Calling Party Numbers for eCall Devices
- options and associated challenges

Freddie McBride, European Communications Office

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• About CEPT/ECC/WG NaN
• Numbering plan management – basic principles
• Numbering for eCall
• E.164 and E.212 defined
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About CEPT/ECC/ECO
About Working Group Numbering and Networks (WG NaN)

“responsible for developing policies in numbering, naming and addressing and advising on technical regulatory matters to promote and support telecom innovation and competition”

Some Relevant Deliverables

- **CEPT Recommendation TSF/1**
  - Long-term standardisation of National Numbering Plans (The Hague, 1972). First effort to harmonise 112 for emergency services

- **ECC Recommendation 11(03)**
  - Numbering and Addressing for Machine-to-Machine (M2M) communications (Athens, 2011)

- **ECC Report 194**
  - Extra-territorial Use of E.164 Numbers (Budapest, 2013)

- **ECC Report 212**
  - Evolution in the Use of E.212 Mobile Network Codes (Lisbon, 2014)

- **ECC Report 225**
  - Establishing Criteria for the Accuracy & Reliability of Caller Location Information in support of Emergency Services (Oslo, 2014)

- **WG NaN Green Paper**
  - Long Term Evolution in Numbering, Naming and Addressing (2012-2022)
Numbering Plan Management

- Numbering a key enabler of communications services
  - Numbering enables competition
    (number portability and new numbers for new market entrants)
  - Numbering fosters service innovation
    (numbers and short codes for new services – eCall, M2M, Harmonisation)
  - Numbering facilitates consumer protection
    (Tariff transparency, CLI, Legal Intercept)

- Balance between providing numbers and mitigating risk of exhaustion. Number changes are expensive!
- Careful long term planning required - A strategic national resource
- National Numbering resources assigned by numbering plan managers, typically NRA or Ministry
- International Numbering Resources assigned by ITU
Stakeholders involved in Numbering Plan Management

<table>
<thead>
<tr>
<th>Stakeholders assigned to MS/Administrations by ITU</th>
<th>Stakeholders assigned direct to operators by ITU</th>
<th>Stakeholders assigned by ITU</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.164 CC, X.121 DCC, Q.708 SANC, E.218 T(MCC)</td>
<td>UPT (E.168.1), UIFN (E.169.1), UIPRN (E.169.2), ISCN (E.169.3), IC (E.164.3), IND AESA (E.191), Shared MNC (E.212), Trials (E.164.2)</td>
<td>ICC (M.1400), Terminal (T.35), Bureaufax (F.170), OID (X.660)</td>
</tr>
</tbody>
</table>

- **National resources assigned by Administrations National level**
- **Other resources assigned by ITU**
- **Non-ITU resources assigned by other entities or via Administrations or other national entity (e.g. NSO)**

- IMEI (3GPP TS 23.003)
- ERMES (ETS 300 133-3)
- Domain name (RFC 1034)
- IPv4-address (RFC 791)
- IPv6-address (RFC 2460)
- MAC (ISO 8802.3)
- NSAP (ISO 8348)
Numbering for eCall

• eCall has all the characteristics of a mobile service
  – Solution based on circuit-switched technology using GSM/UMTS public networks
  – E.212 numbering resources needed for SIM card identification and mobile network authentication (even without mobility management)
  – Ability to roam between networks and across borders is essential
  – E.164 numbering resources needed to make and receive calls
ITU-T Recommendation E.212

- Telecommunication Standardization Sector of the International Telecommunications Union (ITU-T) is the primary international body for fostering cooperative standards for telecommunications equipment and systems.
- E.212. defines the international identification plan for public networks and subscriptions

<table>
<thead>
<tr>
<th>MCC</th>
<th>MNC</th>
<th>MSIN</th>
</tr>
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<tbody>
<tr>
<td>3 digits</td>
<td>2 or 3 digits</td>
<td>Maximum of 10 digits</td>
</tr>
</tbody>
</table>

IMSI - Maximum of 15 digits

- 1,000 MCCs
- 100,000 MNCs overall
- 1,000,000,000,000,000 (10^{15} MSINs) A Quadrillion!

Conclusion:
- Lots of capacity overall
- Each MNC assignee has 10 billion IMSIs to assign
- But there is a bottleneck at the MNC level where there are only 100 resources
- As demand increases, this may become a problem for NRAs.
• Situation in Spain (source: snapshot from wikipedia)

<table>
<thead>
<tr>
<th>MCC</th>
<th>MNC</th>
<th>Brand</th>
<th>Operator</th>
<th>Status</th>
<th>Bands (MHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>214</td>
<td>01</td>
<td>Vodafone</td>
<td>Vodafone Spain</td>
<td>Operational</td>
<td>GSM 900 / GSM 1800 / UMTS 2100</td>
</tr>
<tr>
<td>214</td>
<td>03</td>
<td>Orange</td>
<td>France Telecom España SA</td>
<td>Operational</td>
<td>GSM 900 / GSM 1800 / UMTS 900 / UMTS 2100</td>
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<td>214</td>
<td>04</td>
<td>Yoigo</td>
<td>Xfera Móviles SA</td>
<td>Operational</td>
<td>GSM 1800 / UMTS 2100</td>
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<td>214</td>
<td>05</td>
<td>TME</td>
<td>Teléfonica Móviles España</td>
<td>Operational</td>
<td>GSM 900 / GSM 1800 / UMTS 2100</td>
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<td>214</td>
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<td>Vodafone</td>
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<td>movistar</td>
<td>Teléfonica Móviles España</td>
<td>Operational</td>
<td>GSM 900 / GSM 1800 / UMTS 2100</td>
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<td>214</td>
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<td>Euskaltel</td>
<td></td>
<td>Operational</td>
<td>MVNO</td>
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<tr>
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<td>Orange</td>
<td>France Telecom España SA</td>
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<td>GSM 900 / GSM 1800 / UMTS 2100</td>
</tr>
<tr>
<td>214</td>
<td>15</td>
<td>BT</td>
<td>BT Group España Compañía de Servicios Globales de Telecomunicaciones S.A.U.</td>
<td>Operational</td>
<td>MVNO</td>
</tr>
</tbody>
</table>

• MNCs are only to be assigned to and used by “public networks offering public telecommunication services”
• The game is changing with services such as M2M stimulating greater demand for MNCs from alternative entities
Operator lock-in
- The switching challenge is very different for an individual consumer versus an M2M end-user.

Potential solutions to resolve lock-in
- Administrative
  - Assign E.212 resources to large end users so IMSI range independent of underlying MNO (MVNO type approach)
  - Assign MNC from ITU under a shared MCC which is country-agnostic
  - Administrative solutions require action by ITU.
- Technical
  - Use of SIM card that can be update remotely (OTA) – e.g. Embedded SIM (GSMA)
  - Welcome development. Solution would need to be standardised which may take some time

For eCall, what are the options?
- IMSI resource from country where vehicle is manufactured?
- Different IMSI depending on the destination country?
- International solution under shared MCC (e.g. 901) or shared national MNC for eCall?
E.212 – Continued – MNC Sharing

- Shared MNC Concept
  (source: Gedeeld gebruik MNC’s voor M2M toepassingen, Rapport uitgebracht aan het Ministerie van Economische Zaken, Stratix, 2013)
ITU-T Recommendation E.164

- ITU-T Rec. E.164 defines the international public telecommunication numbering plan

- ITU assigns country code
- NRA/Ministry organises and develops numbering plan behind country code
- Number ranges designated for geographic/fixed, mobile, freephone, short codes etc.
  - Efficient management is essential - Addressing devices rather than personal subscriptions (households to individuals to machines) and cross border use.
E.164 Numbers for eCall

- Does an eCall device need an E.164 number?
  - Not according to the relevant ETSI standards but used in HeERO trials
  - Calling Line Identification (CLI) is required for allowing the PSAP to callback the eCall UE
  - Key question: Temporary or permanent assignment? (Russian Experience) (conflicting EC information)

- How many numbers required?
  - 230 million vehicles – 5% stock renewal each year (11.5 million)
  - New registrations in Europe (source: ACEA)

<table>
<thead>
<tr>
<th>Year</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>5 year average</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Registrations (000,000)</td>
<td>14</td>
<td>13</td>
<td>13</td>
<td>12</td>
<td>13,5</td>
<td>13</td>
</tr>
</tbody>
</table>

- Demand for 13,000,000 new mobile telephone numbers per annum
- As an example, Ireland has a current total mobile numbering capacity of 70 million. Somewhere between 51% already allocated. (28% Free, 21% Reserved)
  - So eCall could use remaining capacity in Ireland within 2-3 years
  - Extending capacity means costly number changes
eCall – Do you have any concerns for your privacy? You shouldn’t….

Confusion should be avoided between the public Pan European 112 eCall that is proposed by the EC -and will be free of charge- and other private road safety systems (possibly resembling eCall) that are, or will be possibly offered under a subscription by private operators in combination with other value added services (e.g. vehicle repair after break-down or insurance).

The public Pan European 112 eCall In-Vehicle System (IVS) remains dormant (that means not connected to the mobile phone networks) until a serious accident happens, therefore no tracking or transmission of data takes place during the normal operation of the system.

While in normal operation the eCall IVS is not registered to any telecommunications network. Registration and voice/data communications take place only in case of an accident. During its normal operation, the IVS may only scan the radio spectrum for available networks, but without communicating with the Mobile Network Operators (MNOs).

Possible solution: Dormant SIM = No Subscription = Temporary assignment of an E.164 number
FAQs on eCall (source: European Commission)

“What will be the cost of the eCall? Who will pay for it? Who will provide the hardware?
The basic pan-European eCall service, based on 112, is a public service deemed to be offered by free. However, it is expected that the eCall technology platform capabilities (i.e., positioning, processing and communication modules) could be exploited commercially (e.g., advanced insurances schemes, stolen vehicles tracking, eTolling).

Possible solution: Active SIM = Subscription Required = Permanent assignment of an E.164 number
E.164 Numbers for eCall - continued

- Challenging to implement conservation measures
  - **Number recycling**
    - Numbers recycled after a period of quarantine (typically 1 year).
    - No significant recycling for at least 15 years (except for accident write-offs)
  - **Number Portability (NP)**
    - Consumers change service while retaining their number
    - Benefit of NP for eCall not obvious – E.164 number is used for addressing device rather than personal subscription – hidden numbers

- Options
  - **Using national numbers**
    - Mobile numbers (extra-territorial use could be an issue)
    - Relevant national number remotely provisioned when car registered in-country
    - Dedicated numbering ranges specifically for eCall and other M2M type applications
      - Number of digits in these ranges to be set at maximum as recognition not important
      - 7 digit number = 10 million capacity, 8 digit = 100 million, 9 digits = 1 Billion etc.
  - **Using international numbers**
    - Country-agnostic number range from ITU (+88x)
• Numbering resources can be made available for eCall. There is no capacity issue *per se*
• Collaboration between key stakeholders is necessary to ensure that the most appropriate solution is found
• From a numbering plan management perspective the numbering solution should provide sufficient capacity in the long term and be efficient and sustainable in order to avoid a ”mish-mash” of different solutions.
• WG NaN welcomed EeIP announcement on establishment of Task Force "Lifecycle management" in order to address the issues related to the SIM during the vehicle life time. Still no first meeting!
• WG NaN considers that this would be the right forum for discussing the numbering issues and is ready and willing to participate
Thank you for your attention!