Broadband – Towards a national plan for Scotland

Ewan Sutherland LINK Centre University of the Witwatersrand and CRIDS, University of Namur

Abstract

The development of national broadband plans has been used by many countries to join up different areas of governmental and regulatory activities and to set ambitious targets for ubiquitous access to and use of the latest fixed and wireless networks and services. For Scotland this requires working within EU and UK legislative frameworks, which have also provided the bulk of the finance for interventions. It also requires an understanding of the significant weaknesses of urban broadband adoption compared to other UK and EU nations and of its e-commerce supply and demand. While resources are being targeted at rural and remote areas, more are needed to close the social digital divide, which is unavoidable if the stated ambition of being world class is to be achieved.

Introduction

National broadband plans are now commonplace, taking a great many forms and encompassing a variety of activities, reflecting the state of deployment of networks, key sectors of national economies and their competitiveness, together with social concerns (OECD, 2011a) (EC, 2012a). The challenges in formulating a broadband policy for Scotland are formidable. Infrastructure has to be brought to outlying locations (e.g., a croft in Assynt), the services have to be affordable for the poor (e.g., a single parent family living on benefits in Drumchapel), they have to be sufficiently attractive and engaging to be used (e.g., by the elderly), they have to be safe to use (e.g., securing bank account details against fraud) and there has to be training and support. Somehow all of this has to be paid for, involving complex relationships between the various companies, with incentives for investments in new devices, content, applications, services and infrastructure, while enthusiastic adoption by businesses and consumers has to be ensured.

Broadband brought telecommunications back into the political sphere, with questions asked about the performance of a market governed by an arm's length regulator, by whom nearly everything had to be treated as a technical consideration, to be addressed with economic tools. Broadband can and, perhaps, must be addressed at a multiplicity of levels: European Union (EU), member state, nation, district, community, household and individual. Potentially each can play a positive or negative role, requiring some rather ungainly and awkward ducks to be put in a row, if the universal adoption of high speed broadband is to be achieved.

The policy objectives of ubiquitous broadband include improving national competitiveness, boosting growth and creating jobs, which requires close coupling with economic and innovation strategies. There is also the social aim of inclusion, by closing digital divides: with comparable nations and between richer and poorer parts of the nation, plus ensuring full accessibility for the disabled and the growing numbers of the elderly. Territorial integrity requires the provision of broadband services in remoter areas. Universal access to broadband enables e-government, which has the potential to save money for taxpayers and increase access to and improve the quality of governmental services.[i]

Since the general election of 1979 telecommunications in the United Kingdom (UK) has changed beyond recognition, being transformed from direct government provision to the governance of telecommunications markets. A remarkably complex regulatory state has been created, comprised of ministers, committees, commissions, authorities, offices, tribunals and ad hoc industry-led bodies, all intervening in markets. This was made more complicated still by a system of asymmetric powers devolved to national legislatures and a dual British-English identity for Westminster and Whitehall institutions. (Sutherland, 2012)

British Telecom (BT) was split from the Post Office and sold to a multitude of citizen-shareholders, competition was introduced and red callboxes all but disappeared (Cramb, 2012). Mobile telephony became ubiquitous and smartphones have become commonplace. Internet access appeared first as dial-up and then as always-on broadband, with growing numbers of citizens uploading their own or other peoples' content. Faster broadband, using optical fibres, has begun to be offered. Free to air television expanded in scope and became digital and high definition (HD). Commercial terrestrial and satellite television services have proliferated, for some of which people happily pay substantial subscription fees.

Radio has not died as was predicted, but is now digital and accessible over the Internet. Both TV and radio offer a week in which to catch up, when it has not been possible or convenient to watch or to listen to the scheduled broadcast.

While the Scotland Act 1998 reserves legislative powers for Westminster, there remains considerable scope for interventions by the Scottish government, by development bodies, by local authorities, by housing associations and by communities.[ii] Governments at all levels across the European Union (EU) have encouraged and supported the supply of broadband and helped to stimulate demand.[iii] Given the present constraints on spending, such interventions have to be judged with special care to ensure value for money and return on investment.

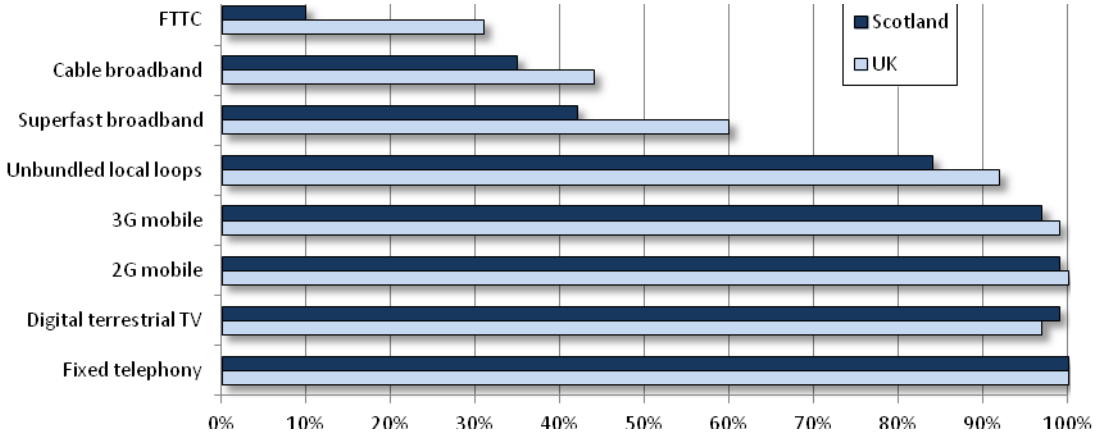
This article examines first the state of broadband in Scotland. It then examines lessons from some other countries and from previous efforts in Scotland. The administrative, legislative and oversight activities of the Scottish and UK governments with respect to broadband are then reviewed. The activities of the European Union are very briefly described. Finally conclusions are drawn and issues identified for further research.

Broadband in Scotland

Fixed broadband services are available both over telephone networks as Digital Subscriber Line (DSL) and, in some locations, as a cable television modem service. The next stage requires replacing the copper wires with optical fibre to street-side cabinets (FTTC) or with optical fibre to the home (FTTH), sometimes known as – echoes of Star Trek – next generation access (NGA).[iv] In some remoter areas the best option for fixed broadband is Ka band satellite, which has become more affordable. Mobile network operators have upgraded their 2G or GSM networks to 3G or UMTS, allowing mobile Internet access, though with many complaints about the insufficiency of coverage. From 30th October 2012, they made 4G or Long Term Evolution (LTE) available, initially in Edinburgh and Glasgow with assurances of wider availability, requiring considerable investment in optical fibre to base stations.

Availability of the various networks in Scotland lags the UK, largely because the population density is about one quarter of the UK average and in the Highlands and Islands drops to about one thirtieth (see Figure 1).

Figure 1 Availability of communications infrastructure in the UK (OFCOM, 2012c)



At the centre of UK broadband policy has been the unbundling of the copper local loops, from BT exchanges to homes, allowing competitive access for third parties to supply telephony and broadband. The Openreach agreement between BT and OFCOM was made under the threat of referral to the Competition Commission in terms of the Competition and Enterprise Acts, rather than using the Communications Act (Cadman, 2010) (Cave, 2006) (Whalley & Curwen, 2008). It was argued that non-discrimination and accounting separation would have continued to have been insufficient to deter behaviour of BT that was intended to sabotage access. The evolving agreement has been of such complexity that few people understand it (OFCOM, 2012b). The economics of unbundled services favour urban areas, so that availability in rural areas has lagged, both at the UK level and in the overall level for Scotland, with some rural loops too long for a broadband service (see Figure 2).

A survey of 1,000 small and medium sized enterprises (SMEs) was conducted in the autumn of 2010 (Scottish Government, 2011b). Some 95 per cent of SMEs with 10-249 employees were connected to the Internet, though this fell to 72 per cent for those firms with less than 10 employees. The majority of non-users perceived the Internet to offer only limited benefits, with 20 per cent not using the Internet because of a lack of skills and 13 per cent indicating concerns about cost, but only 1 per cent citing non-availability.

The vast majority of businesses using the Internet had broadband, with a small minority using dial-up and another small number using dedicated business broadband services, while 5 per cent used mobile broadband. More remote locations suffered slower speeds (see Figure 3).

Figure 2 Availability of unbundled loops in the UK (OFCOM, various years)

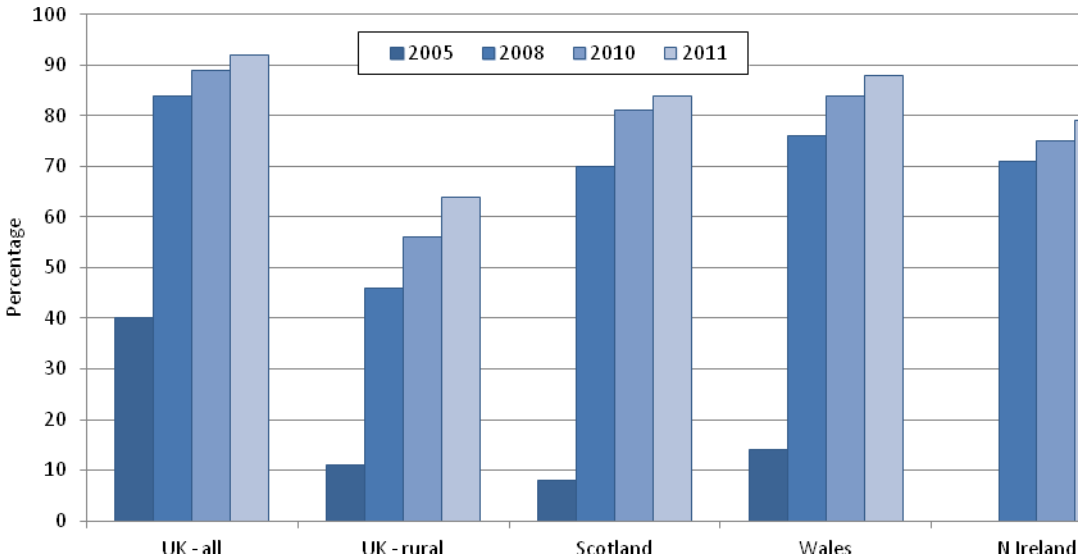
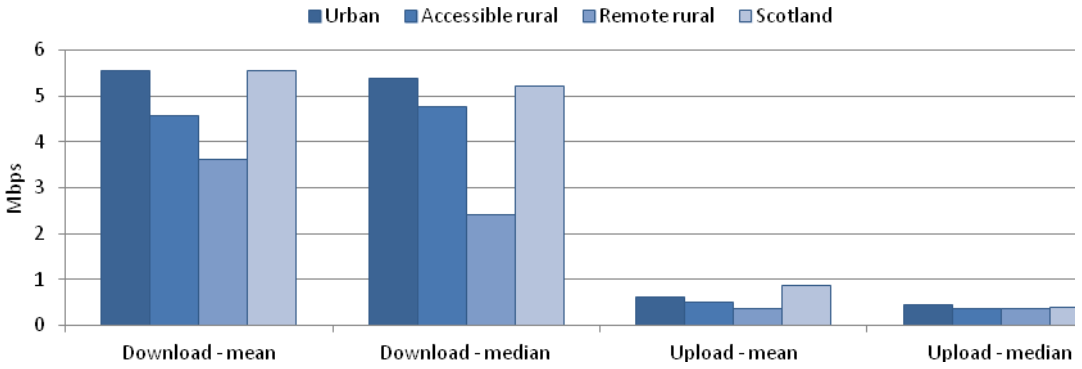


Figure 3 Actual speeds of business broadband in 2010 (Scottish Government, 2011b)



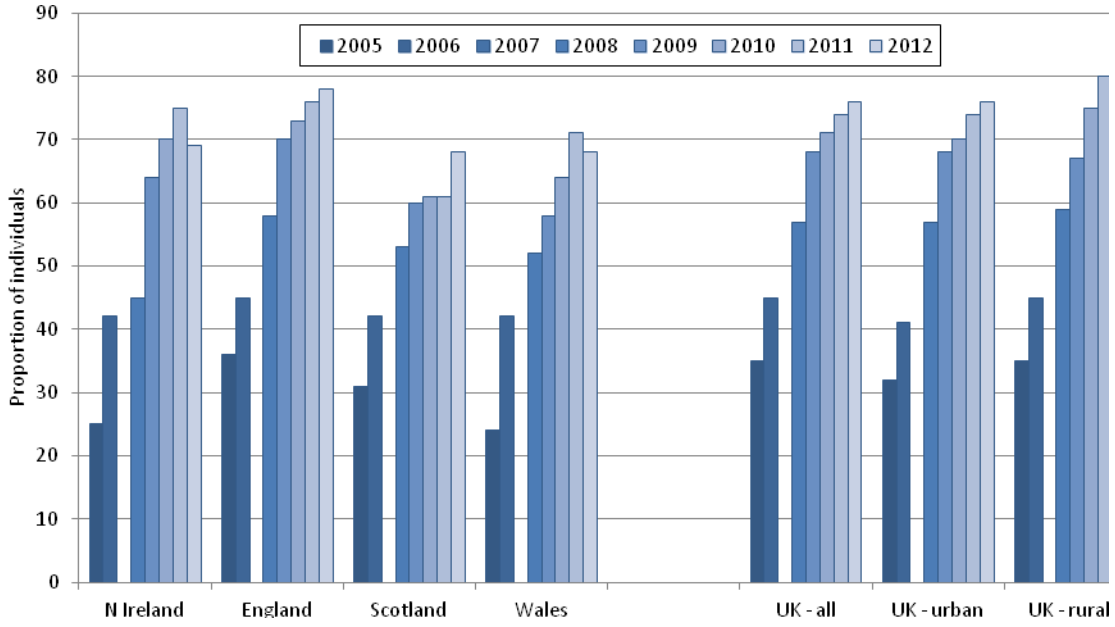
UK businesses have made considerable progress in their adoption of e-commerce, already representing 8 per cent of GDP, with the Boston Consulting Group (BCG) forecasting an annual growth of a remarkable 11 per cent, in part due to a surge in m-commerce enabled by the widespread use of smartphones and tablet computers (BCG, 2012). While data for Scotland are disappointingly limited, it appears that e-commerce lags the UK by a considerable margin, notably in (SQW, 2012):

- Exports;
- Adverts for e-commerce related jobs; and
- Consumers using search engines.

Amongst the barriers are a failure to grasp the potential of e-commerce, a lack of critical mass and significant difficulties in the recruitment of people with the appropriate skills. More detailed statistics are needed for e-commerce in Scotland, while networking opportunities for individuals and businesses must also be improved.[v]

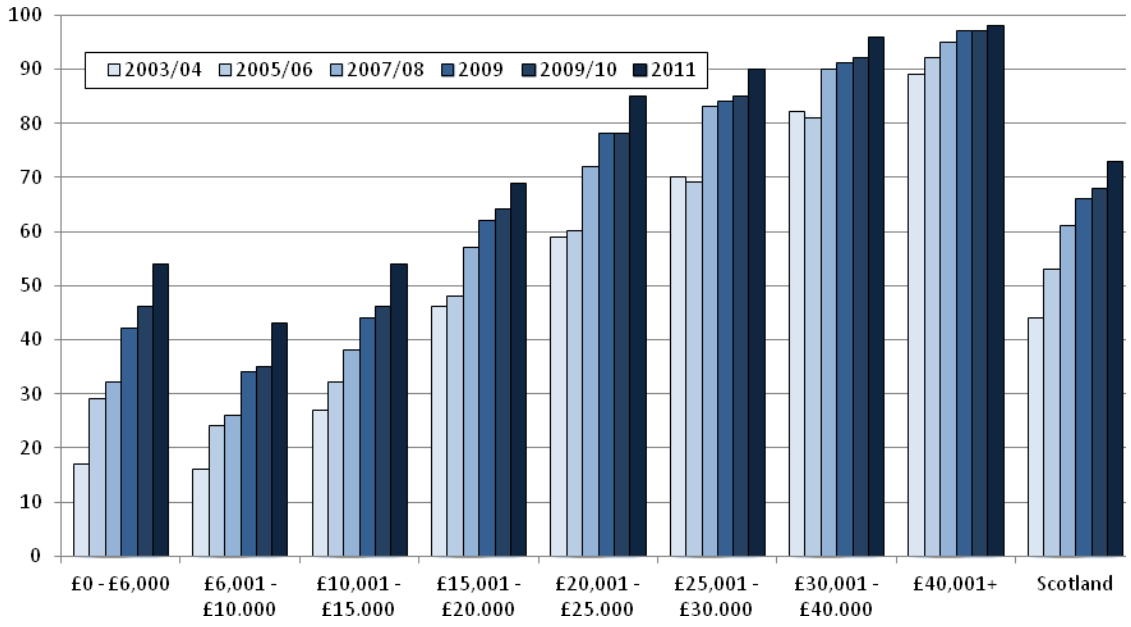
OFCOM publishes annual reports on the communications markets of the UK and breaks this down for the four nations. Unfortunately, the sample sizes for Northern Ireland, Scotland and Wales are small enough that there can appear significant fluctuations in the levels of broadband adoption (see Figure 4). While it is clear that Scotland lags England, it is also quite likely that, despite the 2012 data, it also lags the two other nations.[vi] What is certain is that urban adoption lags rural broadband.

Figure 4 Broadband in first quarter of the year (Source: OFCOM)[vii]



The Scottish Household Survey (SHS) reports Internet access which gives higher numbers than OFCOM, but is less regular giving an impression of growth and stagnations (see Figure 5). While the higher income bands are saturating at close to ubiquitous adoption, the lower income groups are at very much lower levels, greatly affecting the national figure.

Figure 5 Households with Internet access by annual income (SHS, various years)



OFCOM has provided additional data on the poorer performance of Scotland as a broadband adopter (see Table 1). Scotland lagged the UK with some stark differences, notably in those aged 16 to 34 and 55 and over, and where household income is below £17,500 per annum.

Table 1 Broadband adoption (OFCOM, 2011a) (OFCOM, 2012c)

		Age			*Annual household income*		*Households with children*	
	Year	*16-34*	*35-54*	*>54*	*< £17,500*	*> £17,500*	*Children*	*None*
United Kingdom	2011	82%	83%	55%	52%	89%	89%	65%
	2012	83%	86%	59%	56%	87%	90%	68%
Scotland	2011	65%	85%	34%	26%	88%	73%	55%
	2012	78%	85%	45%	34%	97%	85%	60%

A significant factor is the lower level of computer ownership, which until recently was a prerequisite for use of broadband, and a higher proportion of people in Scotland do not use the Internet at all (e.g., not at school, workplace or a public library). A higher proportion of Scots do not use the Internet, predominantly this is a failure to find a reason to do so (see Table 2). There is a similar shortfall in adoption of other technologies (e.g., digital radio and smartphones) suggesting Scotland is the technological laggard of the four nations. The causes seem likely to be cultural and social, that in some ways Scots and, especially, the urban proletariat are significantly less inclined or, at the least, markedly slower to join the hyper-connected world favoured by the rest of the UK.

Table 2 Main reasons for not having a home broadband connection (OFCOM, 2012c)

Reason	*Percentage*
Don't need it	41%
Don't want a computer	25%
Don't have knowledge/skills	19%
Too expensive	18%
Too old to use Internet	18%
Likely to get one next year	17%
Other	6%

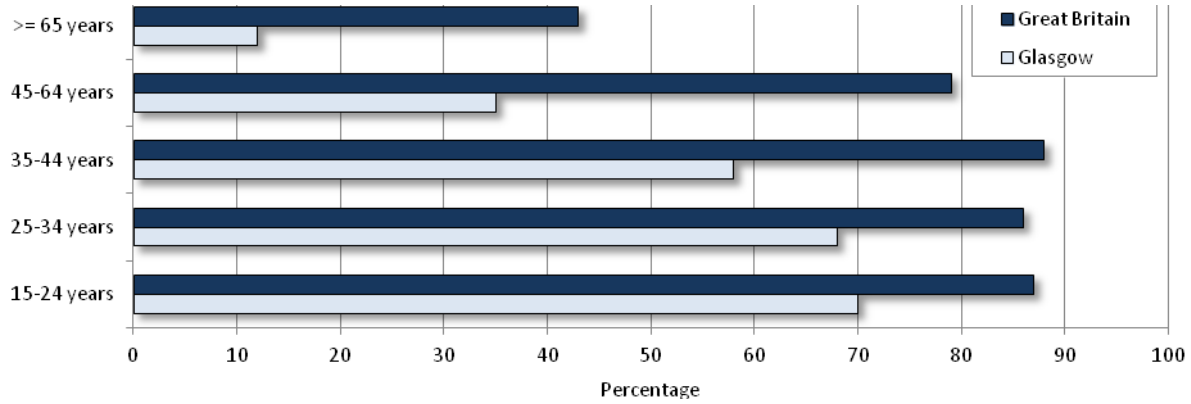
In 2010, OFCOM reported that only 50 per cent of homes in the Greater Glasgow area had access to broadband, compared to 76 per cent for the UK. Glasgow accounted for 11.4 per cent of the Scottish population, which, given its lower broadband adoption rate, weighs heavily on the average for Scotland and on aspirations to be the leading nation. The British Population Survey (BPS) showed Glasgow compared poorly to other British cities in terms of fixed broadband adoption (see Table 3). OFCOM suggested that the population of Glasgow was atypical, with 59 per cent of adults classified as 'hard-pressed'. A recent report points to high levels of Scottish households with a combination of disadvantages, including poor housing, poor health and worklessness, in addition to low income (Bazalgette, Barnes, & Lord, 2010). While broadband take-up was lower across and among all age groups, it was especially so amongst older residents (see

Figure **6**).

Table 3 Fixed broadband take-up, by city (January-September 2011)

	%
Great Britain	76
Glasgow	**50**
Newcastle	64
Birmingham	72
Manchester	75
Liverpool	77
Bradford	77
Brighton & Hove	81
Leeds	86
St Albans	92

Figure 6 Fixed broadband take-up, by age group in 2011 (Source: OFCOM from BPS)



In public health there is a "Glasgow effect", in which excess mortality is observed in the Greater Glasgow area in a way not seen in comparable UK cities, with death rates having diverged noticeably since the 1980s, failing to follow the improvements achieved elsewhere (Reid, 2011) (Walsh, Bendel, Jones, & Hanlon, 2010). Something more than "just deprivation" has been observed to be at work, which might be related to social capital and social networks, even to societal breakdown. At worst, the work in public health points to methodologies to identify underlying causes at low levels of aggregation. It may also point to issues about differences in behaviour, communications and culture that are common to health problems and to the lower adoption of broadband.

These data point to the need for more analyses, in particular surveys of non-users of the Internet at more detailed levels, in order to inform policy initiatives. Data collection needs to be aligned with Eurostat, in order to ensure comparability of results with other European nations and regions. With better data it will be possible to organise significant efforts along the lines of Go ON UK (formerly Race Online 2012), led by Martha Lane Fox, the UK Digital Champion, to engage and enthuse the non-using groups.

Learning from abroad

There is a wide variety of international experiences in support of broadband from which lessons can be drawn. Some are far from being readily applicable, notably those from the Far East, which are intended to boost domestic manufacturing, which Scotland no longer has. Some depend on very dense demand, in high-rise housing, such as Singapore, which will soon have installed an optical fibre to every home and business. While its population is comparable to Scotland, Singapore is only the size of the Isle of Skye, making its network architecture and market structure inapplicable. The USA has vast rural tracts in which telecommunications needs are met through an expensive programme of subsidies that, even in less austere times, might be thought unacceptable.

Perhaps the highest profile national debate has been in Australia where the 2010 federal election turned, to a significant extent, on the proposal to construct a National Broadband Network (NBN), persuading voters and then key independent MPs to support Labor rather than the Liberals. There was and is a concern in rural and remote Australia that market forces would not deliver broadband comparable to that in the cities, leading the Labor government to begin to roll-out the largest infrastructure project since the Snowy Mountains hydro-electric scheme (BCDE, 2010). Even this will only take the optical fibre network to 93 per cent of homes and business premises, drawing a red line beyond which services are to be wireless, both terrestrial and satellite. The cost could be up to AUD 36 billion, with the payback having been questioned (OECD, 2010a). The effects on competition are still uncertain as the regulator struggles to fine tune the access arrangements for Internet service providers (ACCC, 2011) (ACCC, 2012). It has been a prominent and often passionate public debate about how to achieve the vision of a networked nation.

The Republic of Ireland recognised that a gap existed in the provision of broadband for about a quarter of a million rural homes and businesses. Following a competitive tender, a contract was awarded to "3" (Hutchison Whampoa Ltd) to operate the National Broadband Scheme (NBS) (Government of Ireland, 2010). To facilitate competition, 3 was required to provide wholesale access to other operators. The total value of the investment was €223 million, of which the Government of Ireland contributed €79.8 million, with the remainder coming from the European Regional Development Fund (ERDF). By late 2010 a mobile broadband service, using 3G, with a minimum download speed of 1.2 Mbps and a minimum upload speed of 200 kbps, was operational for those rural areas that lacked other forms of access to broadband. 3 has estimated significant economic benefits from broadband use in Ireland (see Table 4). A Rural Broadband Scheme (RBS), intended to address the last one per cent not covered by any services, received five thousand applications of which almost four thousand qualified for funding (Government of Ireland, 2012). A

group of twenty-nine companies was selected to supply broadband under this scheme, at least of which was able to make an offer to all qualified applicants. Despite the severe retrenchment of its budget, the government allocated €30 million in 2012 for the phased rollout broadband at speeds of 100 Mbps to all second level schools and the Rural Broadband Scheme, this includes funding from the ERDF. A plan for a connected Ireland has recently been launched to ensure speeds of up to 100 Mbps, with a minimum of 30 Mbps for all premises "no matter how rural or remote" (Rabbitte, 2012). The cost is expected to be €350 million, of which half would come from public funds, additionally a digital strategy is to address social inclusion, stimulation of demand and economic growth.

Table 4 Estimated economic benefits from broadband in Ireland by county (three.ie, 2010)

County	*Cavan*	*Clare*	*Kerry*	*Limerick*	*Monaghan*	*Roscommon*
Jobs created	450	490	850	570	290	400
Injection to local economy	€21.6	€23.4	€40.8	€27.4	€13.9	€19.2
Benefit in increased taxes and rates	€3.0	€3.3	€5.8	€3.9	€1.9	€2.7
5 year net present value	€107.5	€116	€203	€136	€69.3	€95

Catalonia used the economic crisis as an opportunity to invest in next generation broadband, developing its *Xarxa Oberta*, a public-private partnership providing an open access network funded within the EU state aid rules (Ganuzaa & Viecens, 2011) (EC, 2010f). One objective was to overcome the conservative investment strategy of Telefónica de España, its relatively high prices and market dominance. The *Generalitat de Catalunya* (2012) has a long established policy for information society developments. It self-provided connections to all municipalities in order to serve several thousand public bodies and their offices, while providing wholesale access to service providers, all overseen by the Spanish regulator.
Nations as diverse as Singapore, Catalunya, Ireland and Australia have chosen to make interventions to ensure market structures and networks are in place to deliver more and faster broadband. It is important to identify lessons applicable to Scotland in order to be able to craft policies that help to achieve world class outcomes.

Learning from the past

Scotland is not without its own precedents. Hi-ISDN was the first attempt by the Highlands and Islands Development Board (HIDB) to accelerate modernisation of the BT network in the early 1990s (Eosys, 1986) (Hamilton, Lough, & Dixon, 1990). With £5 million from the Scottish Office and £11 million from BT, the network was upgraded in 43 exchange areas to provide Integrated Services Digital Network (ISDN). The Network Services Agency was created in parallel to provide value-added services over the ISDN. The justification for the project had been to create jobs in the Highlands and Islands, though foreign direct investment (FDI) could have been more effective (Richardson & Gillespie, 1996).

In the late 1990s, Scottish Enterprise claimed to have found a market failure that it proposed to fill through the Accessing Telecoms Links Across Scotland (ATLAS) project. The first phase, in 2002, was to create a virtual Telecommunications Trading Exchange (TTE) with a backhaul link from London and thus a connection to the global Internet backbone. This was to reduce perceived peripherality and to cut the high costs of international access for businesses and Internet Service Providers (ISPs) (McCormack, 2002). The second phase was to link up thirteen business parks, for which a budget of £26.7 million for capital works and £4 million for operating costs was approved. Thus plc, a service provider, complained to the European Commission (EC), showing a prima facie violation of the state aid rules, which triggered a full investigation and a substantial redesign of the project. After a two year delay, the project was cut back to £9.7 million, limited to passive infrastructure (i.e., ducts, chambers, optical fibres and meet -me- rooms) on only six sites, with the management, maintenance and leasing of dark fibre being outsourced, providing neutral access on a non -discriminatory basis (EC, 2004) (Atlas, 2010). The network was subsequently sold off (SSE Telecoms, 2010).

The Scottish Executive awarded two contracts to Thus (later C&W Worldwide) in 2006 to provide managed broadband services, initially with a wider scope but later narrowed to local authorities and schools: Pathfinder North (£63 million) and Pathfinder South (£27 million). The evaluation could not quantify the benefits, but instead relied on qualitative reviews such as the positive feedback on the use of teaching and administrative support systems running over the Pathfinder networks (Mott MacDonald, 2011). The projects were found to have delivered cost-effective broadband, for example, on Pathfinder North the cost of bandwidth was reduced from £3,323 to £600 per Mbps per annum.

The geography of Scotland will require enduring measures and subsidies to address peripheral regions, if they are to obtain reasonable levels of broadband service. A strategy has to be adopted that maximises the contribution of commercial players and ensures compliance with the EU state aid rules at an affordable cost.

The Scottish legislature and administration

In its first broadband strategy the Scottish Executive (2001a) aimed "to make affordable and pervasive broadband connections available to citizens and businesses across Scotland". All schools were to have access to broadband and all units of the health service would be able to transfer data and use telemedicine services, while local authorities would be able to offer their services over broadband. This strategy was closely linked to its economic plan (Scottish Executive, 2001b). However, it did not define affordability, implicitly viewing household adoption as showing affordability, ignoring those where it was available but not adopted.

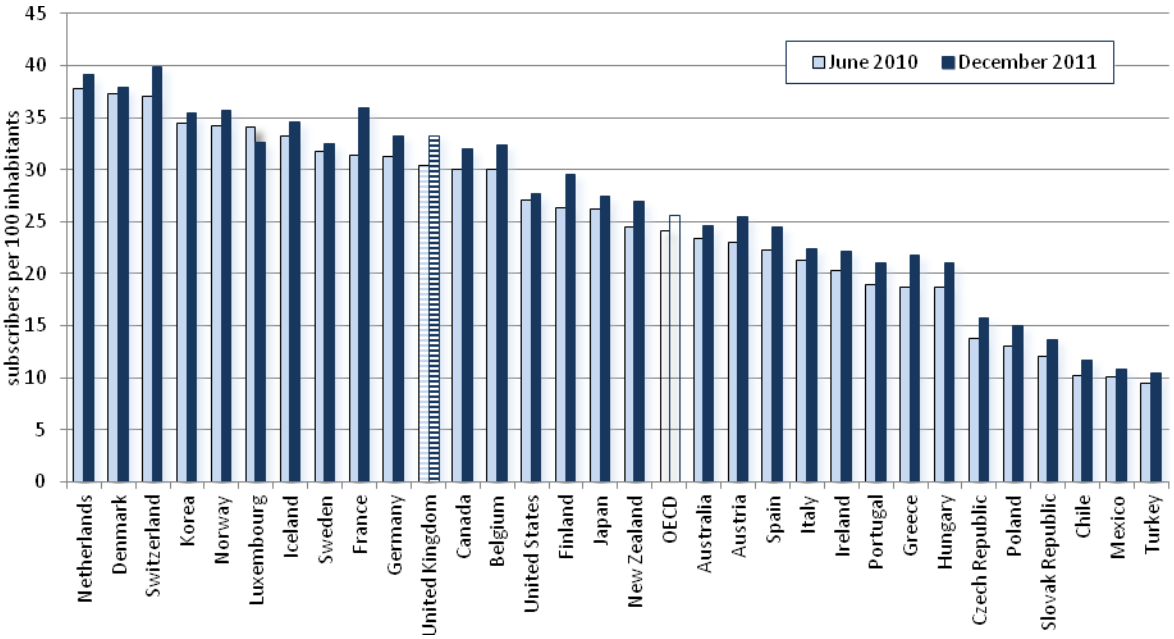
A survey in the first quarter of 2003 found 57 per cent of households had access to a broadband service, though only 25 per cent of business premises and homes had a choice of technology (Analysys Consulting Ltd, 2003). Three gaps were identified:

- Outside the Central Belt infrastructure competition was limited;
- Broadband coverage was low compared to other countries and other UK regions; and
- Business adoption of broadband was very low compared to other countries, and relatively low compared to other UK regions.

The Enterprise and Culture Committee of the Scottish Parliament (2004), while noting the great strides in extending broadband coverage, called for a new strategy, one that would close the digital divide for the 5 per cent of premises that did not yet have broadband coverage. It also wanted work undertaken to encourage adoption of broadband, to "future-proof" the strategy and to measure the benefits of broadband.

By the end of 2005 "affordable access" had increased from 43% to over 99%, following completion of the Broadband for Scotland Rural and Remote Areas Supply-Side Intervention. The Scottish Executive contracted BT to upgrade 378 telephone exchanges to supply broadband DSL, in locations at which it was not considered commercially viable. Consequently, every community (but not every line) had access to broadband at speeds of at least 512 kbps. An evaluation was conducted by means of a telephone survey of 303 businesses and a field survey of 208 households, followed by focus group discussions (Primrose & Fawcett, 2007). This found that the Scottish Executive had not received much credit and that many believed that broadband would have been available in their communities at some time, regardless of the intervention.

Figure 7 Fixed (wired) broadband penetration in June 2010 (OECD, 2010b)



A 2006 study for the Scottish Executive found about 1 per cent of telephone lines, including 47 clusters, still could not obtain broadband at 512 kbps (Mason, 2006). It proposed improving the BT copper loop or installing Wi-Fi based networks with "cost-effective backhaul" at a likely cost of £20 million, with satellite as the backstop.[viii]

The McConnell Administration committed itself to making Scotland a "digitally inclusive society", with accessibility for the disabled and the elderly (Scottish Executive, 2006). To achieve this it called for a joint

approach of the public, private and voluntary sectors. Since 2009 these issues have been considered by the Cross-party Group on Digital Participation in the Scottish Parliament.[ix]

Looking towards high speed broadband, there was concern at the possible creation of a new divide, with speeds from 100 to 1000 Mbps available over optical fibres (SQW Ltd, 2007). The economics of such investments did not appear promising in rural areas, with their long distances and low population densities.

In October 2010, the Salmond Administration set out a "Digital Ambition", stating that:

- Next generation broadband would be available to all by 2020, and significant progress would be made by 2015;[x] and
- The level of broadband adoption would be at or above the UK average by 2013, and should be the highest of the UK nations by 2015.

The aspiration to be average might be thought to lack ambition, especially since it was a UK average rather than an EU or OECD average, let alone a group of socially comparable nations and economic rivals. The UK was, in mid-2010, a little above the OECD average (see Figure 7), though it should be noted that new countries have been joining the OECD reducing the growth of that average.

In revising its economic strategy, the Salmond Administration asserted that improvements to broadband infrastructure and digital service provision would deliver sustainable economic and social benefits (Scottish Government, 2011c). It conceded that "some of the most challenging geography" meant that the market on its own would not deliver broadband across the whole territory (Scottish Government, 2011d). Nonetheless, faster broadband was considered critical for the economic future and for the delivery of social and health services.

In March 2011, the Salmond Administration restated its target: "that next generation broadband will be available to all by 2020, with significant progress being made by 2015" (Scottish Government, 2011a). With only two months before the election it was more of an aspiration than a proposal for implementation. Next generation broadband was not defined, but the EC speed of 30 Mbps speed seemed to have been endorsed, with mention of commercial offers close to that level, but without reference to next generation access (i.e., FTTC and FTTH). It is difficult to tell what was the intended target, how it might have been achieved or what it might have cost.

A white paper envisaged the construction of a "world-class, future proofed infrastructure that will deliver digital connectivity across the whole of Scotland by 2020" (Scottish Government, 2012a). The result was to be speeds of 40-80 Mbps by 2015 for 85-90 per cent of premises (homes and businesses), while by 2020 there would have been a "step change", so that premises would have world class broadband.[xi]

In its procurement plan, the total costs for this were estimated to be £550-£750 million, of which the public sector contribution would be £190-£350 million (Scottish Government, 2012b). The state aid was primarily to come from Broadband Delivery UK (BDUK), funded by HM Treasury, limited to "white" areas, where commercial operators would not go without subsidy. Funding of £212.5 million was identified, £25.5 million from the European Regional Development Fund (ERDF), £68.8 million from BDUK, £40 million from local authorities and also from the UK Spending Review for Scotland with Barnett top-ups. That left a possible shortfall of £50 million to be found from the public sector, though HMG subsequently allocated £32 million in additional funds, almost closing the gap (Scotland Office, 2012). Separately, the Scottish Government has provided £5 million for a community broadband scheme over three years for remote areas (Scottish Government, 2012c).

A report by the Scottish Parliament drew attention to problem of grey areas which might be bypassed by both commercial and government-funded broadband networks (Scottish Parliament, 2012).

The Scottish Government proposed to raise adoption rates, with a view to improving the case for network investments, seeming to believe this could be achieved by the suppliers through the inclusion of take-up clauses in its procurement contracts. It identified the contribution of Scotland's Digital Participation Charter and the Digital Participation Action Group (DPAG), though there seems to be little evidence of activity.

As the data analysed above show the target of being above average is unlikely to be attained, not least since the problems of low adoption rates have not been adequately recognised and because no plan is in place to identify and address the underlying problems. While funds from HMG and the EU, channelled through BDUK and local authorities, will boost availability in rural areas, unless the demand problems are addressed, the dead weight of the cities and, especially, Glasgow, means that the target is almost impossible to achieve.

The United Kingdom – The legislature, the executive and the regulators

Any broadband plan for Scotland has to fit within the general framework of the European Union and United Kingdom treaties and legislation, subject to their complex politico-electoral cycles. In particular it must conform to the EU state aid rules, based on TFEU Article 109 (EC, 2010d). It must also conform to the telecommunications regulatory framework, as transposed into UK law by the Communications Act 2003 and the Electronic Communications and Wireless Telegraphy Regulations 2011, as implemented by the Office of Communications (OFCOM) (Nihoul & Rodford, 2011).

The Brown Administration commissioned a report on next generation broadband. Its author, after warnings that many of issues were remote from the concerns of the general public and, by implication, most politicians, concluded that over time broadband would become an "essential digital utility" and would require an "extensive upgrade of the access infrastructure", the copper wires running from exchanges into businesses and homes (Caio, 2008). Rejecting the case for short term intervention, the report nonetheless warned of the need, over a period of five to ten years, to ensure the widespread availability of next generation networks.

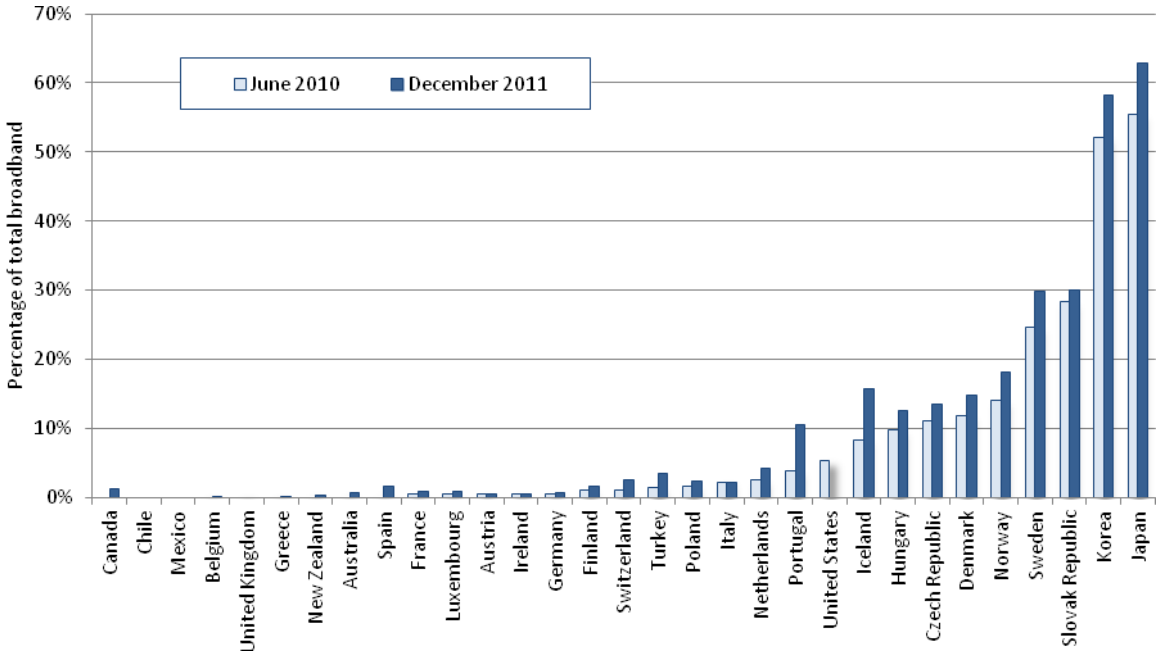
HMG responded with a plan to modernise and upgrade access networks, with a commitment that by 2012 at least 2 Mbps would be available to every home over existing copper wires (HMG, 2009). Affordability was addressed through a £300 million Home Access scheme (now closed), while increasing participation was assigned to a Champion for Digital Inclusion.

The parliamentary Business Innovation and Skills Committee (2009) called for a full-time broadband minister, there having been a succession of multi-tasking ministers, and supported the proposal for a universal service commitment to 2 Mbps as "an appropriate and achievable ambition". However, it considered intervention in next generation broadband markets to be unwise at such an early stage and in the absence of pent-up demand. It rejected the proposal to fund the intervention by a £0.50 monthly levy on all fixed telephone lines, as both regressive and poorly targeted, arguing:

> *In times of great stringency in public expenditure, digital inclusion not Next Generation Access should be the priority for expenditure.*

The Brown Administration rejected the proposal for a full-time minister (HMG, 2010a). It was a position confirmed by the subsequent Cameron Administration, in which Ed Vaizey MP was appointed to cover: arts, media, museums & galleries, telecoms & broadband, digital switchover, creative industries and libraries, while reporting to two Secretaries of State, one from each of the coalition parties. This was later simplified by the transfer of all telecommunications policy issues to the Department of Culture, Media and Sport (BIS, 2011).

Figure 8 Optical fibre as a percentage of total broadband (OECD, 2010b)



In March 2010, the Brown Administration launched the UK National Plan for Digital Participation, to support "everyone who wants to be online to get online, do more online and benefit from the advantages of

being online" (BIS, 2010). It was estimated that the total economic benefits of everyone in the UK being online were in excess of £22 billion (PWC, 2009). However, one recent longitudinal study confirmed that Internet access and use reflected socio-economic status and educational background, thus those already disadvantaged had poorer access to broadband, with the makings of a digital underclass (White & Selwyn, 2012).

The UK general election of 2010 saw broadband given a relatively low profile, with the major parties all agreed it was a good thing, that it ought to be more widely available and fast enough to be "world class". Specific commitments were eschewed, presumably because they would not sway voters and from a fear of the impending spending review.

Compared to other OECD countries, the UK had a slow start in the deployment of optical fibre cables to homes and premises (see Figure 8). While some fibre to street cabinets is being installed by BT, this does not provide either the same speeds or the same degree of flexibility as fibre to the home. Moreover, there is evidence of a lack of enthusiasm amongst consumers to switch and, especially, to pay for next generation services.

The Cameron Administration sought to provide for the rapid rollout of "superfast broadband" in both urban and rural areas, ensuring an acceptable level of availability in those parts of the country that had, until then, been excluded (HMG, 2010b). The change in terminology appears to have been more a reflection of the transition from Brown to Cameron than of any change of technology:

> *In simple terms, the Government wanted the UK to have the best superfast broadband network in Europe by 2015.*

It is still far from clear what this meant in terms of coverage, adoption, speed, technical parameters and the like – a vagueness that must make its achievement less likely.

The UK regulator held consultations on spectrum it proposed to auction for 4G or mobile broadband, which proved unusually contentious (OFCOM, 2011b) (OFCOM, 2012a). It proposed a coverage target of 95 per cent of the population for one licence, which would significantly reduce the price paid at auction as the operator would have had to spend more on base stations and backhaul networks. Not content with this, the Salmond Administration called for the coverage requirements to be raised from 95 per cent of the UK to 98 per cent for each UK local authority. This would have had the immediate effect of transferring funds from HM Treasury to Scotland, by forcing the operator to increase spending on network deployment in poorly populated rural areas. Unlike OFCOM, the Scottish Government did not provide an impact assessment for its proposal, nor even an estimate of the costs.

The Network Design and Procurement Group within BERR (later BIS) was rebranded as Broadband Delivery UK before being transferred to the Department of Culture, Media and Sport (BDUK, 2012). The Cameron Administration assigned £530 million to BDUK in the spending review for 2010-15. Initially there were four rural market pilots, to which a fifth was added, selected to improve understanding of how superfast broadband might be made commercially viable in rural communities:

- Connecting Cumbria;
- Highlands and Islands Next Generation Broadband Project (HIE, 2010);
- Connecting North Yorkshire;
- Borders Broadband; and
- Digital Rutland.

Funding allocations have been made for different parts of the UK (see Table 5). Additionally, HMG has allocated £150 million for super-connected cities and the same sum to improve mobile coverage where it is poor or absent. Edinburgh was one of ten chosen British cities, due to receive between £10 and £25 million.

The Digital Champion, Martha Lane Fox, was re-appointed following the 2010 UK General Election. She set the objective of greatly reducing the number of people who had never used the Internet by the time of the London Olympic Games in mid-2012, (UK Digital Champion, 2010). There were nine million such adults, equivalent to the population of the five largest UK cities. Everyone in work was to learn to use the Internet before retirement, even if that was, quite separately, being delayed. Her project was subsequently re-branded Go ON UK and continues today, seeking to include yet more people.
The position does not permit complaisance, since:

> *Unemployed internet users with lower education levels have incorporated the internet into fewer aspects of their everyday lives over the years and, while their use has increased, they are becoming relatively more disadvantaged compared to other internet users. (Helsper, 2011)*

This presents a specific challenge to HMG since it has adopted a paradigm of "digital by default", that it would make government services accessible in the first instance online (Lane-Fox, 2010).

Despite the present austerity, HMG has allocated £850 million for fixed and mobile infrastructure and supported this by work to encourage adoption by those who have not yet found reasons to use the Internet. Nonetheless, to achieve its target it may be obliged to find additional funds.

Table 5 BDUK allocation of funding

Date	*Fund (millions)*	*Area*	*Notes*
May 2011	£50.0	Wiltshire, Norfolk and Devon & Somerset	Rural pilots "to support the roll-out of superfast broadband to areas that the market alone will not reach"
July 2011	£56.9	Wales	Welsh government invited to match HMG's funding. "to help take broadband to the whole of Wales"
August 2011	£4.4	Northern Ireland	With matching funding 2Mbps to reach 100% of homes
August 2011	£294.8	England	90 per cent of homes and businesses having access to superfast broadband and for everyone in the UK to have access to at least 2Mbps
August 2011 June 2012	£68.8 £101.0	Scotland	90 per cent of homes and businesses, with the Scottish government to provide matching funding

The European Union and the Digital Agenda

Since the adoption of the "Lisbon Agenda" in 2000, the European Union has evolved its economic strategy, focusing on growth and the creation of jobs. In 2010 the EC adopted a renewed strategy for the period to 2020 (EC, 2010a). Related to this is a policy on smart regulation to address incomplete, ineffective, and underperforming regulatory measures (EC, 2010b).

One of the EU flagship policies for jobs and growth is the digital agenda, which is to deliver sustainable economic and social benefits from a digital single market (EC, 2010c). A study for the European Commission showed that completion of the internal market for electronic communications would cause GDP to grow by up to €110 billion, or more than 0.8 per cent (EC, 2012b) (Ecorys, 2011).

Among the objectives set for the digital agenda were:

- By 2013: Broadband access for all;
- By 2020: Access for all at higher Internet speeds (30 Mbps or above) and 50% or more of European households subscribing to Internet connections above 100 Mbps.

While these appear vague, they have to encompass a very diverse range of member states, with quite different levels of infrastructure development and competition. One supporting measure is the radio spectrum policy programme, to ensure at least 1,200 MHz of frequencies are available to operators to meet increased demand for data traffic and to allow spectrum trading throughout the EU (2011).

To help achieve its 2020 objective, the EC adopted a growth package for infrastructure, which recognised the insufficiency of investment in broadband compared to Europe's principal competitors (EC, 2011). It called for an increase in competitive pressure in markets for broadband networks and the development of strategies for public support of the rollout of networks in areas where no business case existed. A Connecting Europe Facility (CEF) of €9.1 billion for telecommunications, from a total of €50 billion, was proposed by the EC and agreed by Council (2012).[xii] It will offer support for broadband networks of up to 50 per cent, plus 75 per cent for the removal of bottlenecks hindering the completion of the Digital Single Market, while project related to the digital platform for the European cultural heritage can get up to 100 per cent. This is expected to "leverage" spending of another €50 billion. In addition to broadband networks, the grants can be used to build infrastructure needed to roll-out:

- e-ID;
- eProcurement;
- electronic health care records;
- Europeana (culture);
- eJustice; and
- customs-related services.

The money would serve to ensure interoperability and to meet the costs of running the infrastructure at European level. In particular, it will help with the construction of trans-national corridors.

The EU thus provides an agreed framework for telecommunications policies and monitors implementation, both of the specific measures and market outcomes. Through the digital agenda it seeks to link the legislation and other measures to objectives for jobs and growth.

Conclusion

The possession of a national broadband plan was once considered *avant garde*, but is now almost mundane, with the risk it is not implemented, serving as shelfware. For the all blue ink in the broadband statements of the Scottish government, there is remarkably little that would need to be changed for Serbia, Slovakia or South Carolina. There are no strong links to those sectors on which economic growth is dependent (e.g., renewable energy, food & drink, tourism and video games), nor is there any recognition of the specific cultural and social problems that have for some time constrained the adoption of broadband in Scotland border. A revision is urgently needed to achieve a much closer coupling with economic policies, social strategies and the realities of network deployment and adoption.

While parts of the general public and some politicians are sceptical about the ability of markets to deliver broadband for all and to do so promptly there has been considerable progress in availability. The economic evidence warns that interventions, even those that are well intentioned, may distort competition and make matters worse, thus careful evaluation is required before initiatives are implemented (Kenny & Kenny, 2011). The Scottish Government needs to adopt the better regulation approach, with consultations and impact assessments for its proposed interventions (EC, 2010e).

It is necessary to judge whether any money allocated to support broadband is being well spent, or if it would not be better used for, say, more front line police officers or to attract foreign direct investment. Thereafter, difficult choices have to be made between encouraging use by SMEs, increasing uptake amongst the poor and improving availability in rural areas, since these cannot all be afforded.[xiii] Insofar as the Scottish Government has answered this question it favours extending rural supply, rather than increasing urban or SME participation. It also seems disinclined to spend its own money, preferring to ask for more from London.

The real challenge is to increase the adoption of services as networks become available, initially to UK levels and, thereafter, to become world class. Scotland has a significant problem of low adoption in urban areas, one that is still poorly explained, which makes network deployment less attractive than in the rest of the UK, compounding the problem of low population density in rural areas. If and when optical fibres are brought close to the homes of the poor, the remote, the elderly and the disabled, there is neither universal enthusiasm nor willingness to adopt and to pay for the services. This needs to be probed by detailed and enduring survey work, at low levels of aggregation, amongst those groups with poorer levels of adoption. With the results of such surveys, it will be possible to design the robust and effective digital inclusion policy that is essential to ensure that those on the wrong side of the digital divide do not become a Scottish digital underclass. For many families paying for an economically viable broadband service may not be interesting or will not be possible. Therefore the Scottish Government must say how it will support and persuade such groups to access broadband, if only to remove the obstacles from accessing essential e-government, e-health and e-education services. Corresponding weaknesses in e-commerce, both supply and demand, also need to be addressed.

Keywords: Broadband, Governance, Internet, Regulation, and Telecommunications.

Bibliography

ACCC. (2011, March 1). *ACCC announces outcome of NBN points of interconnect confirmation process*. Retrieved October 5, 2012, from Australian Competition and Consumer Commission: http://www.accc.gov.au/content/index.phtml/itemId/975609

ACCC. (2012). *New NBN Co Special Access Undertaking*. Retrieved October 5, 2012, from Australian Competition and Consumer Commission: http://www.accc.gov.au/content/index.phtml/itemId/1080594

ACSEF. (2012). *Aberdeen City and Shire Economic Future*. Retrieved October 5, 2012, from Aberdeen City and Shire Economic Future: http://acsef.co.uk/

Analysys Consulting Ltd. (2003). *Summary of research on broadband conducted by Analysys Consulting Ltd for the Scottish Executive.* Edinburgh: Scottish Executive.

Atlas. (2010). *Welcome to ATLAS*. Retrieved March 8, 2011, from Atlas Connect Limited: http://www.atlasbroadband.co.uk/

Bazalgette, L., Barnes, M., & Lord, C. (2010). *A wider lens.* London: Demos.

BCDE. (2010). *National Broadband Network*. Retrieved October 5, 2012, from Australian Government: http://www.dbcde.gov.au/funding_and_programs/national_broadband_network

BCG. (2012). *The $4.2 trillion opportunity: the Internet economy in the G-20.* Boston: Boston Consulting Group.

BDUK. (2012). *Broadband Delivery UK*. Retrieved October 5, 2012, from Department of Business, Innovation and Skills: http://www.culture.gov.uk/what_we_do/telecommunications_and_online/7781.aspx

BIS. (2010). *National plan for digital participation.* London: Department for Business, Innovation and Skills.

BIS. (2011, January 18). *Media, broadcasting, digital and telecoms transfers from BIS to DCMS*. Retrieved October 5, 2012, from Department for Business, Innovation and Skills: http://www.bis.gov.uk/news/topstories/2011/Jan/transfer-of-responsibilities-from-bis-to-dcms

Business, Innovation and Skills Committee. (2009). *Broadband: Fourth Report of Session 2009-10 HC 72.* London: The Stationery Office.

Cadman, R. (2010). Means not ends: Deterring discrimination through equivalence and functional separation. *Telecommunications Policy, 34*(7), 366-74.

Caio, F. (2008). *The Next Phase of Broadband UK: Action now for long term competitiveness.* London: Department for Business, Enterprise and Regulatory Reform.

Cave, M. (2006). Six degrees of separation - operational separation as a remedy in European telecommunications regulation. *Communications & Strategies* (Q4), 89-103.

Council. (2012). *A new funding instrument for trans-European infrastructure networks*. Retrieved October 5, 2012, from Council of the European Union: http://consilium.europa.eu/homepage/highlights/a-new-funding-instrument-for-trans-european-infrastructure-networks?lang=en

Cramb, A. (2012). *Villagers stage round-the-clock vigil to protect red telephone box*. Retrieved October 5, 2012, from The Telegraph: http://www.telegraph.co.uk/news/uknews/scotland/9586783/Villagers-stage-round-the-clock-vigil-to-protect-red-telephone-box.html

EC. (2004). *N213/2003 ATLAS : Broadband infrastructure scheme for business park*. Retrieved October 5, 2012, from European Commission: http://ec.europa.eu/competition/elojade/isef/case_details.cfm?proc_code=3_N213_2003

EC. (2010a). *EUROPE 2020 A strategy for smart, sustainable and inclusive growth. COM (2010) 2020 final.* Brussels: European Commission.

EC. (2010b). *Smart Regulation in the European Union. COM (2010) 543 final.* Brussels: European Commission.

EC. (2010c). *Communication from the Commission on A Digital Agenda for Europe. Com (2010) 245.* Brussels: European Commission.

EC. (2010d). *Enforcement of EU State aid law by national courts: The Enforcement Notice and other relevant materials.* Brussels: European Commission.

EC. (2010e). *Smart Regulation in the European Union. COM(2010)543.* Brussels: European Commission.

EC. (2010f). *State aid: Commission approves broadband scheme in Catalonia, Xarxa Oberta. IP/10/1051*. Retrieved October 5, 2012, from European Commission: http://europa.eu/rapid/pressReleasesAction.do?reference=IP/10/1051&format=HTML&aged=0&language=EN&guiLanguage=en

EC. (2011). *Communication on a growth package for integrated European infrastructures. COM(2011) 676.* Brussels: European Commission.

EC. (2012a). *Commission staff working document on the implementation of national broadband plans. SWD(2012) 68.* Brussels: European Commission.

EC. (2012b). *Digital Agenda: €110bn jackpot on offer for completing e-Communications Single Market: IP/12/193*. Retrieved October 5, 2012, from European Commission: http://europa.eu/rapid/pressReleasesAction.do?reference=IP/12/193&format=HTML&aged=0&language=EN&guiLanguage=en

Ecorys. (2011). *Steps towards a truly Internal Market for e-communications in the run-up ro 2020.* Brussels: European Commission.

Enterprise and Culture Committee. (2004). *Report on Broadband in Scotland. SP Paper158.* Edinburgh: Scottish Parliament.

Eosys. (1986). *Telecommunications in the Highlands and Islands of Scotland report to the Highlands and Islands Development Board and the Office of Telecommunications.* Inverness: Highlands and Islands Development Board.

EU. (2011). *Decision No. 243/2011/EU of the European Parliament and of the Council establishing a multi-annual radio spectrum policy programme.* Brussels: European Union.

Ganuzaa, J. J., & Viecens, M. F. (2011). Deployment of high-speed broadband infrastructures during the economic crisis. The case of Xarxa Oberta. *Telecommunications Policy, 35*(9-10), 857-70.

Generalitat de Catalunya. (2012). *Societat de la Informació*. Retrieved October 5, 2012, from Generalitat de Catalunya: http://www20.gencat.cat/portal/site/societat-informacio

Government of Ireland. (2010). *Department of Communications, Energy and Natural Resources*. Retrieved October 5, 2012, from National broadband scheme: http://www.dcenr.gov.ie/Communications/Communications+Development/National+Broadband+Scheme/

Government of Ireland. (2012). *Rural Broadband Scheme*. Retrieved October 5, 2012, from Department of Communications, Energy and Natural Resources: http://www.dcenr.gov.ie/Communications/Communications+Development/Rural+Broadband+Scheme/

Hamilton, F., Lough, J., & Dixon, J. (1990). The Highlands and Island Initiative: network modernisation in the north of Scotland. *Second International Conference on Rural Telecommunications* (pp. 24-29). London: IEE.

Helsper, E. J. (2011). *The emergence of a digital underclass: digital policies in the UK and evidence for inclusion. Media policy brief no. 3.* London: Media@LSE.

HIE. (2010). *Government announces successful bid for superfast broadband for Highlands and Islands*. Retrieved October 5, 2011, from Highlands and Islands Enterprise: http://www.hie.co.uk/about-hie/news-and-media/archive/government-announces-successful-bid-for-superfast-broadband-for-highlands-and-islands.html

HIE. (2012). *Highlands and Islands superfast broadband rollout on course to begin in 2013.* Retrieved October 5, 2012, from Highlands and Islands Enterprise: http://www.hie.co.uk/about-hie/news-and-media/archive/highlands-and-islands-superfast-broadband-rollout-on-course-to-begin-in-2013.html

HMG. (2009). *Digital Britain: Final Report. Cm 7650.* London: Department for Culture, Media and Sport & Departmetn for Business, Innovation and Skills.

HMG. (2010a). *Government response to the House of Commons: Business, Innovation and Skills Select Committee Report on broadband. CM 7859.* London: The Stationery Office.

HMG. (2010b). *Britain's superfast broadband future.* London: Department for Business, Innovation and Skills.

Kenny, R., & Kenny, C. (2011). Superfast broadband: is it really worth a subsidy? *Info, 13*(4), 3-29.

Lane-Fox, M. (2010). *Directgov 2010 and Beyond: Revolution Not Evolution - Letter to Francis Maude*. Retrieved October 19, 2012, from Cabinet Office: http://www.cabinetoffice.gov.uk/resource-library/directgov-2010-and-beyond-revolution-not-evolution

Mason. (2006). *A report into broadband reach in Scotland.* Edinburgh: Scottish Executive.

McCormack, G. (2002, February 3). *Telecoms boost for Scottish industry*. Retrieved October 5, 2012, from The Scotsman: http://scotlandonsunday.scotsman.com/medialeisure/Telecoms-boost-for-Scottish-industry.2299712.jp

Mott MacDonald. (2011). *An evaluation of the Pathfinder Project - a broadband connectivity project for parts of the public sector in the Highlands & Islands and the South of Scotland.* Edinburgh: Scottish Government.

Nihoul, P. L., & Rodford, P. B. (2011). *EU electronic communications law: competition and regulation in the European telecommunications market.* Oxford: Oxford University Press.

OECD. (2010a). *Economic Survey of Australia 2010.* Paris: Organisation for Economic Cooperation and Development.

OECD. (2010b). *Broadband portal*. Retrieved October 5, 2012, from Organisation for Economic Cooperation and Development: http://www.oecd.org/sti/ict/broadband

OECD. (2011a). *National broadband plans.* Paris: Organisation for Economic Cooperation and Development.

OFCOM. (2011a). *Communications market report: Scotland.* London: Office of Communications.

OFCOM. (2011b). *Assessment of future mobile competition and proposals for the award of 800 MHz and 2.6 GHz spectrum and related issues*. Retrieved October 5, 2012, from Office of Communications: http://stakeholders.ofcom.org.uk/consultations/combined-award/

OFCOM. (2012a). *Second consultation on assessment of future mobile competition and proposals for the award of 800 MHz and 2.6 GHz spectrum and related issues*. Retrieved October 5, 2012, from Office of Communications: http://stakeholders.ofcom.org.uk/consultations/award-800mhz-2.6ghz/

OFCOM. (2012b). *OFCOM proposes new wholesale charge controls for Openreach*. Retrieved October 5, 2012, from Office of Communications: http://media.ofcom.org.uk/2012/02/06/ofcom-proposes-new-wholesale-charge-controls-for-openreach/

OFCOM. (2012c). *Communications market report 2012.* London: Office of Communications.

Primrose, D., & Fawcett, J. (2007). *Evaluation of the Scottish Executive's 'Broadband for Scotland' intervention.* Edinburgh: Scottish Executive.

PWC. (2009). *Champion for digital inclusion: The economic case for digital inclusion.* London: Champion for Digital Inclusion.

Rabbitte, P. (2012, August 30). *Minister Rabbitte delivering a connected society – A national broadband plan*. Retrieved October 5, 2012, from Department of Communications, Energy and Natural Resources: http://www.dcenr.gov.ie/Press+Releases/2012/Minister+Rabbitte+Delivering+a+Connected+Society+%E2%80%93+A+National+Broadband+Plan.htm

Reid, M. (2011). Behind the "Glasgow effect". *Bulletin of the World Health Organization, 89*(10), 706–707.

Richardson, R., & Gillespie, A. (1996). Advanced communications and employment creation in rural and peripheral regions: a case study of the Highlands and Islands of Scotland. *The Annals of Regional Science, 30*(1), 91-110.

Scotland Office. (2012). *£32 million of additional UK Government funding for superfast broadband in Scotland.* London: Scotland Office.

Scottish Executive. (2001a). *Connecting Scotland: Our broadband future.* Edinburgh: Scottish Executive.

Scottish Executive. (2001b). *A smart, successful Scotland: Ambitions for the enterprise networks.* Edinburgh: Scottish Executive.

Scottish Executive. (2006). *Digital incluson in partnership.* Edinburgh: Scottish Executive.

Scottish Government. (2011a). *Scotland's digital future: A strategy for Scotland.* Edinburgh: Scottish Government.

Scottish Government. (2011b). *Research on Broadband and Business in Scotland: A report to the Scottish government.* Edinburgh: Scottish Government.

Scottish Government. (2011c). *The Scottish Economic Recovery Plan: Update February 2011.* Edinburgh: Scottish Government.

Scottish Government. (2011d). *The government economic strategy*. Edinburgh: Scottish government.

Scottish Government. (2012a). *Scotland's Digital Future - Infrastructure Action Plan.* Edinburgh: Scottish Government.

Scottish Government. (2012b). *Scotland's Future - Infrastructure Action Plan - Step Change 2015 - Procurement Plan.* Edinburgh: Scottish Government.

Scottish Government. (2012c). *Broadband help for rural communities*. Retrieved October 5, 2012, from Scottish Government: http://www.scotland.gov.uk/News/Releases/2012/08/broadband-rural-communities09082012

Scottish Parliament. (2012). *Infrastructure and Capital Investment Committee - 3rd report 2012 - Broadband infrastructure in Scotland.* Edinburgh: The Scottish Parliament.

SoSA. (2012). *South of Scotland next generation broadband*. Retrieved October 5, 2012, from South of Scotland Alliance: http://southofscotland.org/index.aspx?articleid=10305

SQW. (2012). *Scottish e-commerce study: final report to Scottish Enterprise.* Glasgow: Scottish Enterprise.

SQW Ltd. (2007). *Next generation broadband in Scotland.* Edinburgh: Scottish Executive.

SSE Telecoms. (2010, March). *Scottish and Southern Engergy PLC acquisition - Atlas fibre telecoms networks*. Retrieved October 5, 2012, from SSE Telecoms: www.ssetelecoms.com/Services/Media.ashx?mid=34

Sutherland, E. (2012). Devolution and the regulatory state: the case of broadband and telecommunications. *Regional Studies Association, Winter Conference.* London.

three.ie. (2010). *Press releases*. Retrieved October 5, 2011, from three.ie: http://www.3ireland.ie/about3/press-releases/index.html

UK Digital Champion. (2010). *Race online 2012*. Retrieved October 5, 2012, from UK Digital Champion: http://raceonline2012.org/manifesto

Walsh, D., Bendel, N., Jones, R., & Hanlon, P. (2010). *Investigating a "Glasgow effect" why do equally deprived UK cities experience different health outcomes?* Glasgow: Glasgow Centre for Population Health.

Whalley, J., & Curwen, P. (2008). Equality of access and local loop unbundling in the UK broadband telecommunications market. *Telematics and Informatics, 25*(4), 280-91.

White, P., & Selwyn, N. (2012). Moving on-line? An analysis of patterns of adult Internet in the UK, 2002-2010. *Information, Communication & Society*, forthcoming.

---

[i] See, for example, the Scotland's People database or the Canmore database of the Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS).http://www.rcahms.gov.uk/canmore.html

[ii] See Schedule 5 sections C3 Competition and C10 Telecommunications and wireless telegraphy. [iii] See EC decisions on state aid to broadband at http://ec.europa.eu/competition/sectors/telecommunications/broadband_decisions.pdf

[iv] In 1987, Star Trek was relaunched as the Next Generation. See http://www.imdb.com/title/tt0092455/

[v] This is being addressed by, for example, Scotland IS, Social Media Week and Glasgow for Business Week.

[vi] The UK Office of National Statistics confirmed the poor performance of Scotland in 2010, but did not provide a regional breakdown in its 2011 survey.

[vii] No data were provided for 2007.

[viii] Wi-Fi has significantly shorter range than the metal local loops from telephone exchanges.

[ix] http://dpcrosspartygroup.wordpress.com/ and http://www.scottish.parliament.uk/msps/35694.aspx

[x] There was no definition given of next generation broadband.

[xi] The speeds are strange since they do not match technologies such as DSL or cable modem and must be presumed to be either a compromise by planners or an average.

[xii] The European Parliament has yet to adopt the CEF, it can be tracked at: http://www.europarl.europa.eu/oeil/popups/ficheprocedure.do?reference=2011/0302(COD)&l=en

[xiii] It is not immediately clear that there are economic or social groups for whom there are benefits from having next generation broadband today, rather than waiting till next year or the year after.