



SINGAPORE: REGULATORS FACE CHALLENGES WITH IOT AND SMART CITIES

Chng Ken-Wei, Center Director (China), Infocomm Development Authority of Singapore (IDA), First Secretary, Embassy of the Republic of Singapore, Beijing, outlined some thought-provoking challenges and opportunities regulators are grappling with concerning the Internet of Things in the context of smart cities.

We are all facing some common global challenges:

- urban density – two-thirds of the world will live in cities by 2025;
- healthcare – by 2025, there will be 9 billion people, 800 million of whom will be over 65 with high healthcare needs;
- energy sustainability – global demand for energy will rise 37 percent by 2035;
- ageing population – the world is ageing fast and by 2050 more than 2 billion people will be over 60; and
- mobility – people are moving into more congested centers and as urban travel will triple by 2050, congestion could bring cities to a standstill.

See the infographic for how these problems are manifest in Singapore.

The big question is, how will this shape costs and infrastructure when it comes to our future healthcare system? Our leaders have said technology will be key to making Singapore a smart nation, able to address these challenges.

This strategy will be enabled through providing pervasive connectivity (a combination of the national broadband network, public access points to broadband, a Smart Nation Platform), for sensors, open data and the co-creation of new services. Heterogeneous networks – or hetnets – will be important for seamless roaming between networks.

Better homes are being addressed by using technology to create new homes and estates, such as of Punggol town as a smart precinct and Smart Yuhau as a brownfield site.

SINGAPORE

SINGAPORE IS THE WORLD'S MOST DENSELY POPULATED NATION



IT HAS **8,000 PEOPLE PER SQUARE KM**, COMPARED WITH 265 PEOPLE PER SQ KM IN THE UK AND 35 IN THE US



2015 – 300,000 OR 1 IN 9 OF ITS CITIZENS ARE ELDERLY
2030 – 900,000 OR 1 IN 5 OF ITS CITIZENS ARE ELDERLY



THE LENGTH OF SENIORS' STAYS IN HOSPITAL **HAVE INCREASED 30%**



PUBLIC HOSPITAL OCCUPANCY RATES ARE AT **90%**



11,000 MORE HOSPITAL BEDS WILL BE ADDED BY 2020



1 MILLION CARS ON THE ROAD ROADS TAKE UP **12% OF LAND**



DEMAND FOR POWER WILL **INCREASE 30% BY 2050**

Aspirations for better health and successful aging are being addressed through tele-trials, the most recent trial being remote monitoring of vital signs for hypertensive patients. Learning from these trials will be applied to the national deployment. Successful Aging is a massive undertaking, with a \$3 billion action plan.

In all of these and other endeavors, Internet of Things will be a key for Singapore's Smart Nation vision. "Our bottom-up analysis for the applications we size estimates that IoT has a total potential economic impact of \$3.9 trillion to \$11.1 trillion a year by 2025," McKinsey (2015).

The regulatory framework for IoT

Professor Ian Brown of the Oxford Internet Institute, University of Oxford, UK, published a discussion paper for the Global Symposium of Regulators in 2015. In *Regulation and the Internet of Things*, he wrote that regulating the IoT is not likely to be straightforward because of the different scales of deployment and different communication models.

Brown outlined four common communications models describing the Internet Architecture Board:

- back-end data sharing;
- device-to-gateway;
- device-to-cloud; and
- device-to-device.

The Professor's paper also outlined three different scales of deployment:

Individual – typically spans smartphones and wearables used by individuals, where the intended audience for the data is likely to be the user themselves, perhaps their immediate friends and family, or maybe a bank (for mobile money apps) or their employers for work-related use.

Community – includes connected cars, health devices and smart homes, linked to intelligent transport systems, remote alarms and heating systems, blood pressure monitors and so on. The data will be about speed, distance, airbag, crash locations, heart rate, blood pressure and diet, and so on. The audience for that data will be doctors and other healthcare givers, car insurance companies, police, social networks, and a wider circle of friends.

"Regulating the IoT is unlikely to be straightforward due to the different scales of deployment and communication models"

Society – meaning large systems like smart cities and smart grids, that rely on smart electric, gas and water meters, and traffic monitoring. The data will be based around consumption and billing, and traffic flow data. The audience for the data is regulators and authorities, utilities and other citizens.

5 big areas for concern

Several regulators are looking at common challenges posed by IoT regarding some of the most pressing issues which are: security, data protection, interoperability and standards, licensing, spectrum and resource allocation.

Here are Singapore's approaches to them:

Security – the plan here is to minimize cyber security breaches through close collaboration with multiple stakeholders. There is a need to manage consumers' expectations and no single security policy will cover everything from a Fitbit to smart grid. Telecom regulators will have to work closely with cyber security agencies and industry players. Security should be implemented by design, across a product's lifecycle.

Protecting personal data to enhance consumer trust in IoT – regulation and public education will be key to safeguard consumer interest. Companies will have to comply with Singapore's Personal Data Protection Act (2012), including those which are collecting personal data via IoT.

Technical interoperability and standards are being addressed by IDA's Telecommunications Standards Advisory Committee, working on various IoT-related standards in line with the ITU-T work program.

Licensing framework to evolve to meet the challenges of IoT by addressing key concerns while facing operational challenges, for instance, whether to register billions of devices.

Maintaining flexibility to ensure IoT devices have sufficient spectrum. It's unclear whether most IoT devices will use licensed or license-exempt spectrum, and what types of devices they will be.

Finally, **monitoring availability of network addresses** for IoT is essential, as there will be billions of devices, so IPv6 will play a key role. IDA has launched regulatory and industry initiatives to support IPv6 in Singapore.

All these things will play their part in the vision is Smart Nation Singapore – many smart ideas, one smart nation.