Adopting the IoT Paradigm: Challenges and Opportunities for Regulators

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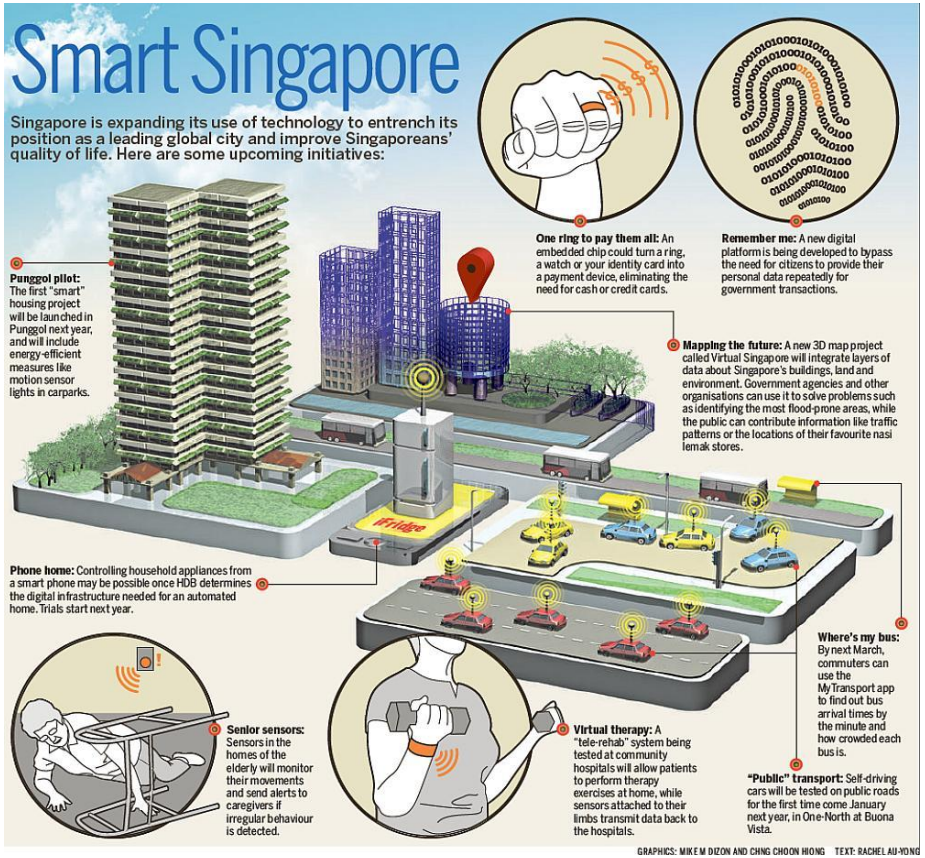
IoT is a key enabler to Singapore vision to be a Smart Nation

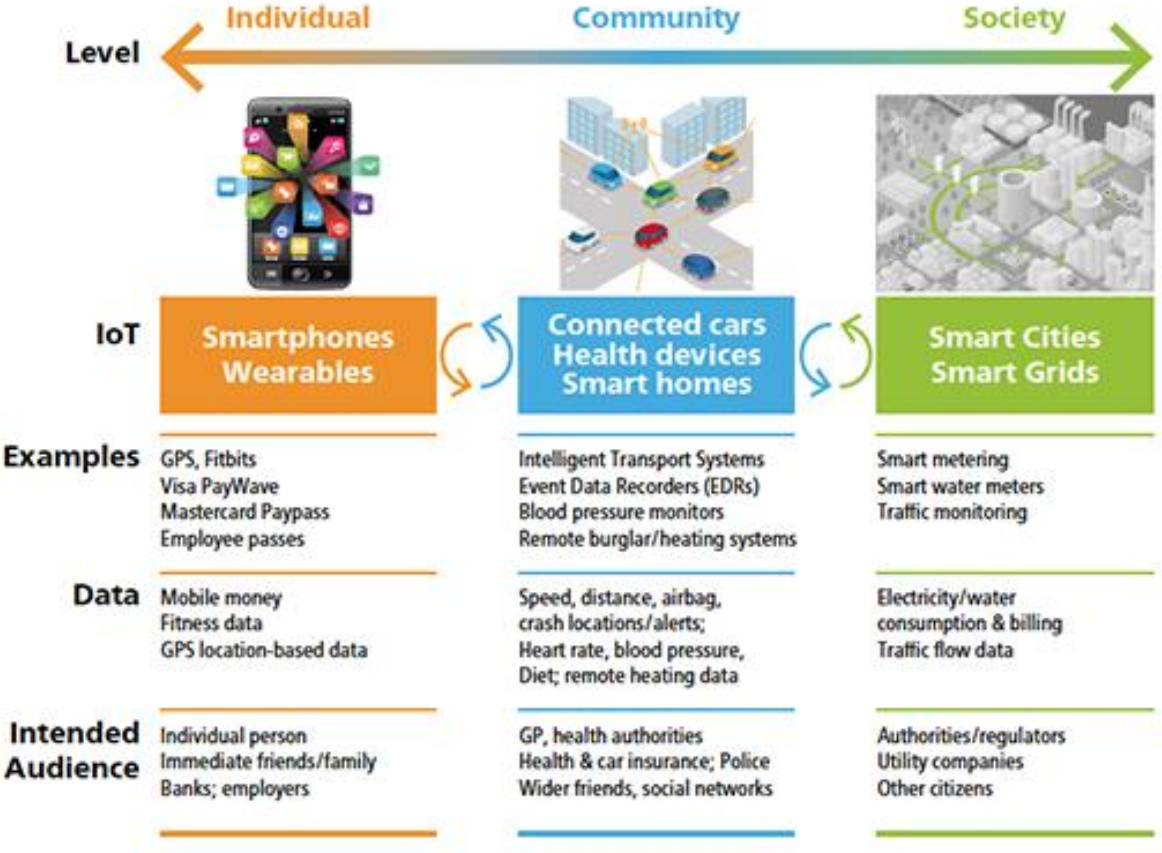
- Beyond economic opportunities, IoT can also enrich the quality of living for citizens

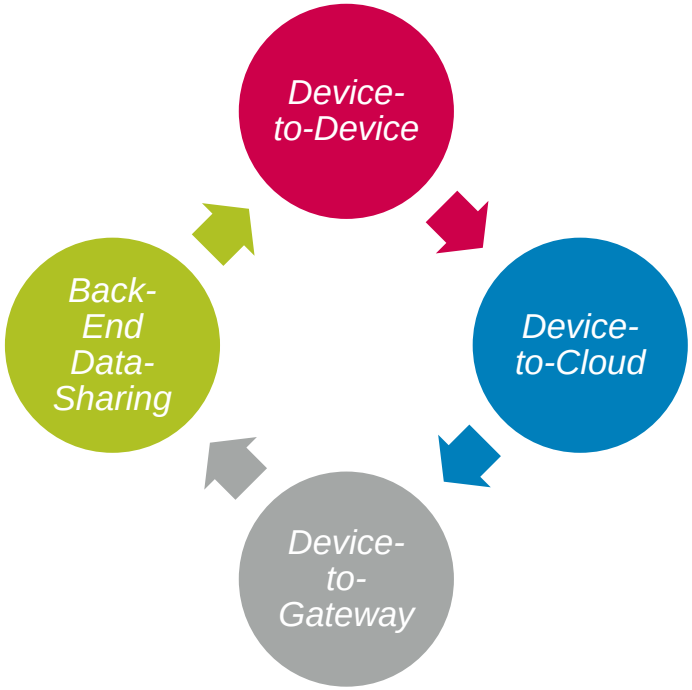
"Our bottom-up analysis for the applications we size estimates that the IoT has a total potential economic impact of **$3.9 trillion** to **$11.1 trillion a year** by 2025," said McKinsey (2015).



Regulating IoT might not be straightforward – from different technologies to…

- Different scales of deployment
- Different communication models



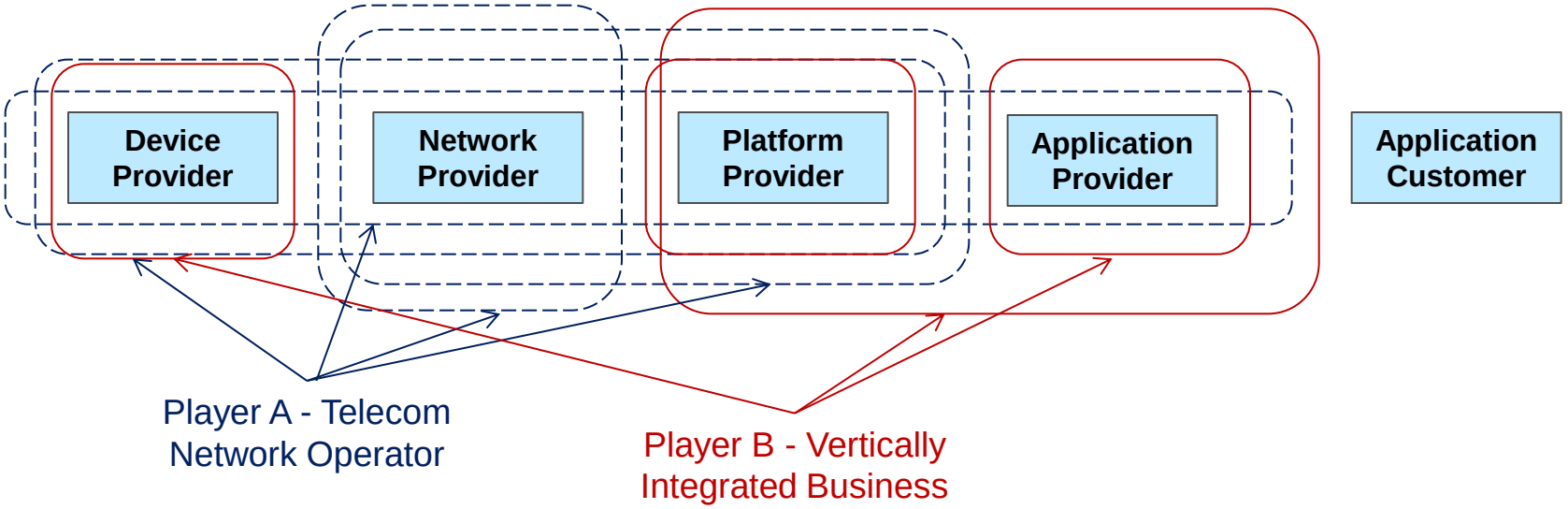


Four common communications models described by the Internet Architecture Board

Source: GSR Discussion Paper, "Regulation and the Internet of Things", Professor Ian Brown (2015)

… Complexity in roles played

- Variety of roles in the IoT ecosystem from the perspective of telecom service & network operators



- Telecom network operators as Players A
  - Network & Platform Providers in access and control of IoT, and device management
- Vertically integrated businesses as Players B
  - Provision of reliable and secure IoT devices for communication, sensory and actuation functions in the delivery of data and content
  - Provision of IoT applications to application customers

Several regulators are looking at common challenges posed by IoT

- Five key IoT areas are examined to explore some of the most pressing challenges and questions related to IoT

Minimising cyber security breaches through close collaboration

- Multi-stakeholder approach will be key but need to manage consumer expectations

Security

Data Protection

Interoperability and standards

Licensing

Spectrum & Resource Allocation

Finding the vulnerabilities of smart devices at home

i. Complex landscape – no one size fits all security policy for all IoT devices (e.g. Fitbit vs Smart Grid)

ii. Telecom regulators will have to work closely with cyber security agencies and industry players

iii. Companies should implement security by design (e.g., security to extend throughout lifecycle of product; access controls)

iv. Consumer and business education on cyber security will be important (e.g. regular changing of passwords)

Protecting Personal Data to enhance consumer trust in IoT

- Regulation and public education will be key to safeguard consumer interest

Security

Data Protection

Interoperability and standards

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Spectrum & Resource Allocation

PERSONAL DATA PROTECTION COMMISSION SINGAPORE

i. Companies will have to comply with Singapore's Personal Data Protection Act (2012), including those which are collecting personal data from IoT

ii. Companies should strive to adopt "data protection by design" as a default for all development

iii. Public education will be key to safeguard consumer interest

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Singapore – On-going initiatives to ensure technical interoperability and standards

IDA's Telecommunications Standards Advisory Committee (TSAC) is working on various IoT-related standards in line with the ITU-T work programme.

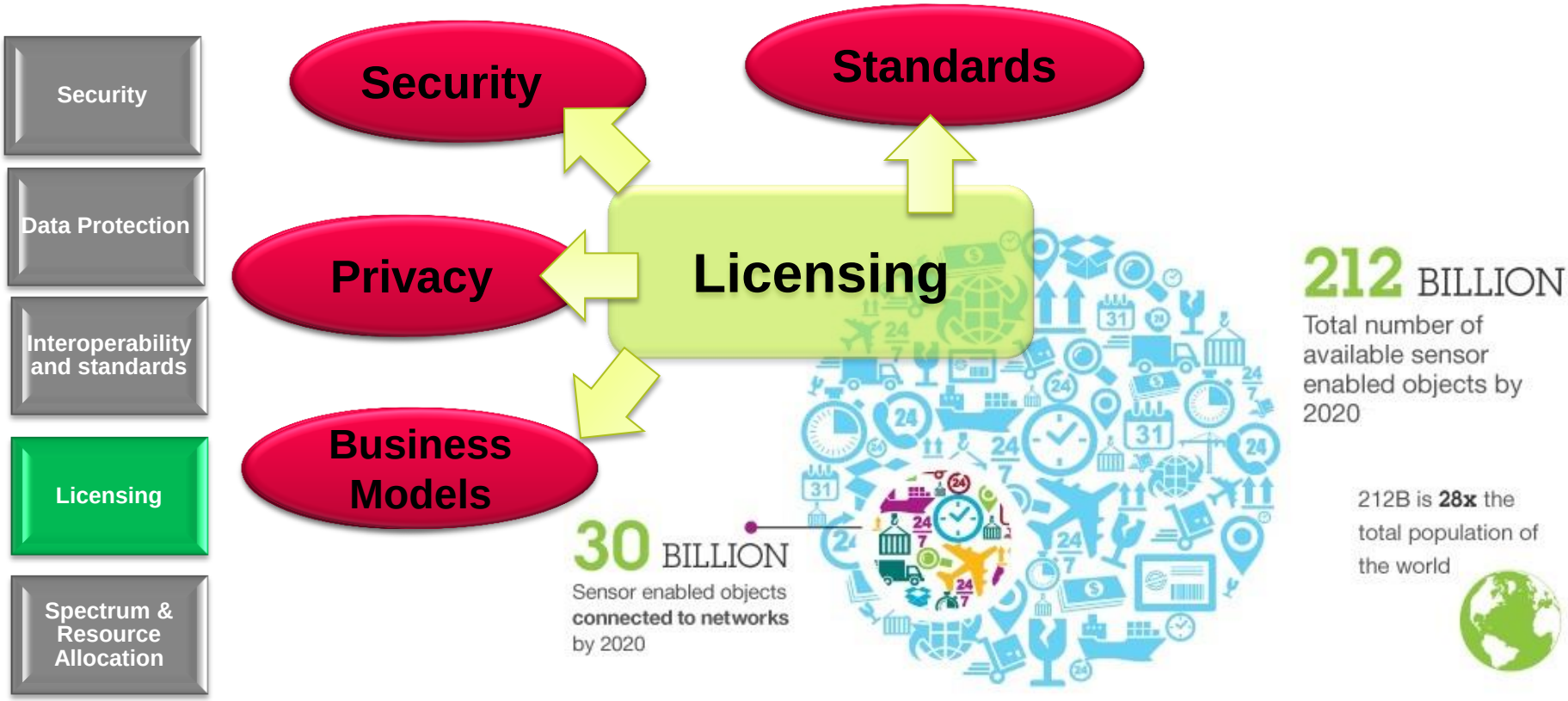
- Security
- Data Protection
- Interoperability and standards
- Licensing
- Spectrum & Resource Allocation

ITU-T SG20	TSAC				
	WG1	WG2	WG3	WG6	WG7
Q2/20 – **Integration of IoT**	**Future Networks** IoT Device Management		**Multimedia** ITS, AV E-health	**Wireless** Smart Wearables	
Q3/20 – **IoT Gateway**	Signaling and protocols	**Smart Homes**		Smart Phones	
Q4/20 – **IoT Interworking**		End-to-end services, performance	Directory services Middleware	M2M	**Security**
Q5/20 – **IoT Ecosystem**	IoT players engagement				
Q6/20 – **Use of Infrastructures for IoT**	Guidelines and best practices				

IDA conducts trials on GSMA's Specifications for OTA Subscription Management

Licensing framework to evolve to meet the challenges of IoT

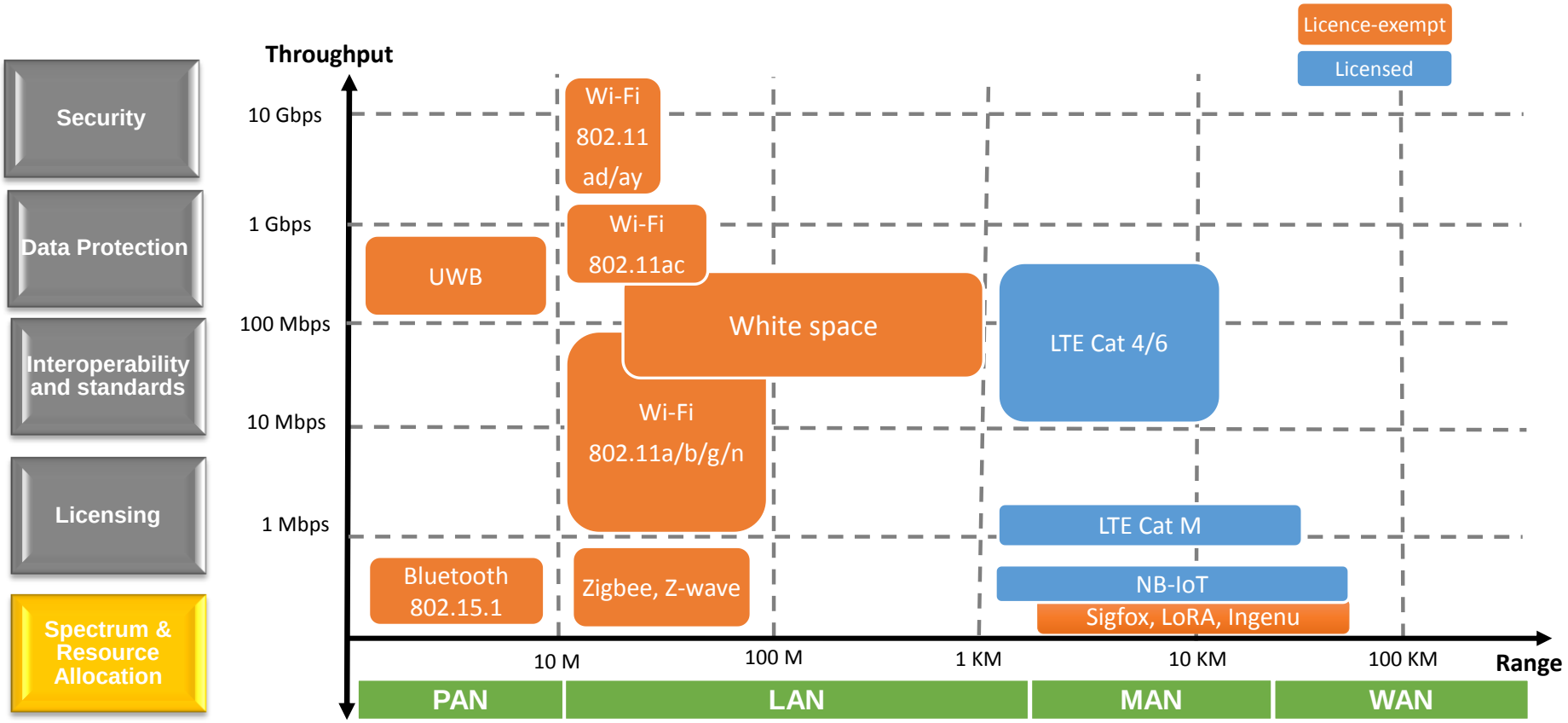
- Addressing key concerns while facing operational challenges (e.g. whether to register billions of devices)



Source: IBM

Maintaining flexibility to ensure IoT devices can be supported with sufficient spectrum

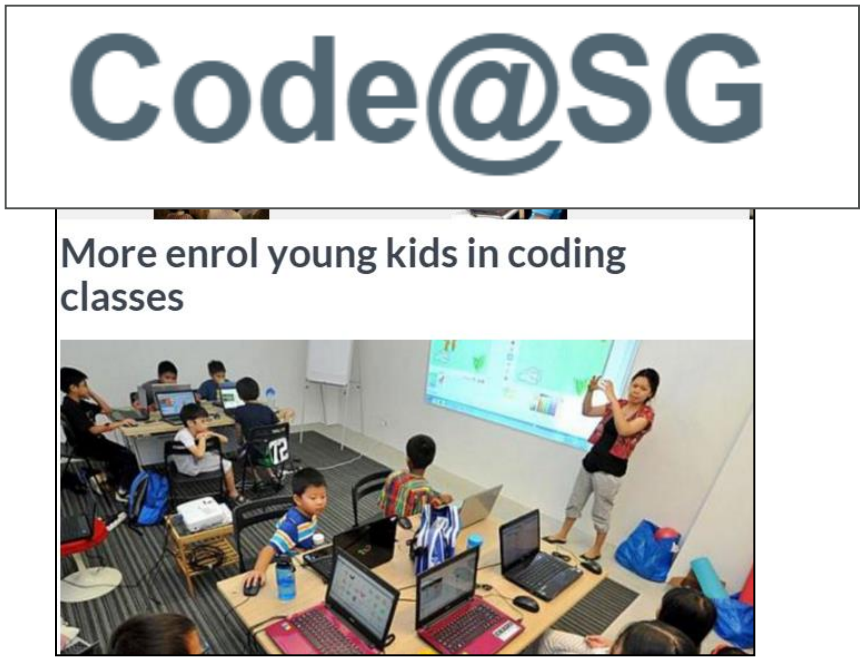
- Currently unclear whether majority of IoT devices are going to ride on licensed or licence-exempt spectrum as well as type of devices



Going beyond traditional regulatory role to prepare for the future

- Ensuring current and future workforce can ride on the opportunities and benefit from IoT

Engaging the current generation in Smart Nation



Having a future workforce that can work with IoT devices

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Thank You