situation showed little sign of improvement. These circumstances meant that urgency was a key element in any intervention; rapid delivery was prioritised, along with the creation of a sense of momentum in the local telecommunications market regarding broadband.

The fundamental question facing this review is therefore, as follows. Would the problems identified above have addressed themselves through the market, or was state intervention required? Furthermore, if the answer to the previous question was positive, was MANs the most suitable intervention? The evidence gathered above suggests that while the market has certainly embraced the communications sector in recent years, the MANs made a very significant contribution at a critical stage in this process, and continue to do so in a less obvious way. Certainly, the MANs programme – the construction of "middle mile", open access, fibre optic networks - would not have been replicated by the market. Indeed all high end national telecommunications infrastructure constructed in the period in question were built with State assistance. The immediate take up on the MANs and the uses to which they are being put, even in the 4 cities alone, shows that there was a market failure in place in the period in question, and that some state intervention was justified. If a MAN was required for broadband to become available on a widespread basis in a city the size of Cork (c190,000 people), then the likelihood of the market rolling out services in any workable timeframe to much smaller towns can only be said to be remote. The evidence shows also that the market has responded to competitive challenges including those posed by the first phase of MANs (and indeed the announcement of Government's intention to proceed with Phase 2), changes in the regulatory environment and the investment decisions of private sector. While the regulatory developments were critical in and of themselves, the MANs facilitated and enabled many of these regulatory decisions, and provided a critical open access route for competitors to gain access to local markets. In this context, the reaction of the

dominant player in the sector, Eircom, is noteworthy in many ways. The evidence gathered for this review uncovered a number of situations whereby the incumbent operator had actively promoted its DSL services before the completion of the MAN in a particular location. Interestingly, a recently published review of the Group Broadband Schemes found similar incidences with regard to that scheme.

It is also clear, however, that there have been a number of difficulties with regard to elements of the MANs project. There are a number of towns in Phase 1 with live MANs with no operators using them. On this basis, it should be noted that the selection criteria for towns and cities in Phase 1 were less than ideal in that the candidates were, to a degree at least, self selecting, rather than emerging from a structured analysis carried out on the basis of clear criteria. It is clear from the evidence and analysis presented here that the factors determining the success of individual MANs, such as the size of the town or city or the availability of competitive backhaul, were all capable of being modelled and predicted in advance. Equally, the lack of congruence with the NSS is also notable. Perhaps the most notable outcome however has been that even towns in Phase 1 with no MAN customers have broadband services and competition. As already mentioned, the contingent factors at the time of the inception of the MANs meant that particular emphasis was laid on the urgency of implementation at the acknowledged expense of planning. A formal assessment and detailed selection procedure could have prevented investment in MANs that now have no customers. It is important to point out, however, that there are circumstances in which a MAN is justified even in the (current) absence of a critical mass of population or economic activity. As is dealt with in a later section, regional development policy is often predicated on 'front loading' infrastructure in areas designated for future development. MANs, as high end infrastructure, clearly have a role in these circumstances.

It is therefore clear that the MANs, at least in some cases, have made a very significant impact on broadband roll out in urban settlements outside of Dublin, along with the already discussed impact on the industrial sector. However, the programme has not been without its issues. Having established that there was a market failure at play, and that the MANs are an effective means of redressing this, providing

beneficiary towns had a case, either now (via critical mass of population or business) or in the future (due to selection as NSS towns), the question remains as to whether MANs were the most appropriate response in all cases.

5.4 The MANs; One size fits all?

The evidence presented in this review shows that the MANs have clearly played an important role in the development of the market for broadband in the State. However, it also shows that considerable issues have arisen over the past number of years with regard to the uniformity of the effect of the MANs, not least in those cases where MANs lie dormant in towns that have several broadband suppliers. This begs the question as to whether or not the MANs were required at all or whether the market would eventually have provided a solution at no direct cost to the taxpayer.

Clearly also, part of this success is down to the regulatory environment created by Comreg. It is very difficult to surmise, however, even with the benefit of hindsight, what the effects of these regulatory decisions would have been in the absence of the MANs. At the very least, it is safe to say that (a) the roll out of Broadband would have been significantly slower in the absence of the MANs, and (b) that the MANs made a very significant contribution to the delivery of services in a large number of the States' cities and towns.

While a case can be made that the private sector would inevitably have dealt with the problems in the broadband market (ie, supply would have risen to meet demand), this has serious problems in this instance. Firstly, in the time that it would have taken for the private sector to bridge the 'broadband gap', the State would have been falling further behind competitor countries in terms of the availability of an increasingly vital service. It is all very well to suggest that the 'private sector would get there eventually', if 'eventually' is at a cost of significant lost FDI, GDP growth and lost employment. The second problem with the case for non intervention is that of coverage. As evidenced by the research completed to support the National Broadband Scheme, there are still areas of the State in which it is not possible to access broadband by means of fixed line, wireless or mobile internet. There is a substantial case to be made that, without MANs, the access map would be even more canted in favour of the more densely populated areas than it is now.

However, in terms of the effectiveness of the programme on the basis of customer take-up a number of learning points emerge. It is quite clear now that the scale of the town in terms of population provides a very good indicator as to the degree to which the infrastructure will be utilised – certainly in the short term. The most successful towns in terms of MAN customer uptake, and hence those towns where a MAN has been more immediately effective, have been the 4 cities or larger towns in terms of both population and business activity. Consequently, it is not unreasonable to infer that the business population in a particular town, and the mix of end customers with a need or a demand for high quality broadband has a significant impact on the attractiveness or otherwise of a MAN to its potential customers (namely communications companies and larger corporate broadband customers). This is because the average cost of a customer connection (or drop connection) to a MAN remains high, meaning that only the larger customers can justify incurring the expense of utilising the MAN directly. This leads to the conclusion that, all things being equal, scale or the urban centre's size is **a**, if not **the**, critical factor in predicting whether or not a MAN will be effective in terms of facilitating the delivery of high quality services and promoting competition. A MAN constructed in a town with few or no large end customers is not likely to promote competition and in fact could remain un-used were that critical mass not to appear at a later stage. The most notable instances where such scale could be expected to appear would be in regard to those hub towns set out in the NSS.

Therefore, in terms of the effectiveness of the programme in meeting one of its key targets - that of promoting competition in the communications sector - the evidence to date would suggest that it is significantly less successful in towns with smaller populations and no key corporate customers. Indeed four of the five MANs with no customers are very small in terms of population and the other town (Monaghan) only recently obtained an alternative backhaul, suggesting that the business activity in the towns and the demand for high quality broadband was insufficient to justify the construction of alternative networks in the first place. This may explain the difficulties in attracting operators to use this particular MAN. Allied to this, Monaghan currently has both DSL and fixed wireless access providers that may have satisfied much of the latent residential and SME demand for broadband.

As mentioned previously in the review, due to the medium to long term objectives of the programme it is too early to definitively judge whether or not the programme was a success in terms of meeting those objectives or indeed to assess the future uses to which the infrastructure may be put and any future economic benefits that may be derived from such uses. In fact the MANs, by design, are technically specified to very high standards with the aim of being future-proofed to meet the expected growth in demand for ICT services – and a fibre network was assessed as being the optimal means to ensure this for many years into the future. However it is clear that the MANs model has limitations when it comes to smaller settlements, and that in a small number of cases, they would appear for the moment at least to be a stranded asset. Moreover, the State's telecommunications market is significantly more mature now than it was when the MANs were first considered. The case for MANs being used in all situations is therefore very weak. As set out in Chapter 4, the MANs appear to have a very limited role to play in regions and settlements where critical mass of population and economic activity does not already exist. The MANS, as high end network architecture, are clearly not required solely to ensure broadband connectivity in smaller settlements given that the private sector now seems willing to provide broadband services in these cases. Equally, the forthcoming National Broadband Scheme (NBS) appearing a much more cost effective and appropriate means of extending broadband availability in cases where the market has not already done so (such in less populated rural areas). The MANs do have a significant role to play in larger settlements however, in driving down costs for employers, in providing significantly future proofed infrastructure and in maintaining the attractiveness of these cities and towns to international firms looking for locations for FDI.

As set out in the conclusion to the previous chapter, the failure to carry out a full needs and options analysis resulted in the universal prescription of the MANs as a remedy in all cases. The question of whether the differing scales of settlement involved had varying reasons for a lack of broadband connectivity does not seem to have received appropriate consideration. A key recommendation of this review is that any future such intervention receive such analysis, including the full application of the Capital Appraisal Guidelines.

There are two other ancillary points that bear brief attention at this juncture also. The first of these is that the external success factors determining the success (or otherwise) of MANs do not seem to have received adequate attention in the planning of the individual projects. These factors include, centrally, the availability of competitively priced backhaul. The second ancillary point relates to the ongoing monitoring of the MANs project in the context of the Departments larger role in the sector. It is clear that, particularly with regard to Phase 2, ongoing developments in the sector obviated the need for some of these projects. As dealt with in the recommendations, future such interventions require a facility that would allow them to be terminated at an identified point, were it decided that they were no longer required. The most obvious time for such a review would be at the mid point of a project, although circumstances may dictate a different approach.

5.5 Regional Policy Lessons

National regional development and the policy in this regard needs to be considered in the context of MANs spend. While this may appear to be labouring the scalar issues associated with the MANs, there is a critical point to be made about the alignment of such public infrastructure projects with the National Spatial Strategy. The NSS is premised on the concept of the State intervening to redress infrastructure deficits in certain locations, selecting them above others so as to encourage the formation of a critical mass of economic activity. In regional development terms, this works to ensure the increasing returns to scale, external economies of scale and general agglomerative benefits associated with urban settlements above a certain size. The logic behind the NSS is that, if critical mass is to develop in these select areas, investment is targeted in a smaller number of locations rather than diluting the impact over a large number of locations.

The MANs are only one form of State intervention; similar interventions exist in a variety of other fields (from education to transport). Obviously however, these interventions need to be co-ordinated across government agencies and departments. Such concentrated and complementary investment would lead to a greater efficiency and indeed effectiveness in terms of infrastructure deployment and usage and would facilitate the development of clusters of activity and would help the development of regional hubs and gateways.

Certainly the first phase, in terms of feeding into a coherent programme of regional development, was not assisted by the publication of the National Spatial Strategy coming after the announcement of the programme. Despite this, Phase 1 did manage to incorporate all Gateway towns (with the exception of Dublin which was deemed not to require a MAN) and all but 6 Hub towns. As an aside, the findings of this review support the premise behind the NSS, suggesting that targeted State investment in a small number of centres does in fact represent a more appropriate use of its resources. Spending money on relatively large and expensive pieces of infrastructure for which there may not currently be demand (actual or 'revealed' as opposed to stated demand) does not represent an optimal use of resources. One of the lessons of the MANs has been that they have been utilised more in larger centres of business and population. However, the inescapable conclusion is that the MANs should have been aligned with the NSS at the earliest possible opportunity so as to provide maximum return on investment. Granted, the timing of the publication of the NSS significantly complicated matters; however a reframing of the MANs was obviously possible in the context of the Phase 1A towns, which begs the obvious question as to why the same did not occur after the publication of the NSS.

Moreover, a substantial case emerges for a more nuanced policy framework for State intervention in settlements of differing sizes. This has already been recognised in that the MANs and Group Broadband Scheme are aimed at different size settlements, however it is clear that the characteristics of the MANs limits their effectiveness in settlements below a certain size, or which do not have a large anchor tenant. In some cases, clearly, fibre optic MANs are an effective solution, and should certainly be considered for all towns designated for considerable future development or of a given scale (particularly NSS towns and their immediate hinterlands – see below). In other cases however, particularly those urban settlements of smaller size that already have broadband services, careful evaluation is required to determine which type of intervention is required, if any. This evaluation should take into account the size of the town, the level and type of economic activity, proximity to larger urban centres or NSS towns, demand by existing Service Providers for a MAN, and the availability of backhaul capacity. Equally, if MANs are to be constructed in smaller settlements that

currently lack an anchor tenant, then that decision should be taken in concert with IDA location decisions.

5.6 The Future of the MANs

The question as to whether or not the Government needs to continue funding fibre optic open-access metropolitan area networks needs to be considered. Certainly broadband and the ICT sector remains an important element of industrial and regional policy and the MANs continue to be relevant in terms of overall Government policy of promoting regional development and service competition in the communications sector.

Normally, a key question to be addressed by a VFMPR relates to the future of the scheme. In this instance, it should be noted, that to a certain extent the question is moot. In December 2003, a Government decision was made to provide additional funding of €105m for 2005-2007 to carry out the Broadband Action Plan which would entail the construction of open-access broadband infrastructure to over 90 towns with a population in excess of 1,500. This "Phase 2" which in effect is a continuation of the initial phase has already commenced and at the time of writing €50 million has been spent with legal commitments to spend an additional €24m. It is expected that these MANs will be completed during 2007 and 2008. It should be noted that this cost relates only to the capital expenditure on the projects and does not include any expenditure incurred on consultancies or department staff and overheads. As stated previously, this second phase falls outside the scope of this review.

Notwithstanding this, post-Phase 1, there are fewer towns now that would appear to be able to, in the short term at least, justify investment in MANs in terms of population bases. Added to that is the fact that broadband is widely available in terms of residential and SME customers – most towns now have a choice of DSL/broadband provider. This means that potential customers of the MANs would be entering markets where demand for DSL products has been met or partially met leaving a smaller residual market for the new entrant to target.

One of the selection criteria for the second phase towns was that the towns must have had, according to the 2002 Census, a population in excess of 1,500 but be without

DSL broadband. The findings of this review raise a real question over whether or not there is still a gap in terms of (high quality and volume) broadband availability for which the MANs were originally designed and whether or not there is competition failure as a result of an infrastructure deficit that the installation of fibre optic networks would address. For example in the instance of one of the towns in Phase 2, Longford has an alternative cable provider, Crossan Cable - incidentally co-funded by the Department under the NDP 2000-2006. A legitimate question to ask would be whether or not that cable provider could meet the communications needs of the one big corporate client in that town– the Irish Prisons Services? Or was it necessary to proceed with a MAN to meet this demand?

In that context, two critical questions remain that require resolution. The first is that one must ask whether or not there is still a problem of market failure in "middle mile" communications infrastructure, the second being whether precisely the same problem (if one does exist) exists in every urban location in the country and whether a single type of intervention mechanism remains appropriate in the future?

The analysis suggests that the number of towns that do not currently have a MAN in Phase 1 but that could possibly justify such an investment - where the construction of a MAN would be "effective" in terms of meeting its objectives- is quite limited. As mentioned previously, excluding Dublin only six Hub towns were not covered by Phase 1. Given the population distribution and the nature of the urban hierarchy in Ireland, there are few settlements that can be considered 'Metropolitan' in a real sense, let alone ones still without a MAN. In that context, the likelihood that further MANs in settlements other than NSS towns, or very large towns not previously covered, would unilaterally equate to good value for money is remote.

Given the very different levels of populations of the locations in Phase 1, (and indeed subsequent phases) it would appear intuitive that different problems, if any, would manifest themselves across different towns and that consequently different solutions would be required or would be appropriate. Not all towns will have the same business mix and consequently not all towns will or can justify an open access fibre optic *metropolitan* area network. The review suggests that it is simply not a case of building smaller MANs for smaller locations because without the business demand for

broadband the business case will not exist for a service provider to use the MAN in the first instance – the cost of access to the MAN being the same irrespective of the size of the MAN.

In other words: the key question that must be addressed is whether or not the selection criteria for MAN locations are still valid, or whether the market has moved on? The industrial development agencies have a role in continuing to advise the Department in this regard, however the number of towns remaining that do not have MANs but that could possibly justify one are very limited at this stage. One of the key lessons with regard to Phase 1 has been that inadequate planning, and the lack of a mid term review, mean that inappropriate locations were selected in some cases. There is a very real possibility that similar problems may exist within the Phase II MANs programme. If the criteria do not justify continuing with the second phase in its entirety, then policy makers may need to reconsider or target investment elsewhere. The clear prioritisation should be on those remaining NSS towns, with consideration then turning to larger remaining settlements, on the basis of a clear and explicit evaluation of needs. On that basis, consideration should be given to halting the rollout of MANs in those towns for which Phase 2 MANs are planned but which have not yet started work (or have not yet entered legally binding contracts), pending such an evaluation. Such an evaluation should be conducted on the basis of the Capital Appraisal Guidelines from the Department of Finance, and include either a Multi Criterion Analysis or Cost Benefit Analysis, and set out Key Performance Indicators for any future projects. From this evaluation of Phase 1, suitable indicators include the forecast vs actual cost, forecast vs actual infrastructure delivered, numbers of contract customers on the MAN, and ideally the effect on the price of connectivity in the given centre.

From the development agencies' perspectives, the towns for priority investment are those identified in the National Spatial Strategy, and the key county towns. As can be seen in Appendix 5, of the towns identified in the National Spatial Strategy as Hubs and Gateways, Tralee and Killarney have been included in Phase 2. Of the county capitals, Trim/Navan and Longford are also included. At the completion of the second phase, four NSS towns will not have had a MAN constructed: Tuam, Ennis, Shannon and Mallow. While there may not be an immediate economic argument for the

provision of a MAN in these towns on the basis of their size now, there is however, a longer term argument on the basis that providing this investment now will ensure the provision of high quality services as these towns achieve critical mass of population and economic activity in the future. More suitable solutions may be found for those smaller settlements not judged to have, or be likely to attain, sufficient scale to require a MAN. The rollout of the NBS will ensure that broadband access is available in all parts of the State.

If it can be accepted that governments can or should plan regional development then the argument to go beyond these towns in terms of MANs infrastructure in the short to medium term is not convincing at present. This does not necessarily rule out other forms of State investment/intervention in other locations but suggests that MANs are not appropriate to, or desirable for, all locations.

5.7 Future of the Phase 1 MANs and Communications Policy

A question that must be considered is what should the State do, if indeed anything, with the MANs constructed in the first phase? They were designed to address a local access or middle mile infrastructure deficit and they have been of mixed success as evidenced by the differing take-up rates. The risk could arise whereby policy makers attempt to maximise the utility of the MANs and shape communications policy around the MANs in an attempt to further justify the initial investment.

As discussions progress in relation to other sectoral developments such as "next generation" networks there could be a temptation to shape policy around the infrastructure already in place – i.e. the State has these assets and how does it use them in the context of future policy formulation?

The MANs when originally devised were seen as a long term infrastructure investment to help deliver services over 20 years or more. The fibre optic network design was selected on the belief that demand for broadband services was going to increase (exponentially) and the broadband required per user was also going to grow. In this regard a fibre network was seen as the best medium to meet this demand as it has the capacity to deliver the highest volumes of data. Certainly, it is possible that the Phase 1 or 2 MANs, or at least some of them, could play a role in future "next

generation" networks. However, it is critical that future government policy in this regard is not shaped solely by the existence of the MANs - they can be part of the solution to a policy objective but the policy objectives in the communications sector should not be defined by the future uses to which the MANs could be put. Attempting to justify the initial investment by means of further investment is not a wise use of public funds. The cost incurred in constructing Phase 1 should be considered sunk in the context of future policy decisions in the sector.

The review has concluded that the objectives remain valid, however there is less evidence to support the continuation of the programme in further locations and consequently, the ultimate recommendation is to fulfil its legal obligations with respect to Phase 2 towns but not to proceed with any towns for which there is no contract in place pending a full and formal review of the suitability of a MAN for each town involved, and of the remaining NSS towns not already scheduled to receive a MAN.

Recommendations

1. While the administration of the scheme has been appropriate and cost effective, the prioritisation of urgency, while understandable in the context of the time, over proper planning at the outset has had a number of important consequences for the project. It should be reiterated that it is standard practice for any such intervention to proceed only after the full application of the Capital Appraisal Guidelines, including full needs analysis, options analysis and documented decision, design and planning stages and that these requirements need to be observed in all policy development instances.

2. The lack of appropriate baseline data, and the nature of the selection procedure for the Phase 1, and particularly for the Phase 1A, MANs, meant that a number of inappropriate locations were selected. Future projects in this sector require a more rigorous planning phase before construction can commence.

3. The lack of a formal review after the completion of the first phase of the MANs, and before the inception of the second, meant that some of the difficulties experienced were overlooked. While the situation was difficult, dynamic and pressurised, such a review would have contributed greatly to the later operation of the scheme. In the case of future such iterative schemes, such a review is highly advisable.

4. Despite the timing difficulties, the Gateways and Hubs selected by the NSS should have received greater and more systematic attention from the MANs programme and this should be the case in any future similar intervention in the communications area.

5. It is clear that, even in the case of the towns selected for Phase 1A, the MANs model is not always the optimal solution. Any future such programme should examine all technical options as part of the assessment process.

6. The telecommunications market is significantly more mature at this point (Q3, 2007) than previously, and certainly more so than at the time of the decision being taken to go ahead with the MANs; the MANs intervention model is no longer considered appropriate in all circumstances. A significant argument exists for new MANs in those remaining NSS Gateway and Hub towns that are destined for significant future development. Consideration could also be given to towns of a significant size and level of economic activity, subject to a clear and comprehensive evaluation process, as set out above. The Department should fulfil its legal obligations with respect to Phase 2 towns but not proceed with any towns for which there is no contract in place until such a time as a full evaluation has been carried out.

7. The fact that MANs exist and have considerable spare capacity should not become a driver of future communications policy and the development of associated programmes in and of itself. While it is logical that this investment be leveraged if possible, further investment directed solely at 'making use' of the MANs would not be wise.

8. Measuring the impact or outcomes of the intervention proved to be difficult as the outcomes are a function of a wide range of factors. However, it was further complicated by the fact that there was insufficient data collected at the planning stage against which progress could be monitored. Consequently, for future projects in this policy area, more attention should be paid to collecting key baseline data at the planning stage of the project.

9. The lack of a coherent pre project assessment also meant that ongoing monitoring of the scheme was very difficult, if not impossible, in a real sense. Any future project in this sector should have a set of clear and transparent Key Performance Indicators set out at its inception to allow for ongoing monitoring of the programme.

10. The lack of pre planning, and interim reviews in relation to the MANs programme were important oversights. However, even if such controls were in

place, the Department must have the facility to terminate the programme if the intervention is judged to no longer be required on the basis of a rational analysis, or indeed in the face of more pressing priorities elsewhere in the communications sector. Any future programme should have an open and transparent mechanism by which it can be closed with a minimum of legal and financial implications for the State, even if that involves a mid life termination clause in contracts.

Annex 1 – Summary of Second Call for Proposals under NDP 2000-2006

Programme line	Title	Description	Eligible Tenderer	Available funding[1]
A	Commercial Broadband Rollout	Commercial Broadband Rollout projects, similar to those currently supported under the NDP programme, aimed at providing commercial broadband services.	Any organisation	€20million
B	Commercial DSL rollout	This programme line is aimed at addressing geographical deficits in the availability of DSL services.	Any organisation	€15 million
C	Public Broadband Rollout Projects with economic development objectives	Public bodies (Local Authorities, Government Agencies, Health Boards, etc,) may now seek support for broadband infrastructure projects. Additional funding may be available for these projects subject to the public service nature of the project. These projects are aimed at the facilitation of public service delivery or economic development.	Non commercial Public Body (as defined in section 1.5.3)	€20 million
			Total	€55million

Annex 2 - Details of previous Government Investment Interventions

In 1999, under the National Development Plan 1994-1999 and Interreg II, €26 million was made available to support the roll-out of broadband to the regions. 13 broadband related projects were rolled out nationwide to a value (both public and private funding) of €70 million euro, and are now completed. These projects were as follows.

Advanced Communications Infrastructure Projects

Economic Infrastructure Operational Programme
(National Development Plan 1994-1999)

Tenderer	Project Description	€M	EIOP	Aid rate
Cablelink	Deployment of fibre optic cable from the Cablelink headend at Terenure to a node at Belgard Road in order to serve SME's in the Tallaght area	2.2	1.0	45.5%
CMI	Design and construction of a hybrid fibre coaxial infrastructure in Castlebar	1.65	0.78	47%
Eircom	Development of high capacity fibre optic infrastructure in 75 towns along the West coast from Sligo to West Cork. Eircom state that the percentage of rural customers with access to the national broadband network in the region will increase from 50% to 70% as a result of this project.	13.4	5.72	42.6%

Eircom	Provision of optical fibre cable along a 32 km link on a route connecting Galway and Castlebar (linking Westport, Aille, Ballinrobe, Kilconly, Kilmaine, Tuam and Claregalway) and a 40 km link between Birr and Tullamore improving access to broadband infrastructure and services	1.69	0.80	47%
Esat Telecom	Roll-out of fibre optic cable in urban areas including Cork, Galway, Dundalk, Thurles, Carlow, Tralee, Athlone, Sligo, Maynooth, Letterkenny & Limerick	4.2	1.9	45.2%
Esat Telecom	Extension of Esat's national fibre optic network to Mayo, Roscommon and Sligo covering the towns of Athlone, Ballina, Claremorris, Roscommon, Castlerea, Ballyhaunis, Sligo and Collooney.	5.0	1.9	38%
Esat Telecom	Extension of Esat's national fibre optic network from Cork to Little Island to Carrigtwohill (21 kms)	1.22	0.57	47%
HEAnet	HEAnet is a not-for-profit organisation delivering managed broadband services to over 30 educational/research institutions throughout the State. HEAnet will redesign and upgrade it's network infrastructure, to provide an all-Ireland architecture, on a par with other EU countries.	2.22	1.0	45%

Irish Multichannel	To provide 114 km of optical fibre network linking the towns of Ennis, Shannon, Limerick, Kilmallock, Charleville, Mallow and Cork enabling the delivery of broadband services in these areas	7.74	1.14	14.8%
Ocean	Construction of a high capacity fibre optic digital corridor linking Dublin, Athlone, Galway and Shannon and 30 locations enroute.	17.5	6.0	34.4%
Suir Nore Relays	Hybrid Fibre Co-axial cable upgrades and Digital MMDS upgrades in Clonmel and Kilkenny	4.41	2.0	45.4%
Suir Nore Relays	Proposal to upgrade and extend existing cable network in Thurles to provide broadband infrastructure and services addressing business, educational and residential sectors It is also proposed to develop an SME broadband Centre in Thurles to stimulate the demand for broadband services in the area)	2.72	1.14	42%
	Total investment	63.9	23.9	37.5%

Under the National Development Plan 2000-2006, the figure allocated to telecommunications initiatives was approximately €200 million. The intention was to use this funding under the Communications and E-Commerce Measure of the NDP to leverage and accelerate investment in competitive advanced information and communications infrastructure and services to enhance the potential for the development of electronic commerce facilities and enable the electronic provision of public services, including education services, virtual libraries, welfare and health services.

First Call NDP 2000-2006

Project	**Company**	**Project Cost (€ million)**	**Funding sought (€ million)**
Wireless Local Loop for Broadband Services	Esat Telecom	2.82	1.13
National Fibre Optic Network	ESBI	49.2	16.6
Accelerated xDSL	Esat Telecom	25.18	10.1
BMW Broadband Corridor	Chorus	17.8	5.9
SW Cork Digital Link	Esat Telecom	6.63	2.65
Broadband Infrastructure Longford	Crossan Cable	0.73	0.29
SE Broadband Comms Corridor	Chorus	50.3	13.7
Kerry Broadband Comms Corridor	Chorus	4.62	1.85
Regional e-Commerce hubs	Neveada tele.com	10.9	4.34

The ESB fibre wrap project consisted of the creation of a 1,300 kilometre optic fibre trunk network along the main electricity transmission grid, using the cables to carry the fibre. The network extends in two loops, the Southern loop serving Counties Limerick, Cork, Waterford, Wicklow, Dublin, Kildare, Laois, Offaly and Tipperary, while the Northern loop passes through Clare, Galway, Sligo, Leitrim, Cavan, Monaghan, Louth and Meath and also extends as far as Buncrana in Co. Donegal.

Esat BT completed a number of projects under the previous NDP 1994-1999, including the rollout of national and urban fibre networks and the construction of a high-capacity digital corridor linking Dublin, Athlone, Galway and Shannon, serving 30 locations en route. Under NDP 2000-2006 the company upgraded its digital link from Cork to Clonakilty, and enabled 40 telephone exchanges for delivery of broadband by Digital Subscriber Lines

The grant agreement with Eircom provided for upgrades to telephone exchanges for the provision of DSL services. Fourteen exchanges were enabled.

Smaller grant agreements were signed with Crossan Cable and Nevadatele for upgrades to local networks and regional switches. Chorus did not complete its projects. Another company, Formus, had been offered contracts but ceased trading before the contracts could be executed.

In the light of the private sector's inability to fund any more projects, and in order to achieve the Government's targets for broadband penetration, the emphasis was shifted to the Metropolitan Area Networks programme, in partnership with the local and regional authorities, where a higher level of funding (90%) could be made available and the infrastructure would remain in public ownership.

Annex 3 - Customer Trends on the MANs

LOCAL AUTHORITY	MAN Town	Customer numbers 04/05	Customer numbers 05/06	Customer numbers Q2 06/07	Customer numbers April 2007
CORK	Cork	**3**	**11**	**13**	**14**
DONEGAL	Letterkenny	**2**	**3**	**5**	**5**
	Gweedore	0	0	0	0
GALWAY	Galway	**2**	**6**	**8**	**9**
WESTMEATH	Mullingar	0	0	0	**3**
	Athlone	0	**2**	**2**	**2**
LAOIS	Portlaoise	0	**4**	**4**	**4**
ROSCOMMON	Roscommon	0	0	0	**1**
OFFALY	Tullamore	0	**1**	**1**	**2**
LEITRIM	Carrick-on-Shannon	**1**	**2**	**3**	**3**
	Manorhamilton	0	**1**	**1**	**1**
LIMERICK	Limerick	**3**	**6**	**10**	**13**
MAYO	Ballina	**1**	**1**	**1**	**2**
	Kiltimagh	0	0	0	0
NORTH EAST	Dundalk	0	0	**3**	**6**
	Drogheda	0	0	**1**	**1**
	Carrickmacross	0	0	0	0
	Monaghan	0	0	0	0
	Cavan	0	0	**3**	**4**
	Kingscourt	0	0	0	0
SOUTH EAST	Carlow	0	0	**1**	**3**
	Kilkenny	0	0	0	**1**
	Clonmel	**1**	**1**	**2**	**3**
	Dungarvan	0	0	0	**1**
	Waterford	**1**	**3**	**4**	**4**
	Wexford	**1**	**2**	**2**	**5**
SLIGO	Sligo	**1**	**2**	**4**	**5**
	Totals	**16**	**44**	**69**	**92**

Context Statement for the Value for Money and Policy Review (VFMPR) of Phase I of the Metropolitan Area Networks (MANs) Programme

The Department of Communications, Energy and Natural Resources is currently implementing the Government's Metropolitan Area Networks (MANs) Programme. The construction of the MANs by local and regional authorities is co-funded by the European Regional Development Fund under Ireland's Regional Operations Programmes 2000 - 2006. In the period 2003 to 2005, 27 networks were constructed under Phase I of the Programme and it is expected that Phase II will have delivered MANs in a further 66 towns by mid-2008.

MANs are State owned, underground telecommunications networks that are located in regional cities and towns. They consist of carrier-neutral duct and fibre rings linking the main commercial and public buildings to "co-location centres" where service providers locate their telecommunications equipment and access the network. The MANs make these state-of-the-art facilities available to service providers to enable them to offer high-speed broadband to their retail customers without having to build their own networks.

Since mid-2004, the Phase I MANs have been managed, operated and marketed by eNet. The Department is currently tendering for a Management Services Entity (MSE) for the Phase II MANs.

As the MANs are a long-term (20–30 year) investment in Ireland's telecommunications infrastructure it is not surprising that the networks generating most custom in the earlier years of the investment are those built in the cities and larger towns where the high-speed connectivity offered by the MANs is currently most in demand. Nevertheless, after less than four years, the networks have enabled 32 service providers to establish presences in

regional towns and to offer and compete for broadband services over a range of platforms.

The telecommunications sector is very dynamic and needs to respond to new technologies to thrive. In 2002, when the Government first decided to provide the sector with open access infrastructure through its MANs Programme, broadband availability in the regions was negligible and less than 4,000 subscribers had broadband services. There are now about 1,000,000 broadband customers across 6 different platforms (DSL, wireless, cable, mobile, satellite, and fibre). The MANs have directly and indirectly provided the competitive impetus to drive that impressive rollout of broadband.

The sector's new challenge is to respond to future demands for next generation broadband services. As demand grows for higher bandwidths to deliver these products, fibre optic networks will increasingly be a favoured infrastructure platform, particularly in urban areas. The availability by mid 2008 of over 1,000 km of high-specification MANs infrastructure in more than 90 Irish cities and towns will facilitate service providers to compete with each other to deliver next generation broadband over fibre optic technology. The MANs will also be used by service providers to support the rollout of next generation wireless services.

The Department is currently preparing a Next Generation Broadband (NGB) Paper which will review policy options in relation to the optimal role for Government in the evolution to next generation broadband. In anticipation of this VFMPR and the draft policy paper on NGB, the Minister decided in December 2007 to suspend the commencement of construction of any further MANS. Further investment in broadband infrastructure will be guided by this VFM&PR, the policy paper on NGB (when finalised after public consultation) and other analysis currently underway.

It is likely that proposals to build additional MANs will, in accordance with the recommendations of this report, prioritise National Spatial Strategy and other larger towns in the first instance.

Communications Development Division
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