Radio Spectrum and Technical Standards Advisory Committee

SSAC Paper 3/2015
Update on Standardization in
Machine-to-Machine (M2M)
Communications

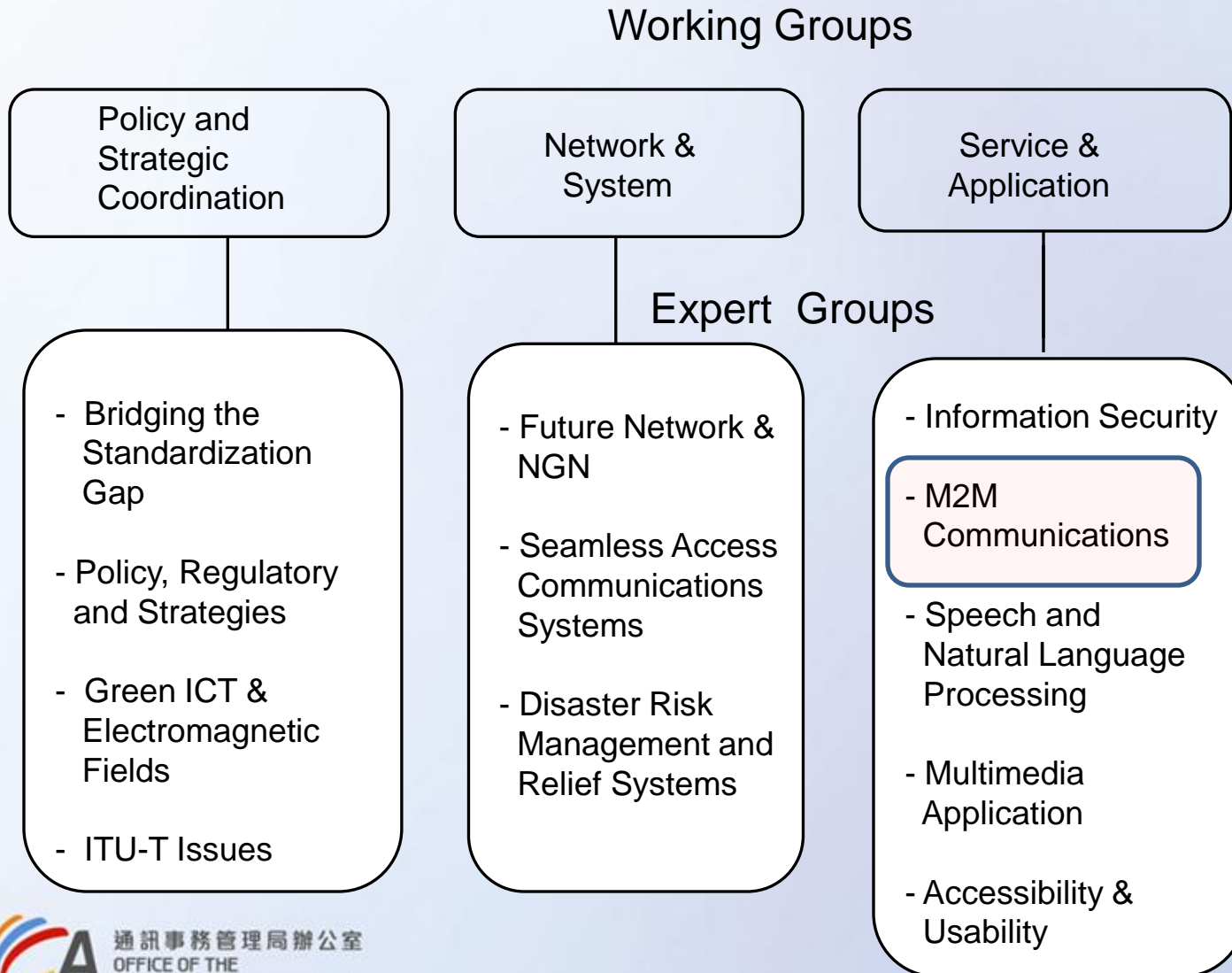Office of the Communications Authority
Date: 7 May 2015

Asia-Pacific Telecommunity Standardization Program Forum

APT Standardization Program Forum (ASTAP)

- OFCA attended the 25th ASTAP Forum (ASTAP-25) held in March 2015 in Bangkok

- ASTAP is the APT's platform for regional coordination on standardization of telecommunications and ICT

- ASTAP Expert Group on machine to machine communication (M2M) to conduct research and studies on standardisation issues

ASTAP Structure

Working Groups

Policy and Strategic Coordination	Network & System	Service & Application

Expert Groups

Policy and Strategic Coordination
- Bridging the Standardization Gap
- Policy, Regulatory and Strategies
- Green ICT & Electromagnetic Fields
- ITU-T Issues

Network & System
- Future Network & NGN
- Seamless Access Communications Systems
- Disaster Risk Management and Relief Systems

Service & Application
- Information Security
- M2M Communications
- Speech and Natural Language Processing
- Multimedia Application
- Accessibility & Usability

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ASTAP M2M Expert Group

- ASTAP-25 concludes that the M2M Expert Group would expand its work items to cover smart city issues, including
    - Smart sustainable city
    - Smart utility network
- M2M Expert Group issues APT Report on Smart Grid in Asia-Pacific Region

    http://www.apt.int/sites/default/files/Upload-files/ASTAP/APT-ASTAP-REP-16_Report_of_SmartGrid_150305.docx

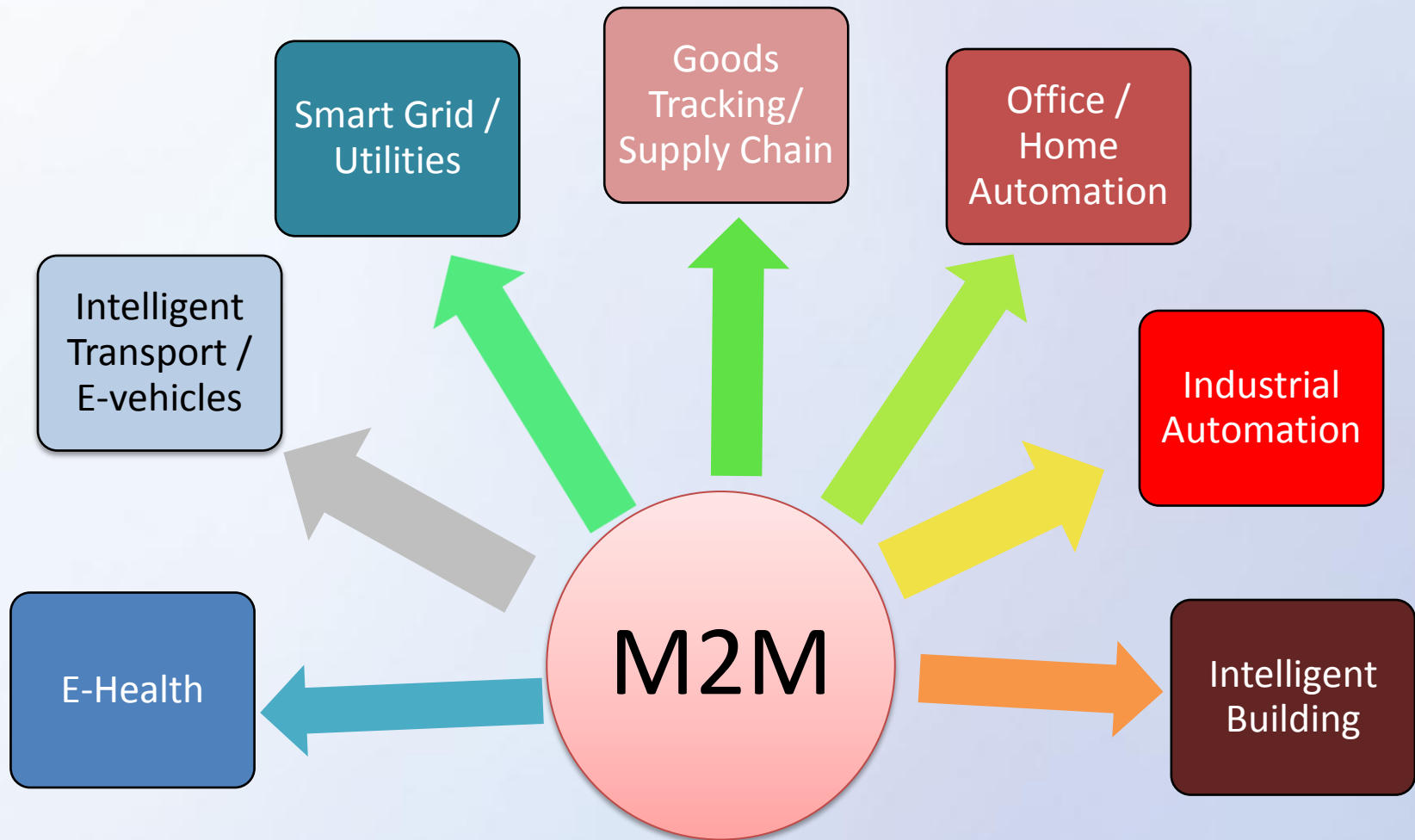- Noting the recent development on M2M, OFCA would like to provide some updates for Members' information

M2M Network Configurations and Applications
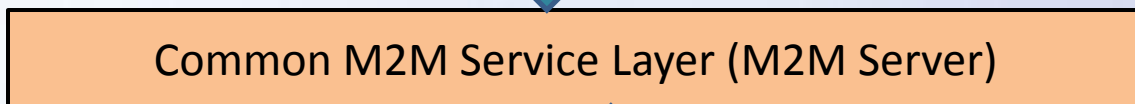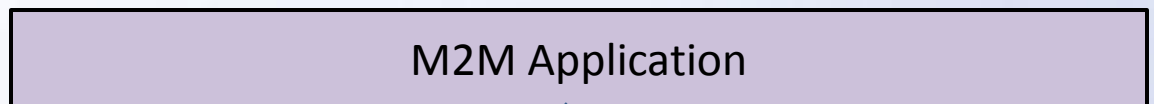
What is Machine-to-Machine (M2M)

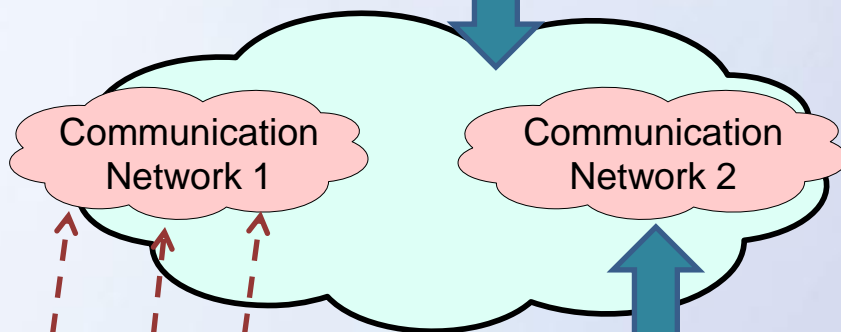Devices are communicating end-to-end without human intervention.

sense, monitor, detect

communicate

store, process, trigger

M2M Applications

Generic M2M Architecture

Network Elements

M2M Communication Network
- LTE, GPRS, Satellite, Fixed Network

M2M Gateway
- Aggregate M2M device traffic to Communication Network
- Might employ Firewall and QoS control
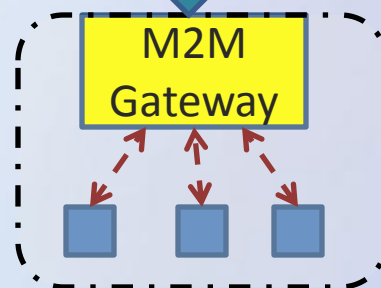
M2M Area Network
- WiFi, RFID, WPAN, Powerline comm, Ethernet, short range radios
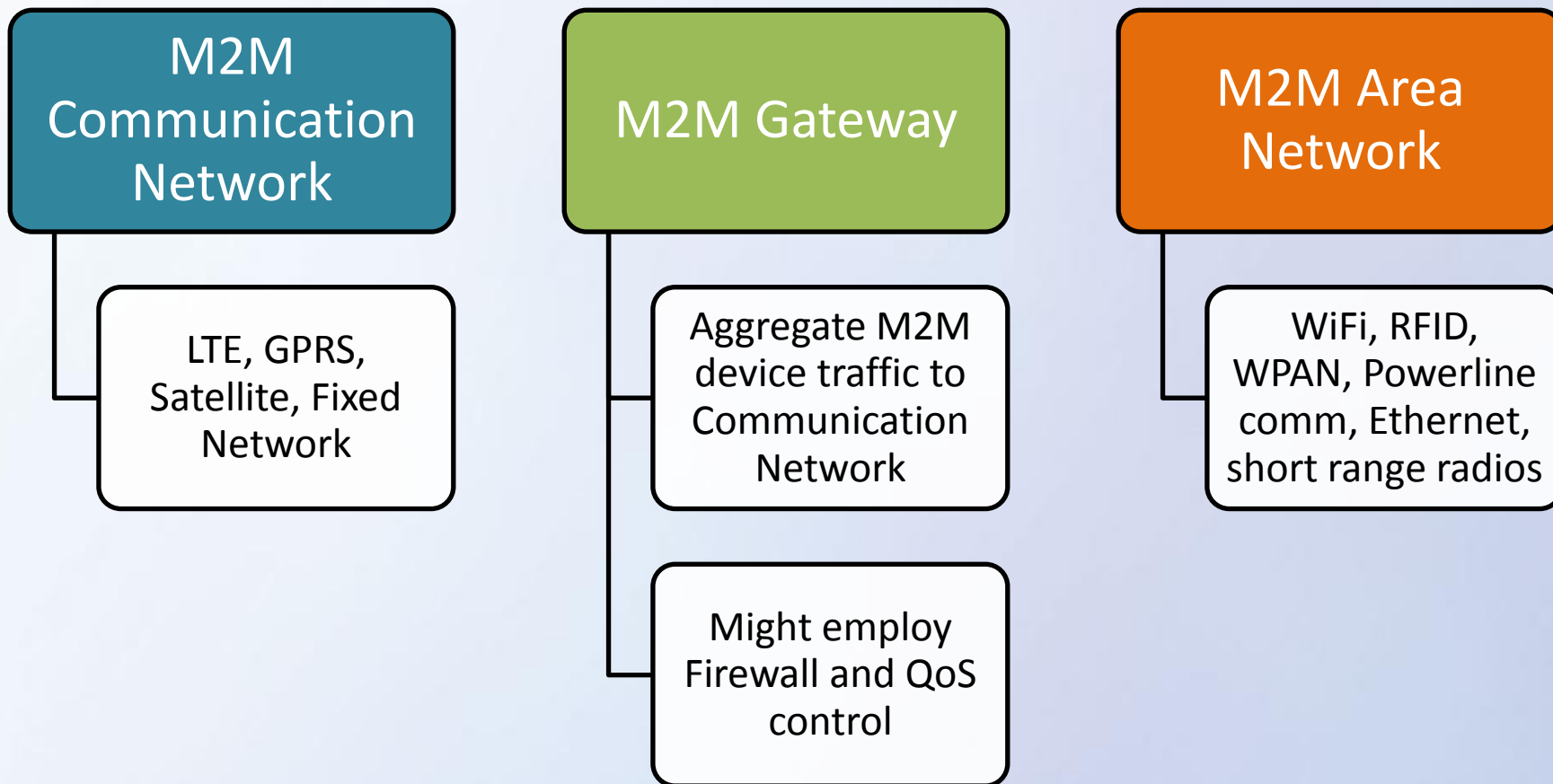
Standardisation Works
of SDOs

M2M Standardisations

- Technical standards are required to ensure network compatibility and inter-operability of M2M devices

- SDOs working on M2M standardisation
    - 3GPP
    - IEEE
    - ETSI

Standards Development Organisations (SDOs) working on M2M

SDO	Areas	Standardization Task
3GPP	- Device - Network	Machine-Type Communications Optimizing Core Network and Radio Access Network for M2M traffic
IEEE	- Network	IEEE 802.16p WiMAX enhancements to support M2M
IEEE	- Devices	M2M Area Network – optimizing short range radio access technologies for M2M end devices to M2M Gateway
oneM2M	Service Layer (M2M Server)	Service layer – working on architecture and solutions for different industries
ETSI TC M2M	Service Layer (M2M Server)	Has passed the service layer standardization task to oneM2M. Focusing on European mandates and implementations.

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**M2M Challenges identified by 3GPP
(3GPP TR23.888 System Improvements for Machine-Type Communications)**

numbering and addressing

charging and subscription

device trigger

small amounts of data

low mobility

remote device management

device group communications

data is time critical or delay tolerant

device security

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3GPP Release 11 TS 23.682 - Network Architecture Enhancements for Machine-Type Communications (MTC)

M2M-IWF (Interworking Function)
The network interface to service layer of M2M Server

Service provision
Packet switch subscription only, no voice service is allowed

Identifiers
MSISDN-less, Use Internet style identifiers

Addressing
Use IPv6 addresses only

Device Triggering
Machine Type SMS Short Message Service Centre

Congestion and Overloading
Extended Access Barring to bar M2M devices when Core Network and Radio Access Network overloads

Priority
Add low priority access indicator. Certain M2M applications can override low access

Remote device management
Add OMA DM specifications for service provisioning, upgrade, and fault management.

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3GPP LTE-M Category 0 Devices

3GPP TR 36.888 - Study on provision of low-cost Machine-Type Communications (MTC) User Equipments (UEs) based on LTE		
Parameter	3GPP Release 12	3GPP Release 13
Peak uplink / downlink rate	1 Mbps / 1 Mbps	200 kbps / 200 kbps
Max number of downlink spatial layers	1	1
Duplex Mode	Half duplex (optional)	Half duplex (optional)
UE receive bandwidth	20 MHz	1.4 MHz
Maximum transmit power	23 dBm	20 dBm
Modem complexity compared to LTE Cat-1 user equipment	50 %	25 %

3GPP - User Equipments based on General Packet Radio Service (GPRS)

Ultra-low complexity, low throughput IoT devices

- New work item identified in 3GPP Release 13
- Data rate 16 bits per second
- 20 dB better coverage than GPRS
- 40 devices per household
- AA size battery last for 10 year
- Reduction of signaling overheads in order to save battery drain

IEEE 802.16p on M2M

- Optimize WiMAX for M2M traffic

- Recognise similar challenges as identified by 3GPP

- Produce some core technical reports:

  IEEE 802.16p-11/0033

  Enhancements to Support Machine-to-Machine Applications for Wireless MAN-Advanced

  IEEE 802.16p-10/0004

  Machine to Machine (M2M) System Requirements Document

  IEEE 802.16p-11/0014

  Machine to Machine (M2M) Evaluation Methodology Document

  IEEE 802.16p-10/0005

  Machine to Machine (M2M) Communications Technical Report

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IEEE 802.15.4g

Wireless Smart Utility Network (WI-SUN)

- Based on IEEE 802.15.4g, a variant of 802.15.4 Wireless Personal Area Network
- Operates in 2.4 GHz and sub 1 GHz bands
- Multi-hop operations
- 902 – 928 MHz (USA), 920 – 928 MHz (Japan)
- Wi-SUN Alliance formed to certify product interoperability
- Trials of smart metering for electricity and gas supply underway

ETSI oneM2M

Set up by 7 leading SDOs in 2012

- **Japan**
  ARIB, TTC
- **Europe**
  ETSI
- **China**
  CCSA
- **US**
  TIA, ATIS
- **Korea**
  TTA

- Over 200 members
- Develop common M2M Service Layer Technical Specifications
- Enabler for connecting myriad of devices to all types of M2M applications
- Take over the tasks of ETSI TC M2M

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Deliverables of oneM2M

- Initial Candidate Release of Technical Specifications for comments in Aug 2014

- Adopt the 1st set of draft Technical Specifications in Jan 2015

Reference	Version	Title	Date
TS 0001	1.6.1	Functional Architecture	01/2015
TS 0002	1.0.1	Requirements	01/2015
TS 0003	1.0.1	Security Solutions	01/2015
TS 0004	1.0.1	Service Layer Core Protocol Specification	01/2015
TS 0005	1.0.1	Management Enablement (OMA)	01/2015
TS 0006	1.0.1	Management Enablement (BBF)	01/2015
TS 0008	1.0.1	CoAP Protocol Binding	01/2015
TS 0009	1.0.1	HTTP Protocol Binding	01/2015
TS 0010	1.0.1	MQTT Protocol Binding	01/2015
TS 0011	1.2.1	Common Terminology	01/2015

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Way Forward

- Keep abreast of regional/international development

- Monitor progress of SDO standardisation work

- Further update to SSAC in due course

Thank You !