

The Executive Director
National Infrastructure Unit
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The following is a personal submission from an individual.

This submission is about the need for a coherent national view of a future Digital Infrastructure for New Zealand.

A bright future for a physically remote New Zealand requires our citizens and businesses to become increasingly connected to each other and to the rest of the world. Only in this way can we reduce the tyranny of distance to the lowest possible level.

The part the New Zealand government plays in this must be rigorously examined – and then there must be appropriate action.

This submission proposes that the first national infrastructure plan should include a significant section covering a **Digital Infrastructure for New Zealand**.

I would be happy to discuss this submission with you, if you feel it would be helpful.

A handwritten signature in black ink that reads "Mike Pownall." The signature is written in a cursive, slightly slanted style.

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1. The Digital Infrastructure – a Summary of the Submission

The thrust of this submission is that having a coherent plan for a “Digital Infrastructure” as part of the 20 year Infrastructure Plan will provide substantial benefits for New Zealand.

For example, recent work by London School of Economics Enterprise Limited (LSE-EL) and the US Information Technology and Innovation Foundation (ITIF) reported in a recent paper suggests “An additional £5 billion investment in broadband networks would create or retain an estimated 280,500 UK jobs for a year” (see Section 7). The Government’s plan to inject \$NZ 1.5 billion in broadband would provide an equivalent target for New Zealand of more than 30,000 jobs. And, “broadband” is just the “plumbing” – the content is more critical!

There is little agreement on a definition of the phrase “Digital Infrastructure”. Nevertheless its use is increasing. For example, Gordon Brown used it (and by default defined it) in a recent article in the Times (see section 4). Barack Obama also used it in a recent speech (see section 6). The US Library of Congress claims it for its digital content.

This submission proposes the use of “Digital Infrastructure”, together with an associated taxonomy, in your work rather than the existing category “Telecommunications”. It is asserted that this term and taxonomy would provide a context for submissions from bodies like NZ ICT Group and The Spatial Industries Business Association (SIBA). Such an approach will make it easier to integrate those submissions into your Infrastructure Plan. It will also facilitate your review of work such the MED’s NZ Digital Strategy, its Digital Content Strategy, and other government work in the “digital” area such as the National Library’s on-line content work, and the Spatial Data Infrastructure (SDI) that is one of three Minister-supported priority areas for Land Information New Zealand (LINZ).

Clarity is the first step in producing a coherent plan for the Digital Infrastructure. This will enable this area to be reviewed for benefits to New Zealand’s development on a somewhat similar basis as the more traditional “infrastructures”.

The second step is to examine the grey elements of Digital Infrastructure. While using an analogy between the Digital Infrastructure and the Roothing Infrastructure is somewhat of a stretch, it does provide some insight into these grey elements e.g. is a petrol station part of the Roothing Infrastructure? The off ramps to motorway service areas certainly are. In a similar way the GPS real-time correction network from LINZ can be seen as valuable as it will improve maintenance efficiency through the easy and accurate-location of buried assets.

The final step is, of course, to review the benefits, costs, and whether the government should intervene. The LSE-EL and ITIF noted the difficulty in assessing the benefits from Digital Infrastructure investments (see Section 7). Nevertheless the pragmatic politicians of the G20 have taken recent positive action (see Section 7):

“Overall, G-20 countries have committed to investing nearly \$2 trillion in general stimulus, with over \$100 billion directed at IT within the next two years.”

The aim of this submission is to raise awareness in the Infrastructure Planning Unit about the need to include this area of potential benefit to New Zealand. The rationale for this view can be found in Section 3.

In summary, this submission is not about seeking a specific result. It is focussed on improving the review framework, so New Zealand gets the Digital Infrastructure it needs to improve its economic and environmental performance in balance, for the next generations.

2. Background

The Digital Infrastructure has much potential to help New Zealand's prosperity through improvements in support of the "Digital Economy".

What is a Digital Infrastructure?

The Digital Infrastructure comprises:

- telecommunications channels such as broadband, digital radio and TV, and mobile phones, and the Internet (just like roads and bridges)
- standards, protocols, and rules (just like the road rules)
- computers, TVs, and phone handsets (just like cars and trucks).
- supporting elements such as the data repositories (e.g. the Library of Congress, Google maps, LINZ Landonline) and the Global Positioning System (GPS) (just like petrol stations and tyre companies).

What is the Digital Economy?

It is useful to differentiate three main parts of the Digital Economy:

1. The production and delivery of "weightless products", mainly for education and entertainment (source to person)
2. The enablement of social interaction, mainly games and conversations through voice, text, and pictures (person to person)
3. The facilitation of physical production and maintenance by (a) better access to up-to-date data for analysis and subsequent decisions, and (b) better supply chain-management through better communication of the critical "management-information" that controls and reports on a "physical products" supply chain (supplier, value-add entity, customer) – see below for examples of both.

The first two parts are clearly visible to all, and have been well identified as opportunities for growth. The third is complex and somewhat obscure, but it offers great potential for improving the operation of the New Zealand economy as a whole. Unfortunately it is neither easy to identified nor easy to measure.

One example of (a) better analysis and decision activity, occurs when a decision is made about the routing of a delivery truck to avoid a congested area of Auckland where the information that is collected centrally from texts sent in by drivers in real-time, is sent by text to the driver of the truck. A second example could be the improved analysis of comprehensive data about an area of land, say the location of a habitat that is important for biodiversity, where the data has been collected by a wide range of individuals or organisations.

One example of (b) better supply chain-management is the use of an address to locate the exact NZ source farm for some lamb chops found in Marks and Spenser in London. Allowing Google maps and the Internet to be used by a potential buyer to view the exact farm delivers a competitive advantage to the company that established this supply. Extending this through the use of MAF's National Animal Identification and Tracing (NAIT) system for all beef cattle and deer would be an opportunity to move some more of New Zealand's produce from a commodity to a premium product. Many other examples of extending the "management-information" part of the supply-chain occur throughout commerce and government, e.g. through the use of on-line ordering and delivery status enquiries.

3. A Rationale for focussing on a Digital Infrastructure to help sustain and improve our prosperity

What is the problem?

How can we sustain and improve our prosperity in a changing and challenging world?

What is the very short answer?

We have to increase our wealth, especially by improving the productivity of our assets – our land, water and people, and we must do this in harmony with our environment.

What do we expect?

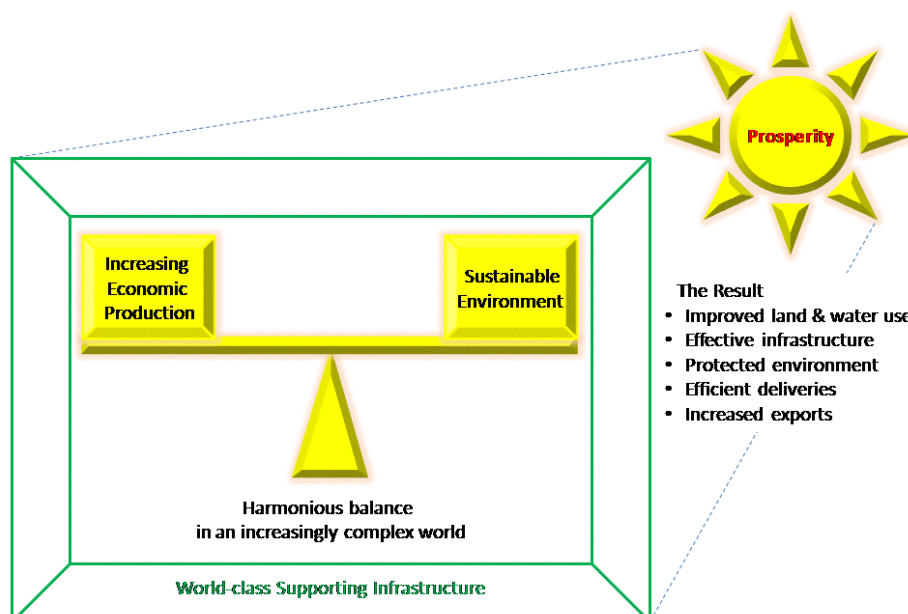
New Zealanders are prosperous. We enjoy a first-world lifestyle, use world-class supporting services, have a wholesome environment, and generally maintain a harmonious relationship between all of these elements. We expect our lifestyle and services to improve along with other first world countries, while we continue to preserve a healthy and sustainable natural environment.

What determines our wealth?

Our wealth depends largely on the productive use of our land and water assets, whether for farming, forestry, fishing, or tourism. Increasing our net wealth also demands more effective and efficient infrastructures and amenities, such as safe roads, fast deliveries, reliable water supplies, invisible sewage disposal, and digital telecommunications. These can all be helped by the innovative use of new techniques and technologies – they not only improve internal productivity but the resulting products and techniques can also be exported.

What determines harmony?

Harmony depends on ongoing, wise decisions that maintain a robust balance between competing demands for resources, amenities, and conservation. This not only applies inside organisations, but also at a community and national level, for example, in conflicts about land-use.



What do we need to do?

New Zealand needs to focus its development activities on using those techniques and technologies that are likely to be most effective in improving our wealth, in balance with our enjoyment. Central government cannot do this alone. Neither can local government or industry. Robust and open collaboration is the key.

What are the critical techniques and technologies?

There is little disagreement that world-wide digital networks will continue to evolve – it is already one of the most significant enabling technologies. It can help improve the delivery of entertainment, increase efficiency in producing goods and delivering services, and support better decisions. Our digital infrastructure will therefore become increasingly important in improving our wellbeing.

4. A Column by Gordon Brown

(The full text is below - highlights added to identify the key areas)

From The Times
June 16, 2009

The internet is as vital as water and gas

Every home will have broadband access as we aim for a digital Britain fit to take on the world

Gordon Brown

The digital revolution is changing all our lives beyond recognition and today we shall set out how Britain must change with it. Whether it is to work online, study, learn new skills, pay bills or simply stay in touch with friends and family, a fast internet connection is now seen by most of the public as an essential service, as indispensable as electricity, gas and water.

Just as the bridges, roads and railways built in the 19th century were the foundations of the Industrial Revolution that helped Britain to become the workshop of the world, so investment now in the information and communications industries can underpin our emergence from recession to recovery and cement the UK's position as a global economic powerhouse.

Today the Government will publish its Digital Britain report, which firmly places the digital economy centre stage as it is core to our future industrial capability.

The UK's digital economy at present accounts for about 8 per cent of our national income. Its continued development is fundamental to the productivity and innovative capacity of so many other sectors and, with that, the creation and protection of hundreds of thousands of jobs.

I am determined that Britain's digital infrastructure will be world class. For me, it is all part of building Britain's future beyond the difficult, short-term economic conditions. We must continue to invest to become a world leader in the new high-tech, low-carbon industries of the future by reigniting the British genius for invention, discovery and trade - to capitalise on our strengths.

Whenever I travel abroad, I see the presence of British products and services that testify to our national strength in the emerging high-end manufacturing industries, the information and communications industries and creative industries such as advertising, film and television.

These are the dynamic sectors that we need to back and promote. So, like other leading economies, we must develop the next generation of communications networks - fixed, mobile and broadcast.

The private sector is rightly leading the way and investing significant sums. But there is also a role for targeted, strategic action by government. We can create the right framework, for example, for the release of wireless spectrum - a national asset - while also liberalising its uses and extending mobile broadband coverage.

In our fibre optic and cable networks, which will provide the next generation of superfast broadband, the Government must also complement and assist the private sector to move farther and faster.

Modernisation of our communications infrastructure is vital to take advantage of important shifts in technology. The public sector, businesses large and small - and those who work in them - need access to both fixed and mobile high-standard, high-speed networks.

But I am clear that this transformation must benefit us all, business and consumers alike, in every part of the country. Digital Britain cannot be a two-tier Britain - with those who can take full advantage of being online and those who can't.

So the first step must be to make the existing broadband network truly available to all. Just as we remain committed to a universal postal service, we pledge today to give every home, community and company access to broadband internet.

These technological advances will be accompanied by a revolution in content, which they allow. We must develop and sustain public service content, such as commercial regional news, which we all value and rely on, ensuring that it can be delivered across multiple digital outlets by a range of providers accessible to all.

These are difficult times for local newspapers, TV and radio and, as Ofcom has said, a regionalised TV news network is no longer financially viable. However, competition in news - as in business - is vital to provide consumers with the highest quality and we cannot allow a monopoly to take root. Remaining in touch with local issues and holding councils and regional bodies to account is the lifeblood of our democracy.

We also need to help Channel 4 to secure its future. In its short history, the station has produced Oscar-winning films and some of the most popular and highest-quality programming. But it now requires long-term stability to develop as a truly global player.

Improved communications technologies from the progressive digital switchover will enable the Government and local authorities to provide taxpayers with improved individually tailored public services offering the greatest value for money, and increasing efficiency for citizens and businesses. We must also introduce a robust legal framework to combat digital piracy and secure the rights of Britain's creative talent.

Broadband is at a tipping point. High-speed internet access will soon be essential for everyone. Only a digital Britain can unlock the imagination and creativity that will secure for us and our children the high-skilled jobs of the future in a global economy.

Gordon Brown is the Prime Minister

http://www.timesonline.co.uk/tol/comment/columnists/guest_contributors/article6506136.ece

Accessed on 2 October 2009

5. What is Digital Britain?

Digital Britain measures include:

Communications Infrastructure

We are taking steps to strengthen and modernise the UK's **Digital Infrastructure so the UK can compete and lead globally**

- **Universal access** to today's broadband by 2012, creating equal access for all and a fairer digital future
- A fund for investment in the **next generation of superfast broadband** to ensure it is available to the whole country, not just some of it
- **Digital Radio Upgrade** by 2015
- Accelerating **current and next generation mobile** coverage and services
- Proposed new role for sectoral regulator Ofcom to carry out a **full assessment of the UK's communications infrastructure** every two years

Digital Participation

We are taking steps to ensure that everyone can share in the benefits of Digital Britain

- Three year **National Plan to improve Digital Participation**
- Programme of Digital Switchover in public services
- A new Digital Inclusion Champion: Martha Lane Fox
- Revised Digital remit for Channel 4 and key role for BBC
- Guaranteed funding for three years for targeted marketing and outreach

Digital content

We are taking steps to make the UK one of the world's main creative capitals

- Robust legal and regulatory framework to combat **Digital Piracy**
- **Digital Test Beds** to promote innovation, experimentation and learning around creation and monetization of digital content
- TV Licence Fee: consultation on **contained contestability**, primarily to secure news in the nations, regions and locally
- A new direction for **Channel 4**, championing new talent across all digital media
- Guidance note and clarification on the **media merger regime** and an enhanced evidence role for the regulator in local mergers
- Support for **Independently Funded News Consortia**

http://www.culture.gov.uk/reference_library/media_releases/6220.aspx/

Accessed on 2 October 2009

6. President Obama – address on protecting the Digital Infrastructure

(Highlight added)

REMARKS BY THE PRESIDENT ON SECURING OUR NATION'S CYBER INFRASTRUCTURE

THE WHITE HOUSE

Office of the Press Secretary

We meet today at a transformational moment -- a moment in history when our interconnected world presents us, at once, with great promise but also great peril.

...none of these 21st century challenges can be fully met, without America's **digital infrastructure** -- the backbone that underpins a prosperous economy and a strong military and an open and efficient government. Without that foundation we can't get the job done.

It's long been said that the revolutions in communications and information technology have given birth to a virtual world. But make no mistake: This world -- cyberspace -- is a world that we depend on every single day. It's our hardware and our software, our desktops and laptops and cell phones and Blackberries that have become woven into every aspect of our lives.

It's the broadband networks beneath us and the wireless signals around us, the local networks in our schools and hospitals and businesses, and the massive grids that power our nation. It's the classified military and intelligence networks that keep us safe, and the World Wide Web that has made us more interconnected than at any time in human history.

So cyberspace is real. And so are the risks that come with it.

...

But we need to remember: We're only at the beginning. The epochs of history are long -- the Agricultural Revolution; the Industrial Revolution. By comparison, our Information Age is still in its infancy. We're only at Web 2.0. **Now our virtual world is going viral. And we've only just begun to explore the next generation of technologies that will transform our lives in ways we can't even begin to imagine.**

...

http://www.whitehouse.gov/the_press_office/Remarks-by-the-President-on-Securing-Our-Nations-Cyber-Infrastructure/

Accessed on 2 October 2009

7. Excerpts from articles on G20 investment in ICT and on the value of the Digital Infrastructure to Britain

Driving a Digital Recovery: IT Investments in the G-20 Stimulus Plans

By Scott Andes and Daniel Castro |

Information Technology and Innovation Foundation

September 2009

Overall, G-20 countries have committed to investing nearly \$2 trillion in general stimulus, with over \$100 billion directed at IT within the next two years.

<http://www.itif.org/files/g20-stimulus.pdf>

Accessed on 2 October 2009

The UK's Digital Road to Recovery

By Jonathan Liebenau, Robert Atkinson, Patrik Kärrberg, Daniel Castro And Stephen Ezell

LSE Enterprise Ltd. & the Information Technology and Innovation Foundation

ITIF, 1101 K St. N.W. Suite 610 Washington, DC 20005

April 2009

...

1. Investments in the UK's digital infrastructure will spur significant job creation in the short run. We estimate that spurring an additional investment of £15 billion in the UK's ICT infrastructure would create approximately 700,000 UK jobs (see Table 1). We also estimate that over half of these jobs would be in small businesses (defined as firms having fewer than 250 employees). Please note that we use a £5 billion investment in these examples for illustrative purposes. We are not advocating a specific level of investment in this report.

Broadband networks: An additional £5 billion investment in broadband networks would create or retain an estimated 280,500 UK jobs for a year.

...

2. Investments in these digital infrastructures will create a network effect (or network externality) that will offer superior job creation benefits because of the "network multiplier."

Infrastructure investments—of both the digital and physical variety—will create direct jobs, indirect jobs, and induced jobs. Consider an investment in broadband networks or highway infrastructure. Direct jobs are those created specifically by new spending (e.g., the technicians or road workers hired to lay broadband "pipes" or tarmac). Indirect jobs are those created to supply the materials and other inputs to production (e.g., fibre optic cable or concrete). Induced jobs are those created by newly employed (or retained) workers spending their wages, thus creating jobs in establishments such as restaurants and retail stores. A multiplier is a number that expresses the extent to which a change in a given economic activity generates additional effects through interdependencies associated with some linkage system. Thus, when calculating employment growth generated by a given level of investment, employment multipliers are used to estimate the number of indirect and induced jobs created.

However, investing in certain types of ICT infrastructure offers superior job creation benefits because it creates a "network effect." This network effect leads to an additional employment growth multiplier, herein referred to as the "network multiplier," which arises from the new

consumer and business behaviours, functionalities, and downstream industries enabled by the ICT infrastructure. The network effect employment multiplier refers to the new jobs that will be created through the new applications and services—some manifested in entirely new industries—that digital infrastructure makes possible. This possibility arises because digital infrastructures act as platforms that serve as the foundation for a multitude of innovative technologies and services.

...

No widely applied econometric technique is currently used to capture the effects of digital infrastructure investments in broadband networks, ITS, and the smart grid. This situation may put ICT infrastructure projects at a disadvantage in comparison with more traditional infrastructure projects that economists and policymakers are more familiar with. For that reason, as described below, LSE and ITIF have developed estimates of the network effect of ICT infrastructure investments.

...

Spurring investments in digital infrastructures will also create a market for the goods and technical services of domestic firms. Investing in these infrastructures now will help ensure that domestic firms have the knowledge, skills, and abilities needed to become chief exporters of this technology (e.g., ITS and smart grid components and services) as other countries expand their own digital infrastructure initiatives. Thus an investment in digital infrastructures not only will spur short-term job growth but will enhance long-term competitiveness and lead to the expansion of higher value-added UK jobs.

Finally, the network effect of these ICT infrastructure projects, beyond leading to additional job creation, higher productivity, and increased competitiveness, is also indicative of the positive personal and societal benefits generated by such investments. Spurring the investment of £5 billion in ITS, for example, not only will create 188,500 UK jobs but will also improve road safety and reduce traffic congestion. The network effects will go even further as advances in ITS will support applications like real-time traveller information systems, more efficient freight logistics, and more traveller-friendly transit systems. Likewise, increased broadband infrastructure will spur improvements in educational outcomes, enable more telecommuting, and have a wide range of other societal benefits.

<http://www.itif.org/index.php?id=242>

Accessed on 2 October 2009

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Information Technology and Innovation Foundation

ITIF is a non-profit, non-partisan public policy think tank committed to articulating and advancing a pro-productivity, pro-innovation and pro-technology public policy agenda internationally, in Washington and in the states. through its research, policy proposals, and commentary, ITIF is working to advance and support public policies that boost innovation, e-transformation and productivity. ITIF, 1101 K St. N.W. Suite 610 Washington, DC 20005

8. Responses to the National Infrastructure Unit's Questions

8.1. Base information

Is the sectoral analysis contained here an accurate and informative description of the sector? If not, what changes are required to make it so?

The document overlooks several important components of a modern national digital infrastructure, e.g. digital television, digital radio, standards for the Internet, a Spatial Data Infrastructure.

8.2. Missing issues

Are there important infrastructure issues not mentioned in this document?

The issue of having a coherent plan covering all aspects of a digital infrastructure is missing. While some telecommunications elements are included, there is little effort to integrate even these elements into a coherent view. And, there is no mention of content or standards.

8.3. Decision-making

This document suggests that for projects to contribute to community/national welfare and economic growth, they must have expected benefits (measured comprehensively) that are greater than their estimated costs (also measured comprehensively) – see the decision-making principles in the 'Policy Context' chapter. As well as considering distributional or equity considerations, are there other considerations that should be taken into account and if so, what is the case for that?

Generally, no, but the time frame for the return on investment and the difficulty of measuring the economic impact of ICT activities make the use of pure economic evaluation difficult. The prime example is the Government's decision to invest \$1.5 billion on broadband.

8.4. Cross-sectoral issues

What cross-sectoral issues are faced by operators/users of infrastructure in each sector? This document identifies a number of cross sectoral issues. Are there other cross-sectoral issues that should be included in a National Infrastructure Plan?

The Digital Infrastructure is almost the ultimate cross-sector enabling technology.

Perhaps the best way to answer this is for you to review the Telecommunications sector material in your initial report against the MED's NZ Digital Strategy!

8.5.Regulatory reform

Are there important regulatory constraints on the development of infrastructure that are not being addressed by the government's current regulatory reform programme?

None identified.

8.6.Aspiration

For each infrastructure sector, is it possible or desirable to define the service level New Zealand should aspire to? If so, what should it be and why?

There is no silver bullet. But, NZ has to change its approach to earning a living if we are to retain or improve our economic standard of living – in essence, we need a productivity lift. We need to work smarter, using whatever tools are useful e.g. the Internet and ICT.

The digital environment, and its interconnections, continues to grow at an amazing rate. As President Obama says, "we've only just begun to explore the next generation of technologies that will transform our lives in ways we can't even begin to imagine." (see Section 6)

8.7.Link to economic growth

What additional investment would help New Zealand to increase its rate of economic growth? How can we be confident that this additional investment is a prudent use of scarce funds?

Please refer to the submission from the Spatial Industries Business Association and from the NZICT Group.