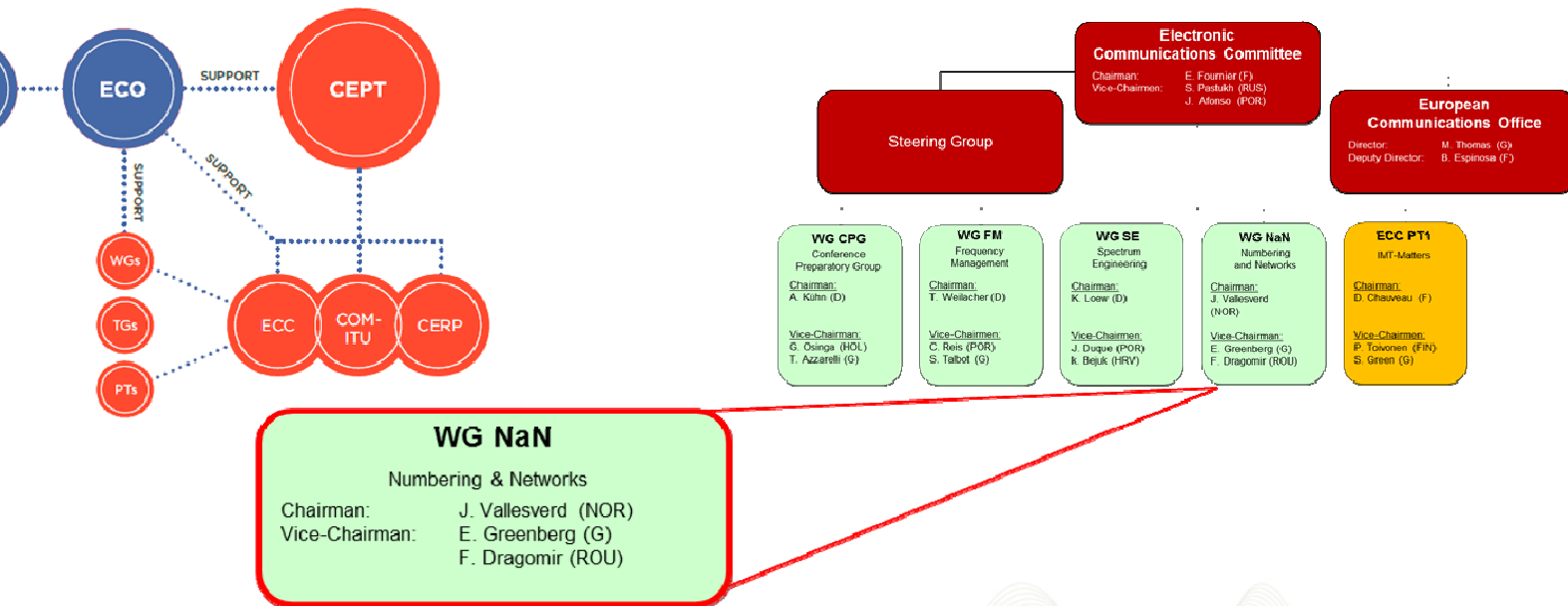**ECC**
CEPT
Electronic Communications Committee

Workshop BEREC IoT
1 February 2017
Scarce resources: Numbering

Johannes Vallesverd
CEPT ECC WG NaN Chairman
Presented by **Óscar Carvalho**
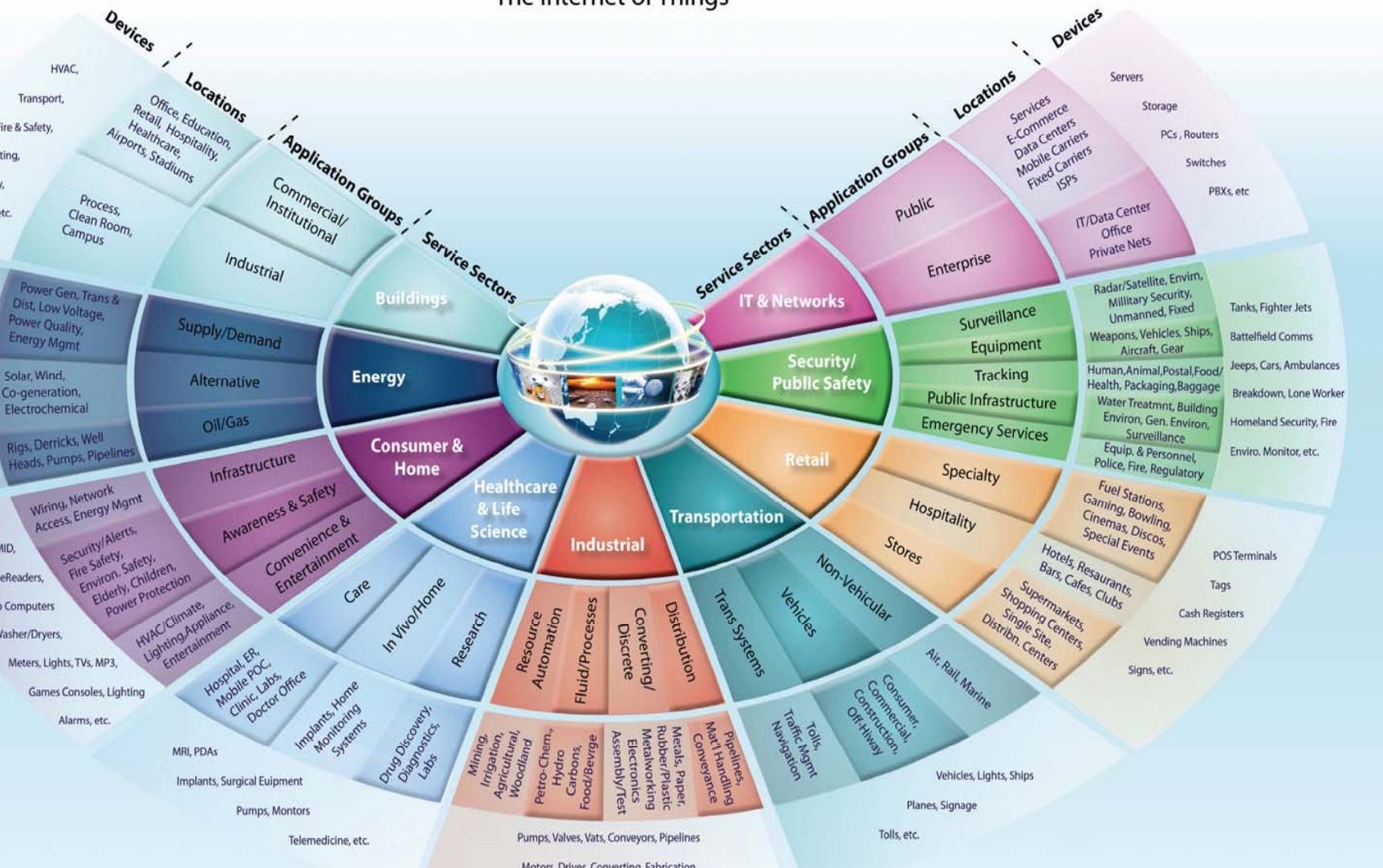Coordinator of Networks & Resources
Unit, Market Regulation dpt., ANACOM

N K
O M
Norwegian
Communications
Authority

Organisation map

M2M World of Connected Services
The Internet of Things

Devices

HVAC,
Transport,
Fire & Safety,
Lighting,
etc.

Locations

Office, Education,
Retail, Hospitality,
Healthcare,
Airports, Stadiums

Process,
Clean Room,
Campus

Application Groups

Commercial/
Institutional

Industrial

Service Sectors

Buildings

Power Gen, Trans &
Dist, Low Voltage,
Power Quality,
Energy Mgmt

Supply/Demand

Solar, Wind,
Co-generation,
Electrochemical

Alternative

Energy

Rigs, Derricks, Well
Heads, Pumps, Pipelines

Oil/Gas

Consumer &
Home

Wiring, Network
Access, Energy Mgmt

Infrastructure

RFID,
eReaders,
Computers

Security/Alerts,
Fire Safety,
Environ. Safety,
Elderly, Children,
Power Protection

Awareness & Safety

Healthcare
& Life
Science

Washer/Dryers,

HVAC/Climate,
Lighting,Appliance,
Entertainment

Convenience &
Entertainment

Meters, Lights, TVs, MP3,

Care

Games Consoles, Lighting

Hospital, ER,
Mobile POC,
Clinic, Labs,
Doctor Office

In Vivo/Home

Alarms, etc.

Research

MRI, PDAs

Implants, Home
Monitoring
Systems

Implants, Surgical Equipment

Drug Discovery,
Diagnostics,
Labs

Pumps, Montors

Telemedicine, etc.

Industrial

Resource
Automation

Fluid/Processes

Converting/
Discrete

Distribution

Mining,
Irrigation,
Agricultural,
Woodland

Petro-Chem,
Hydro
Carbons,
Food/Bevrge

Metals, Paper,
Rubber/Plastic
Metalworking
Electronics
Assembly/Test

Pipelines
Mat'l Handling
Conveyance

Pumps, Valves, Vats, Conveyors, Pipelines

Motors, Drives, Converting, Fabrication

Transportation

Trans Systems

Vehicles

Non-Vehicular

Tolls,
Traffic Mgmt
Navigation

Air, Rail, Marine

Consumer,
Commercial,
Construction,
Off-Hiway

Vehicles, Lights, Ships

Planes, Signage

Tolls, etc.

Devices

Servers

Storage

PCs , Routers

Switches

PBXs, etc

Locations

Services
E-Commerce
Data Centers
Mobile Carriers
Fixed Carriers
ISPs

IT/Data Center
Office
Private Nets

Application Groups

Public

Enterprise

Service Sectors

IT & Networks

Security/
Public Safety

Surveillance
Equipment

Tracking

Public Infrastructure

Emergency Services

Radar/Satellite, Envim,
Millitary Security,
Unmanned, Fixed
Weapons, Vehicles, Ships,
Aircraft, Gear

Tanks, Fighter Jets

Battelfield Comms

Human,Animal,Postal,Food/
Health, Packaging,Baggage

Jeeps, Cars, Ambulances

Water Treatmnt, Building
Environ, Gen. Environ,
Surveillance

Breakdown, Lone Worker

Homeland Security, Fire

Equip. & Personnel,
Police, Fire, Regulatory

Enviro. Monitor, etc.

Retail

Specialty

Hospitality

Stores

Fuel Stations,
Gaming, Bowling,
Cinemas, Discos,
Special Events

Hotels, Resaurants,
Bars, Cafes, Clubs

Supermarkets,
Shopping Centers,
Single Site,
Distrib. Centers

POS Terminals

Tags

Cash Registers

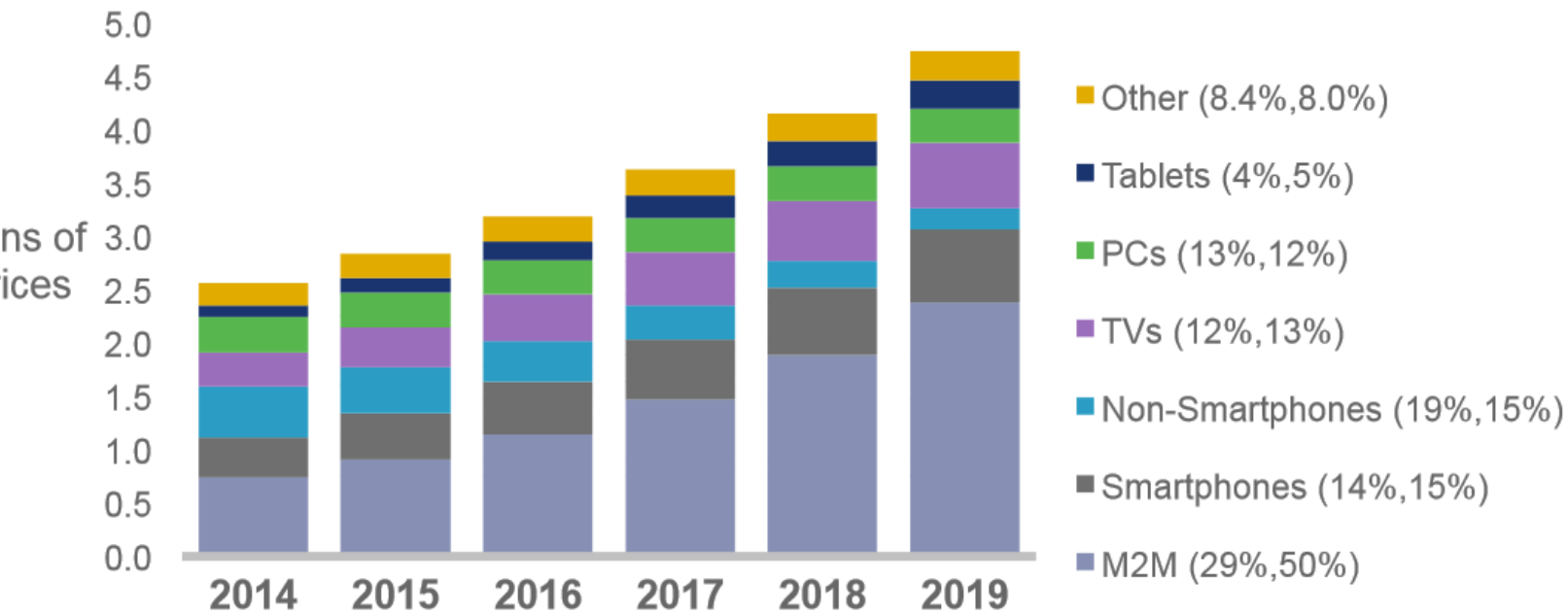Vending Machines

Signs, etc.

Cellular vs. non-cellular

ted devices (billions)

	15 billion	28 billion	CAGR 2015–2021
Cellular IoT	0.4	1.5	27%
Non-cellular IoT	4.2	14.2	22%
PC/laptop/tablet	1.7	1.8	1%
Mobile phones	7.1	8.6	3%
Fixed phones	1.3	1.4	0%
	2015	2021	

e: Ericsson Mobility Report

By 2019, 50% of Total Connections in Europe will be M2M

"BUT…………M2M Traffic Only About 3% by 2019"

Chart showing Petabytes per Month from 2014 to 2019 with device categories:
- Other (0.2%, 0.2%)
- Non-Smartphones (0%, 0%)
- M2M (1%, 3%)
- TVs (8%, 7%)
- Tablets (6%, 29%)
- Smartphones (7%, 25%)
- PCs (79%, 35%)
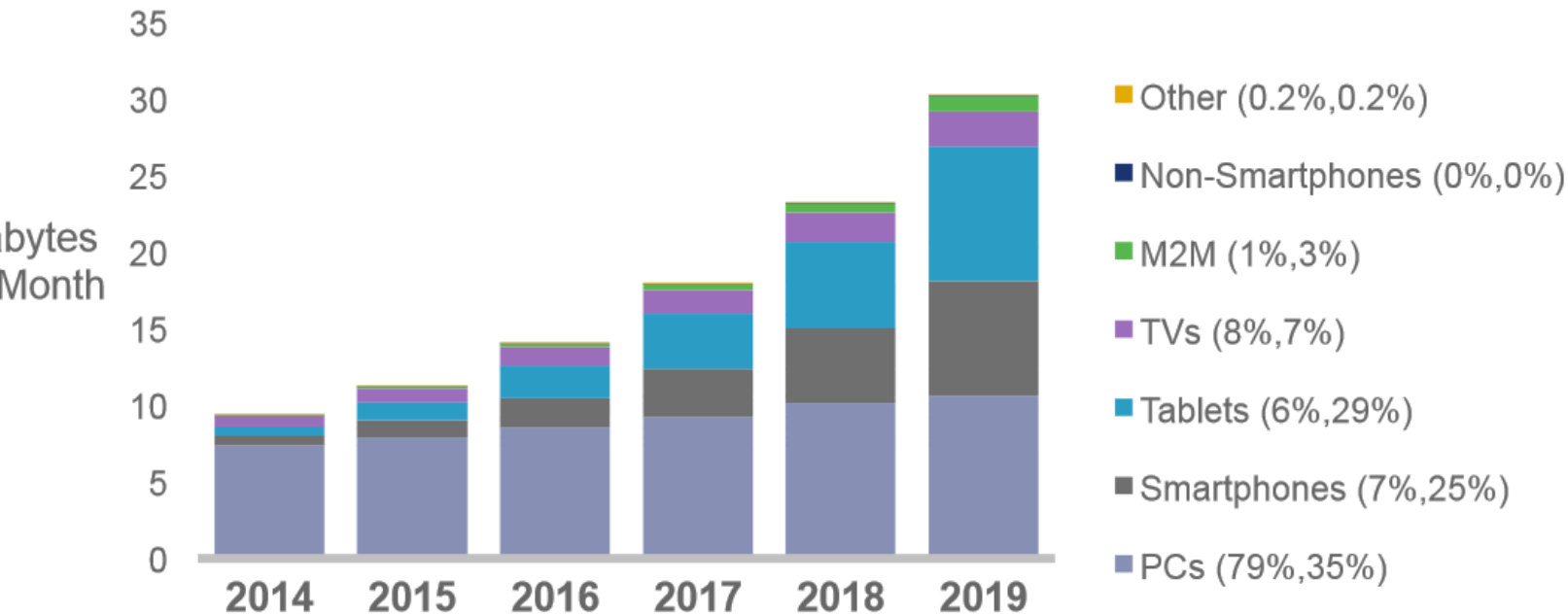
What does this mean for numbering?

For spectrum management, the relationship between the number of connections and traffic volume is an extremely important consideration. i.e. capacity planning and network dimensioning, peak loads etc.

For numbering plan management, the relationship is not so important.

Once a number is assigned to a device it is "in use" regardless of whether it is connected or communicating.

While not all M2M devices will require numbers, some applications are likely to require significant volumes of numbers

Management of numbering and identifiers

Traditional Telecoms World

Internet World

Resources assigned to Administrations by ITU-T

E.164 CC

E.212 MCC

Resources assigned by Administrations to service providers at the National level

ne numbers (E.164)

MNC (E.212)

ISPC/NSPC (Q.708)

INRs assigned direct to operators by ITU-T

UIFN (E.169.1)

UIPRN (E.169.2)

ISCN (E.169.3)

IC (E.164.3)

Shared MNC (E.212)

UPT (E.168)

Other resources assigned by ITU-T

ICC (M.1400)

Terminal (T.35)

Bureaufax (F.170)

Non-ITU resources assigned by other entities

IMEI (3GPP TS 23.003)

Domain name (RFC 1034)

IPv4-address (RFC 791)

IPv6-address (RFC 2460)

ECCs numbering related focus on M2M/IOT

- ✓ M2M E.164 numbering ranges
- ✓ Extra-territorial use of E.164 numbers
- ✓ E.212 MNC flexibility and 90x encouragment
- ✓ OTA switching and numbering
- ✓ Numbering for eCall and 112 issues

M2M numbering ranges

C Report 153 Numbering and Addressing in Machine-to-Machine
Communications (2010)

C/Rec(11)03 Numbering and addressing for Machine-to-Machine
Communications (2011)

M2M Capacity

Year of implementation
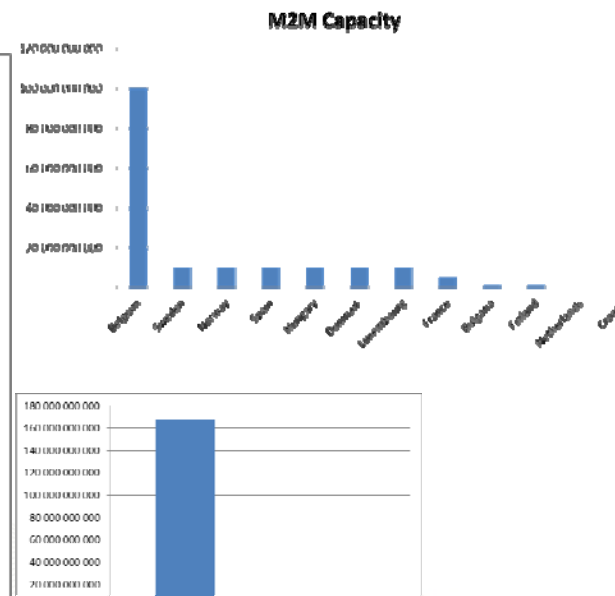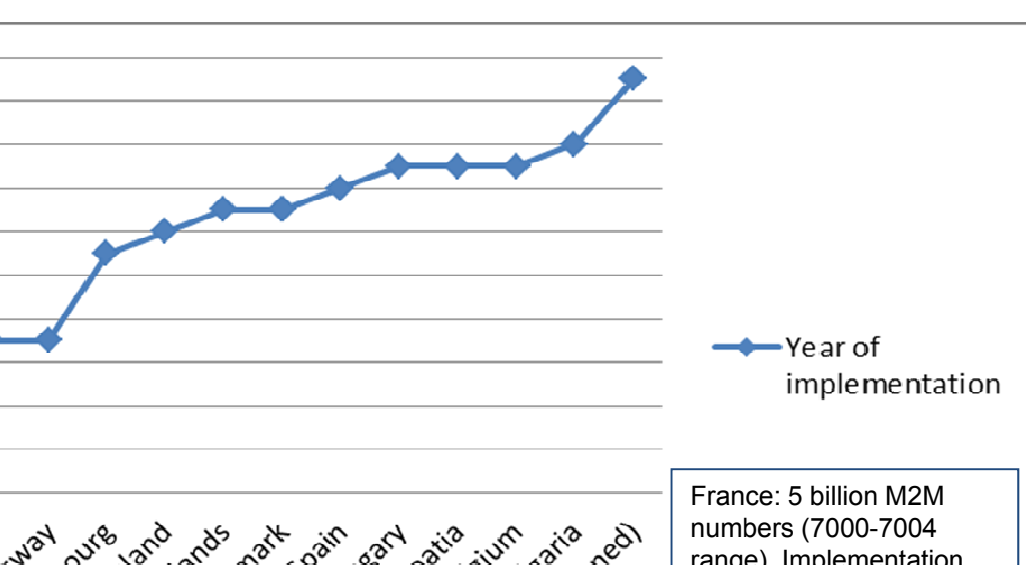
France: 5 billion M2M
numbers (7000-7004
range). Implementation

Scarcity risk vs. flexibility. Usually only 100 MNCs per MCC

MCC	MNC	MSIN
3 digits	2 or 3 digits	Maximum of 10 digits

←------------------------------------- IMSI - Maximum of 15 digits ------------------------------------→
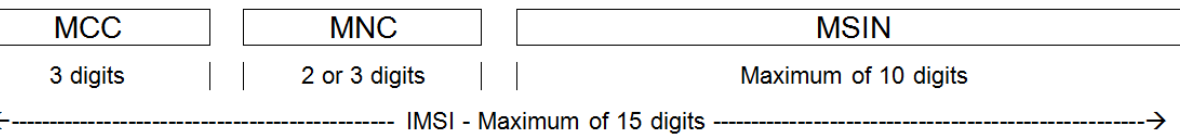
ECC Report 212 the Evolution in the use of E.212 Mobile Network Codes (2014)

- IMSI description, description of emerging demand, options and conclusions
- Input to ITU

2016: Change in ITU-T recommendation E.212

Annex B nr 6: *MNCs are to be assigned to applicants and used by assignees for public networks offering public telecommunication services. In addition MNCs may be assigned to other applicants (e.g. for GSM-R networks) and these assignments are to be made according to procedure and criteria established by the national numbering plan administrator.*

MNC consultation until 8 February 2017

[ECC Recommendation 17-02](#) Harmonised European
Management and Assignment Principles for Geographic
E.212 Mobile Network Codes (MNCs)

Some elements:

- MNCs are to be managed and assigned to permit the most effective and efficient use of a finite resource in order to defer, as long as is practicable, the need to request an additional MCC from the ITU-T TSB;
- Assignments of MNCs are to be made according to procedures and criteria established by the national numbering plan administrator;
- Encourages MNC 90x applications and shared use of national MNCs
- Gives examples of potential applicants; MNO, MVNO, PVNO, GSM R, providers of M2M/IoT and eCall services.

Are E.164 mobile numbers and/or E.212 MNCs assigned to undertakings other than MNOs or MVNOs

Legend:
- No
- Yes
- 3
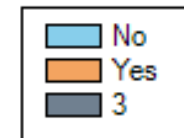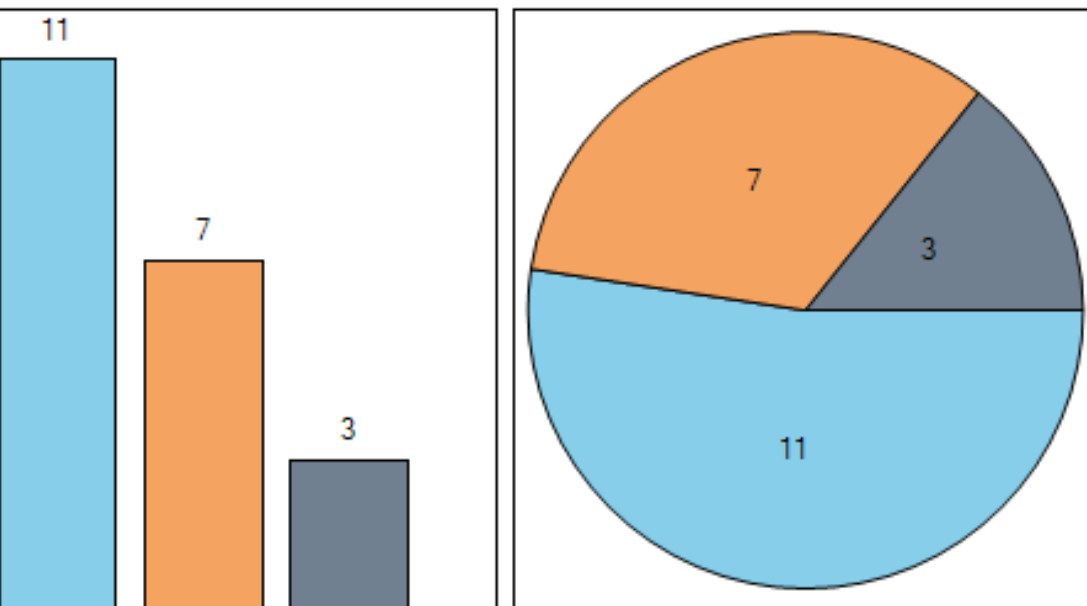
Grey=no answer

Changing connectivity provider in the cellular M2M sector

M2M/IoT devices using public mobile networks need a   form of SIM card for network authentication and communication

The physical replacing of SIM cards is often economically and logistically unrealistic, and sometimes even impossible

Easy switching promotes competition and remains an important policy objective for NRAs

changing of SIM profiles
ables switching without physical presence
SMA has defined an architecture and
ocesses
SI specifications
eat end-user potential

MNC flexibility
- Enables MNC-assignees to produce their own SIM-cards and to more easily switch access provider
- "PVNOs"
- Scarcity and other issues

Gear S2

Both paths or one of them? MNC for large end users – OTA for the rest?
Will eSIM be introduced on a voluntary basis?
EECC: MS «shall promote» OTA for M2M services (why not

Extra-territorial use of E.164 Numbers

ECC Report 194 Extra-territorial Use of E.164 Numbers (2013)
- Describes different types of extra-territorial use, where M2M is one example.
- Provides a problem analysis and pros and cons of extra-territorial use
- Presents policy options and conclusions.

ECC Recommendation (16)02 – Extra-territorial Use of E 164 Numbers - High level principles of assignment and use (2016)
- The general principle is national assignment and use, but an opening for exceptions under certain conditions.
- The applicant shall describe where and for what type of services the numbers are intended for use.
- Cooperation between administrations, if problems arise
- The recommendation considers that extra-territorial use of national numbers for M2M services may provide added value to the global market without having significant negative effects;

Database for ET-use of numbers for transparency is under consideration

The EECC proposes that MS shall determine a numbering range which may be used for ECS other than ICS, for use throughout the Union

bes your country allow its national E.164 mobile numbers and/or E.212 MNCs to be used on a permanent extra-territorial basis for M2M services?

Yes	
No	
2	
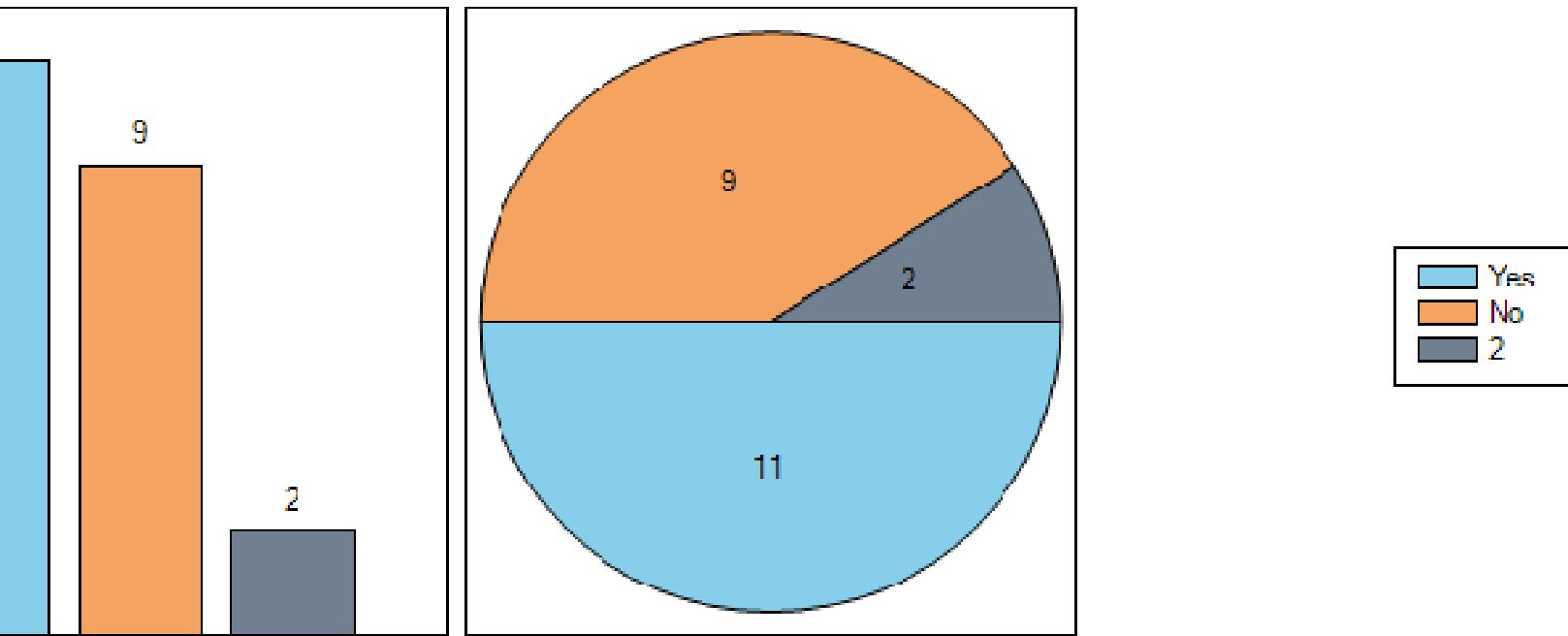
e E.164 mobile numbers and/or E.212 MNCs from another country allowed to be used in your country on a permanent extra-territorial basis for M2M services?

Yes	
No	
6	
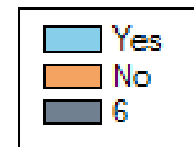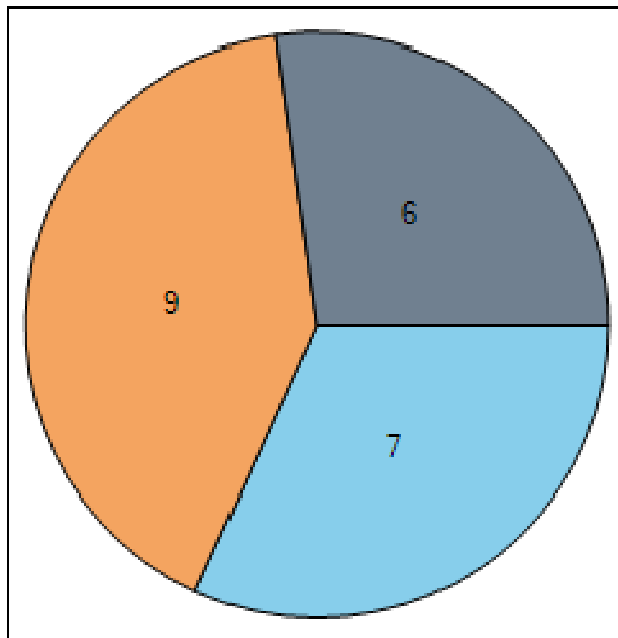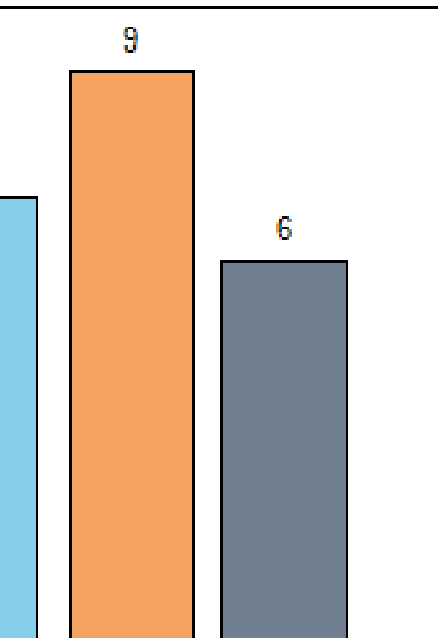
C/T/SF-1: Long Term Standardisation of National Numbering Plans – Recommendation on 112 (1972)

C Report 193: Emergency Calls in VoIP Environment - Compilation of Recent Studies (2012)

C Report 225 : Establishing Criteria for the Accuracy and Reliability of the Caller Location Information in support of Emergency Services (2014)

C Report 255:The use of Assisted-Global Navigation Satellite System (A-GNSS) capabilities to improve caller location information for emergency calls originating on mobile devices (2016)

Ongoing work

aft ECC Report regarding Over-The-Air (OTA) Provisioning of
12 and E.118 Resources and the impact on Number
rtability (PT NP)

aud in numbering (PT NP)

aft ECC Report on Numbering for OTT (PT FNI)

gration PSTN/ISDN to all-IP (PT TRIS)

orkshop on Numbering for eCall (PT FNI) – 31.01.2017

ECC
Electronic Communications Committee

Some conclusions

There are no single numbering solution for M2M/IoT

The CEPT ECC numbering policies stimulates innovation and competition

CEPT ECC contributes constructively to the ITU-T

Extra-territorial use is happening and often on a global scale

OTA will make a difference. Why not for P2P?

Legacy numbering will remain for quite some time and be entangled with IP-addressing.

Number usage play a key part in EECC in creating a level playing field

Continue the good cooperation

Thank you!

MV@NKOM.NO

http://www.cept.org/ecc/groups/ecc/wg-nan/client/introduction/