The Internet of Things in New Zealand: a discussion starter

How do New Zealanders make the most of the Internet of Things - while staying secure and protecting our privacy?

InternetNZ

About this document

This discussion starter sets out to do just as the name suggests - start a discussion.

The "Internet of Things" has started to rev up and many predict that it will change our world hugely. So what do we need to do now in order to get ready for this new wave of technology in our lives? How can New Zealand be assured that we are staying safe, our lives remain private and yet we take advantage of technology and this economic opportunity.

We have many questions about the impact of the Internet of Things and this document outlines these questions - poses some thoughts - and asks for input in what we think is an extremely important discussion.

Introduction: The Internet of Things

At InternetNZ, we believe in **a better world through a better Internet**. The Internet of Things (IoT) is one of the next waves of change enabled by the Internet that we want to ensure is going to better all New Zealanders.

IoT refers to an emerging trend of connecting devices to the Internet that operate without human intervention. Think self-driving cars and smart lighting and heating.

Thanks to the rapidly descending cost and size of sensors and ever more ubiquitous connectivity, we are entering a world where the "things" connected to the Internet may quickly far outweigh the people. Vodafone predicts that there could be between 45 and 50 billion "things" connected to the Internet by 2030.

This IoT world has a lot of potential in providing real time information, insight and management to "things" that we couldn't see before. As such, IoT has the potential to transform many aspects of our lives.

More automation, autonomous systems and machine based connectivity is believed to benefit our homes, our businesses and our communities. However, that potential gives rise to new concerns and challenges.

We're conscious that there's a lot of discussion about IoT happening at the moment, and about how New Zealand can best position itself to make the most of the IoT opportunity. We think that's important, but we think there is more that we need to consider.

We've undertaken this work because we want to ensure that the following perspectives are front and centre of New Zealand's consideration of this trend:

- **How do we manage the data that these things produce, and ensure that that data is managed responsibly?**
- **How do we encourage innovation from a New Zealand perspective?**
- **How do we ensure that New Zealanders are able to make use of IoT in their homes and businesses?**

We have had many discussions to date about these queries and desires.

This document is the next step in our work and serves as an invitation to share your perspective on these issues – what do you see as the opportunities, challenges, risks and issues of IoT in New Zealand?

We will further this conversation at our Speaker Series event on 8 December 2016. We invite you to join us and help us explore these points further. You can register for the event on our website here: https://internetnz.nz/event/speaker-series-things-and-internet

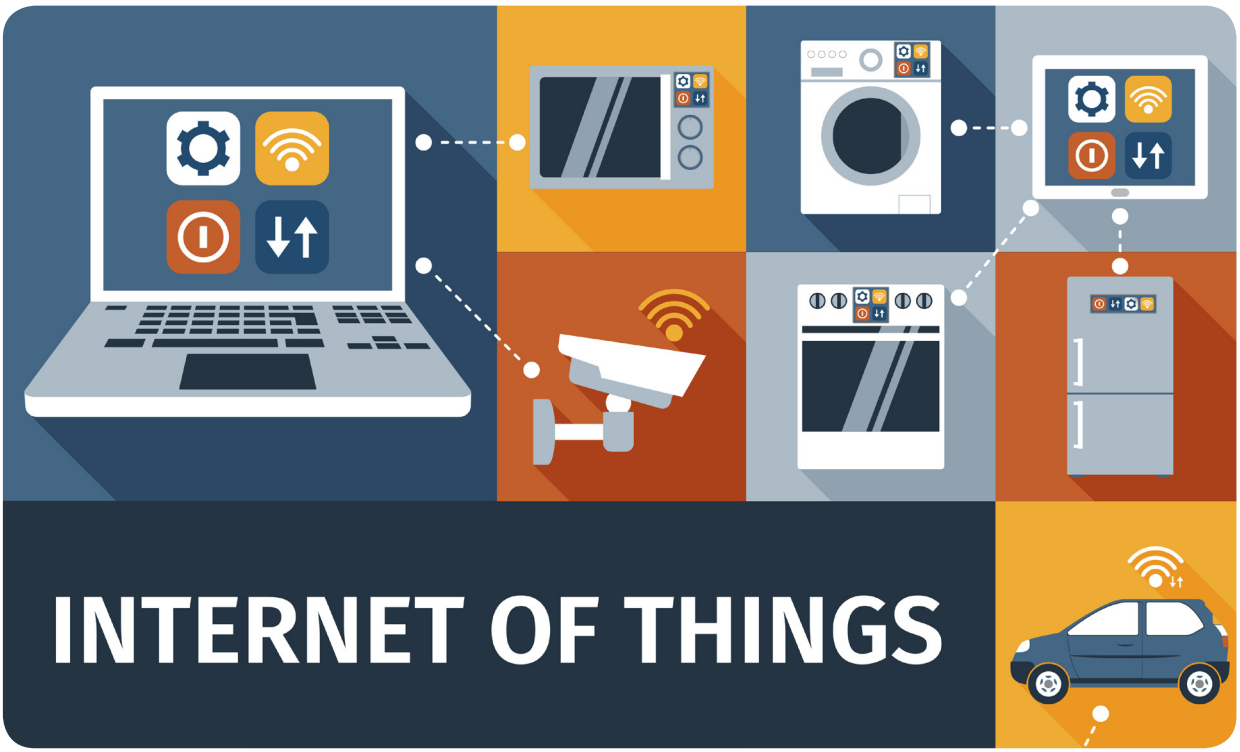
After this speaker series event our goal is to reflect all of our thoughts, observations and learnings in a position paper. It will include recommendations to Government and industry leaders on how the IoT can best benefit all of us in New Zealand.

Our process

With a topic this big, we've sought to spark conversations and learn from the community as a key contribution. We want to understand what is happening with IoT, and pull together key questions and themes for further discussion and deliberation. This discussion starter forms part of our process of exploring the IoT, and builds off our first phase of discussions with the Internet community.

For InternetNZ, we want to help New Zealand make the most of the IoT - as part of our wider work striving for a better world through a better Internet.

Discussions with elements of the Internet community	June - August 2016
This document - isolating key questions and themes	November 2016
Consultation, discussion and debate on this document	November 2016 – February 2017
Speaker Series session on IoT	December 2016
Presentation of IoT position paper following discussion	February 2017
Activities, projects and initiatives in our Activity Plan for 2017/18	April 2017 onward



What we learned through discussions

What is the Internet of Things?

The Oxford dictionary defines The Internet of Things (IoT) as "the interconnection via the Internet of computing devices embedded in everyday objects, enabling them to send and receive data." The IoT is putting small computers and Internet-connections into things that have not been Internet-connected in the past.

The IoT has emerged due to a combination of factors (set out below).

- The ubiquity of (predominantly wireless) Internet connectivity, that is allowing coverage across far greater geographies than previously possible.
- The cost of Internet connectivity dropping substantially, to the point where it is now cost effective to connect a huge number of additional transmitting devices, and to understand and derive value from a huge amount of additional data.
- The availability, performance and cost of sensors, and other devices, that are able to be embedded or added to a great number of systems, processes and things that then allow those to be connected to these networks.
- The increased awareness of the efficiencies, insights and performance outcomes that can be achieved through real time monitoring of these "things."
- Advances in low power communications technology that enable embedded devices to be battery powered and communicating for several years.
- A modern evolution of the No.8 wire culture in the form of the maker community, largely kicked off by the development of the Raspberry Pi that enables people to make complex but tiny devices on their kitchen table.

These factors are as true in New Zealand as they are in any number of other countries.

To put it simply, connecting things to the Internet is easier and cheaper now, and wireless technologies mean we can now get signal from things that are much further away from one another than we could before.

Why does the Internet of Things matter?

By some estimations, the number of connected "things" to the Internet will come to dramatically outweigh the number of people connected to the Internet. For example, Vodafone estimates that by 2030, there will be 45-50 billion "things" online.[1] That's a massive increase in demand for connectivity, that may fundamentally change how the Internet works and what it is used for.

The IoT will create very different traffic as lots of short messages are sent 24/7 and most likely with a lower resilience to network failure than mature systems. The volume will grow, at some point becoming larger than human generated traffic. As it grows the architecture of the Internet will need to change in response – in ways we have yet to understand.

1: https://www.vodafone.com.au/red-wire/internet-of-things-business-home-future/

What have we heard so far? Some themes...

At the ITx conference in July 2016, we ran a number of sessions about the IoT. We had technology experts from across the field speak, listen, discuss and think about what the IoT means for New Zealand.

The IoT is going to be transformative and the people we've engaged with definitely see the advantages of IoT. They also see the challenges and privacy concerns that come with sensors, wearable technologies (like fitbit, Apple watches and Google glasses) and other IoT devices.

The themes that came out from these discussions are set out below.

There are questions about how the IoT relates to personal information management

The IoT can manage all the little things for me. I'll be free to focus on the things that matter in my life.

We don't want our heart monitor to ask for consent before calling 111 when you are having a heart attack...

I am concerned about data sovereignty and companies using my data in ways that New Zealand law would not allow.

There are economic opportunities through effective and efficient use of IoT

New Zealand could make the cool stuff, earning us big export dollars.

The IoT will make city and transport planning easier, enabling councils and officials to spend more time talking to communities about their needs, what they want to do and how to get there.

The IoT can give us free economic growth through efficiency gains.

We need more devices and more types of devices...New Zealand could be a producer and designer for the IoT.

How should we position New Zealand to make the most of IoT?

New Zealand is falling behind on the IoT.

New Zealand needs a spectrum management plan that prepares for IoT and its eventual scale.

I am concerned about IoT being controlled through proprietary systems and standards.

We also came away with a number of questions we want to explore about the IoT.

- How does the IoT enable management of personal data?
- What are the security risks of IoT devices?
- What opportunities can New Zealanders gain from the IoT?

We think it's important to think about these questions here and now, and seek to answer them before it's all too hard. We are close to the beginning of the IoT, and we can act together to shape its development in the most people-centric way possible. However, we need to act now and get a plan together before our lives are already surrounded with the IoT.

Personal data and the Internet of Things

The IoT is actually a catch-all phrase, used to describe many different networks and Internet-connected devices. Sometimes that is a useful catch-all.

But we think the term IoT - to describe everything from Internet-connected cows, traffic sensors, and industrial sensors through to a fitbit - is not going to be useful when thinking about risks, personal information exposure and control of data.

The IoT raises some important questions about personal data, and the current IoT definitions don't do these personal data challenges justice.

We understand that many of the 'things' considered in the IoT do not collect personal information. They are industrial, civic things that sense and track in aircraft, power supplies, transport networks, agricultural systems and even animals. These things enable us to manage our resources, through better understanding of their use – and may not involve personal identification.

But plenty of IoT devices produce a lot of personal data. Wearables, sensors in our cars, all the Internet connected devices on us and in our houses hold personal information about us and how we go about our lives. Using these devices in a way that creates benefits always involves personal identification – it's about you.

Viewing the IoT through a personal data lens raises different uses and privacy implications.

The ethical considerations and data-protection requirements for IoT devices that do, or do not, generate or record personal information, will have some significant points of difference.

Big challenges: personal autonomy and control over personal data

Individuals do, and should, maintain control and sovereignty over their own data.

The data generated by your home and personal devices about you should be yours, not the provider's. You should get to give and revoke consent over time - rather than just accepting certain terms and conditions when first signing up to a service or downloading an application. People should be free to choose whether they share their personal data in this new IoT enabled world.

Is that the case today? If not, how can we get there? If so, how do we make sure things stay that way?

Security updating and longevity

Managing personal data with IoT raises particular challenges around security updates and maintenance.

We think we can get to an IoT world where personal data is managed appropriately, devices follow good security practices and sensitive information is encrypted. However, we are not there yet and we are still left with a patching and update issue for devices that will likely have a longer use life than we are used to for things like PCs or smartphones.

Currently, many manufacturer's are not planning and building security support and updating as a part of their process. This is something that device and software manufacturers like Windows and Apple have solved, while mobile device manufacturers have not adequately addressed to date. Android is a disparate, insecure ecosystem precisely because many phone and tablet manufacturers do not provide patching and security updates for their devices.

Many household items have life expectancies of 10 years or more and industrial equipment typically has a 25 to 30 year lifetime.

What are the implications of poorly secured and poorly managed IoT devices?

If the security aspects of the IoT are not addressed, there are a number of implications for the wider Internet.

Early IoT manufacturers have not learnt the cybersecurity lessons of the last 20 years and have shipped easily compromised devices. This has led to the creation of Mirai, a botnet of around 100,000 compromised consumer devices, used for the largest DDoS attack seen so far.[2]

IoT manufacturers need to ship secure products rather than racing to be first to market, or this problem will only get worse.

2: https://en.wikipedia.org/wiki/Mirai_(malware)

Economic opportunities for New Zealand

The IoT could bring numerous opportunities for New Zealand researchers, businesses and our society.

Efficiencies through scale

The IoT will bring with it large-scale data about things that we do as individuals all across society, and the ways we interact with and use a range of systems, infrastructures and resources. If we make good use of this information, we can be more efficient – and get economic wins as a result.

Automation and "smart cities"

One of the themes that comes with the IoT, and in particular "smart cities," is the potential to better understand and address transportation and civic issues such as roading investments, addressing air quality and water pollution. Possible benefits coming from IoT-data led policies include:

- better air quality in urban areas
- faster responses to emergencies (sensors could help pinpoint locations and remove false positives)
- better investment in transportation networks using more accurate modelling and data.

One example of how the IoT can be used to enhance our understanding is Project Sensibel. Project Sensibel used IoT devices to track where, how and why cyclists move around Christchurch with a view to informing the development of Christchurch's cycleways and traffic systems.[3]

Playing to our economic strengths

The IoT presents opportunities for New Zealand to play to its strengths in primary industries, environmental science and tourism. Developing our IoT experience and expertise could also open up export opportunities for New Zealand organisations.

Recently, Spark launched its 'Connected Farm' services - an IoT-based service that enables farms to incorporate IoT into their everyday work to more efficiently, and effectively, manage agricultural resources. Could it sell this to other markets?

Personal and home use: 1001 opportunities

We've all heard the stories about networked fridges that can order milk for you, but there are many other examples where the IoT shows potential to make everyday life easier.

- Smart lights can let you change the bulb's colour pallette to help you unwind at night, prepare for sleep and provide bright sun-like light during the day.
- Automated heating and cooling systems (including opening your windows and curtains) can ensure your home is a healthy temperature at all times.
- Smart meters and learning thermostats can help you manage your power use.

How can we encourage New Zealanders to derive personal benefits from IoT? Better sensors and knowledge, driven by the IoT should mean we can have shorter commutes to work and make finding a carpark easier.

3: Project Sensibel received an InternetNZ community grant. More information about this project can be found here: https://internetnz.nz/sites/default/files/CCP201506%20-%20Sensibel%20-%20Fabrico%20-%20Full%20report.pdf

Evidence based policy

The IoT has the potential to transform government by supporting evidence based policy using evidence collected at a scale that has not been possible before. For example, it is often claimed that New Zealand state houses are cold and damp and that urgent action is needed to tackle this. The low cost of IoT makes it realistic to install sensors in every state house that can gather high quality evidence to either confirm or deny this claim.

Environmental opportunities

What if we knew exactly when animals started fouling waterways, and which individual animals they were? Localised, more accurate air quality readings could help us understand air pollution issues and potential solutions at a granular and more local level.

Even small scale issues like drain sensors could help inform local councils, and locals, about spills, burst pipes or clogged grates.

Big opportunities: New Zealand could produce niche IoT devices

The world needs many more IoT devices. There is an opportunity for New Zealand to produce IoT devices, exporting devices, plans and intellectual property.

New Zealand has an innovative culture, a widespread technology culture, and the "number-8 wire" culture that means we're usually pretty keen to give something a go.

Niches for New Zealand exporters could include agricultural technology, environmental science and tourism solutions. We could also seek to build global leadership in IoT devices that deal with personal data.

What if we could lead the world on managing personal information on IoT platforms, or designing IoT systems that protect privacy and anonymity?

Questions we have

We'd love to hear your views about these questions.

- Do you think IoT raises issues around personal data management, and if so, what should we do about them?
- What do you think are the biggest benefits that the IoT will bring to New Zealand?
- What are the biggest risks you see from the IoT?
- Are our network and technology companies equipped to design IoT networks and systems in ethical ways?
- When should IoT devices have autonomy and when should they require human intervention?
- How can we ensure that the IoT does not undermine our individual agency as humans in control of our lives, our bodies and our private information?
- How can we ensure there is enough spectrum available for people to innovate and try new things, while ensuring people's rights are respected?
- How would this conversation best happen to make sure all the relevant people and organisations are involved?
- What have we missed?

What happens next?

Send us your thoughts

We would love to hear your views on these questions. Get in touch with InternetNZ's Issues Manager Ben Creet at ben@internetnz.nz.

An InternetNZ speaker series event: Things and the Internet

On 8 December 2016 we are hosting a speaker series event "Things and the Internet," which will be focussed on the IoT. We will be using this discussion starter document, and the questions we've asked to help guide that session.

So please, read, think and come armed with questions and viewpoints to contribute to the discussions.

Should we be focusing on the IoT?

The outcomes from our IoT speaker series event will also feed into the planning for our next financial year. Do we need to focus on the IoT? Is there a particular leadership role that InternetNZ can play for the IoT here in Aōtearoa?

About InternetNZ

InternetNZ's vision is for a better world through a better Internet. We promote the Internet's benefits. We protect its potential. And we focus on advancing an open and uncaptureable Internet for New Zealand.

We provide a voice for the Internet in New Zealand and work on behalf of all Internet users across the country.

We are the designated manager for the .nz Internet domain. And through this role we represent New Zealand at a global level.

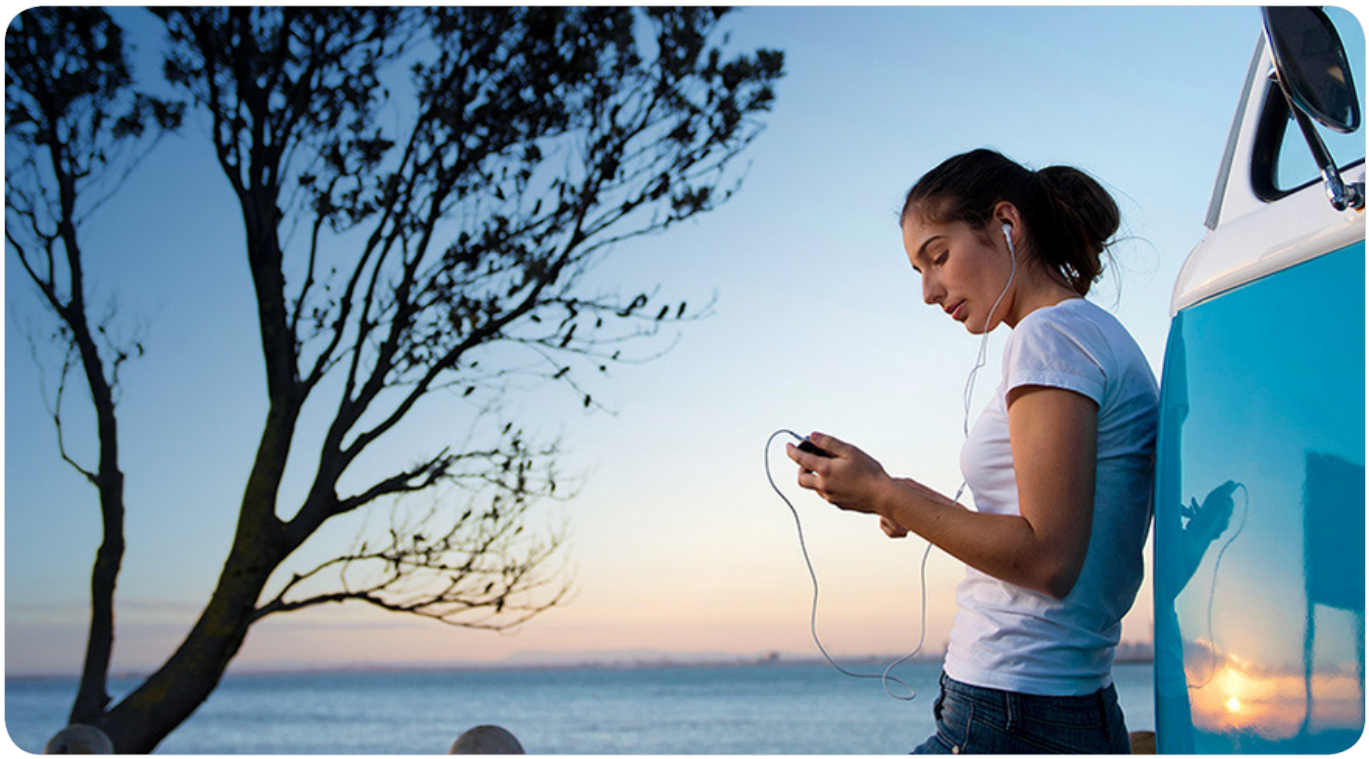
We provide community funding to promote research and the discovery of ways to improve the Internet. We inform people about the Internet and we ensure it is well understood by those making decisions that help shape it.

Every year we bring the Internet community together at events like NetHui - to share wisdom and best practice on the state of the Internet.

We are a non-profit and open membership organisation.

Be a member of InternetNZ and be part of the Internet community.

You can keep a close watch on the latest tech and telecommunications developments and network with other like-minded people at cool events. Being a member of InternetNZ only costs $21 per year. Find out more at internetnz.nz/join



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