

Why do machines need telephone numbers?

You may have heard talk about ideas such as the 'intelligent refrigerator': it would know when you had nearly used all the milk and order some more over the internet for delivery. That is probably a rather self-indulgent example of how an increasingly interconnected world could look. And it is unhelpful, as it distracts from the many real applications now in the market or advancing that way, to bring more useful benefits to people through 'machine-to-machine communications' (M2M). But what is M2M?

'M2M' refers to technologies that allow both wireless and wired systems to communicate with other devices. Typically a device such as a sensor or meter will capture an event (such as temperature, inventory level, etc.), which is relayed through a network (wireless, wired or hybrid) to an application that translates the captured event into meaningful information. And key to enabling this is the use of public networks, or large private ones, where, just as with a phone call or logging on to a website, one machine needs to tell the network exactly what other machine it wants to communicate with.

In recent years a rapid development of a variety of services that make use of M2M communication has taken place. M2M is a communication technology where data can be transferred in an automated way with little or no human interaction between devices and applications.

The advantages of M2M are great for both business and consumers. For business use, M2M technology may lead to more effective and efficient operations (e.g. fleet control, navigation, stock control etc.). For consumers, as an example, applications used for home security, smart metering and health care assistance can be facilitated by M2M.

The prospects for this technology are also considerable. According to Berg Insight the number of cellular M2M connections worldwide is forecasted to grow at a compound annual growth rate of 32 per cent to reach around 290 million in 2015. These figures don't take into account the predicted mass scale deployment of M2M-applications mandated by governments via legislation, such as toll roads, or smart metering (see e.g. EU directive on smart meters). So this is clearly a market with a potential of 1 billion (10⁹) connected devices worldwide in 2020!

In many European countries the existing numbering plans can't accommodate the mass deployment of M2M-applications

While M2M is in its earlier stages of development, a logical approach by operators and M2M Service Providers is to use E.164- numbers (the international numbering scheme agreed by the International Telecommunications Union) from the existing mobile numbering ranges. This offers relatively simple implementation in the already existing network infrastructure. But the potential number of M2M devices will be large and some applications may need several numbers. Correspondingly there is a potential need for a large amount of identifiers.

After a statistical analysis conducted by the ECC's Working Group on Numbering and Networks (WG NaN), it was concluded that a new numbering strategy is required for both the short and long-term to meet the potential demand.

As a result of a lot of study and interactions with the main actors in the M2M business the WG NaN produced an expert report in 2009 on M2M-numbering which addresses the basic M2M characteristics, different access methods from M2M devices to networks and numbering and addressing alternatives for M2M applications. Finally, a set of recommendations for the National Regulatory Authorities regarding M2M numbering were proposed with four options:

- Option A: The use of the existing mobile number ranges, including possible expansion of them (E.164 numbers);
- Option B: A new number range for M2M or similar applications (E.164 numbers - for example longer numbers than normal but with a maximum of 15 digits according to ITU-T Recommendation E.164);
- Option C: An international numbering solution (E.164 numbers);
- Option D: Network internal numbers.

The sector confirmed the initial view of the WG NaN that IPv4/IPv6 is not an option in the short to medium term for M2M-numbering

WG NaN's analyses were very well received by industry in the subsequent consultation. This again confirmed that in the short term IPv4/IPv6 for identification of M2M devices was not an option for the operators and service providers. It also concluded that Option A was not suitable in cases where there is a need to distinguish M2M services and the traditional mobile services. Options B or D are needed if there is no adequate space in existing number ranges in use. There are many situations where a new number range (option B) should be opened: the number range in question may require different regulatory treatment, e.g. relating to access to emergency services, or the services to be provided have certain characteristics (e.g. M2M applications in fixed networks) where existing mobile number ranges may not be adequate or there is simply not enough numbering capacity available.

In practice we see that many countries follow these recommendations. Examples are Denmark, Norway, Netherlands, Spain, Finland, Luxembourg, Sweden and Belgium who opened a new long numbering range only for M2M. In many other countries the decision is pending.

Is the work of the WG NaN finished on M2M? The answer is clearly no! In the first instance the WG NaN will further refine the results of the report and publish a recommendation for the CEPT countries on how to approach M2M-numbering in much more detail. No specific need was detected for a harmonised approach amongst the CEPT countries, but it was felt necessary to continue the momentum to put in place effective and efficient numbering solutions taking into account the specificities of the national numbering plans. Although much of the ECC's work is directed towards harmonisation we understand well that it is not always the best option, and should only be applied where it brings a clear benefit; enabling services, improving efficiency and/or bringing economies of scale.

Empowerment of M2M-users

Furthermore, M2M applications will be embedded in mobile devices with SIM-cards spread all over the world. We have for a long time had number portability in place, which makes it easier for end-users to switch from one operator to another for voice telephony, but today the SIM-cards still have to be physically replaced! For mobile devices spread out all over the world, this will be very difficult and expensive. In some case (e.g. sensors) it would even be a challenge to find where they are because the associated mobile devices will often be hidden!

In this context, the flexible use of E.212 identifiers (i.e. Mobile network codes) is one of the options to empower the user (e.g. M2M service/application provider or large company) for a more flexible choice of his mobile operator. But there are many open questions in this context and it is not assured if this will be a practicable approach. One challenge is that the rules governing E.212 resources (IMSI) have to be changed by the International Telecommunications Union (ITU). Another option is the usage of Soft SIM-cards, but operators are very reluctant to introduce that kind of technology which is still under development. Soft SIM technology allows SIM card configuration in a device over the air, i.e. the SIM card is just a piece of software.

This is only one of the challenges for 2012 for the Project Team on Future Numbering Issues (PT FNI) within the WG NaN. We always welcome further engagement with all stakeholders in the M2M business in order to find the most optimum solutions for a prosperous development of M2M.

Jan Vannieuwenhuyse
Chairman of the ECC's Working Group on
Numbering and Networks (WG NaN)

ECC launches major review of an attractive band of spectrum

We hear a lot about the pressure on spectrum; the growing demands for mobile broadband are well known, but there are many other demands as well. So it may seem strange that 40 MHz of spectrum lies in the technically attractive 'L-Band' but is significantly under-used. Of course, there is a story behind this (see below), but under-used spectrum is an opportunity, and this one is particularly interesting. The ECC is working to enable this attractive spectrum to be used to better effect.

At the end of 2010, the ECC started a review of the use of the L-band (1452 - 1492 MHz). A survey undertaken by **WG FM PT 45**¹ indicated that currently there is a very limited usage of the band. Accordingly, the CEPT administrations, together with industry, proposed a wide variety of possible future applications that could be used in the L-band. The ECC then decided to assess which future use(s) would be the most appropriate for CEPT to investigate as candidate applications. This is a unique review process which may open the way for new applications in this frequency range in order to promote a more efficient use of the spectrum.

Current situation

The band 1452-1492 MHz was identified for digital radio broadcast services at ITU's World Administrative Radio Conference (WARC) in 1992². In Europe, it is allocated for use by terrestrial and satellite digital audio broadcasting (DAB) services in most countries:

- Terrestrial segment: 1452-1479.5 MHz (27.5 MHz)
- Satellite segment: 1479.5-1492 MHz (12.5 MHz)

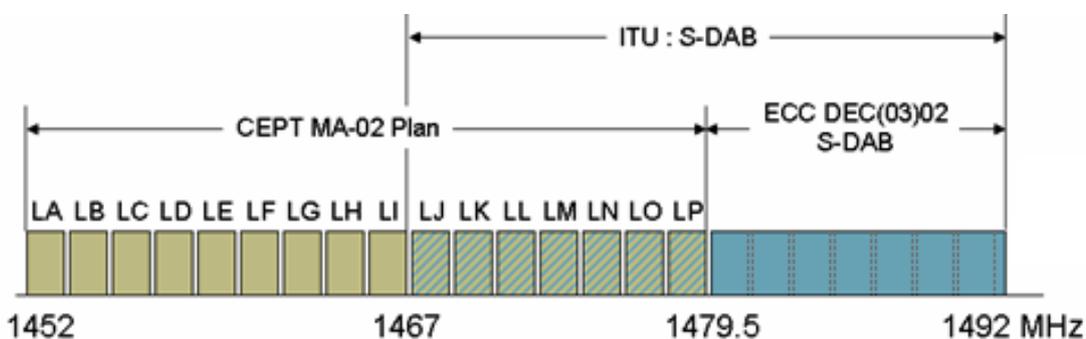


Figure 1: Overview of the Regulatory situation in the frequency range 1452 - 1492 MHz

The frequencies from 1452 to 1467 were originally included in a Terrestrial T-DAB plan agreed at Wiesbaden in 1995. This was superseded by the [Maastricht Special 2002 Special Arrangement](#), covering the 1452 to 1479.5 range, which in turn was revised in Constanța in 2007. This revision in 2007 was to allow a wider variety of systems (especially mobile multimedia systems) to be deployed as long as they fit within the Plan and Agreement. This provides additional flexibility to administrations in terms of technology use on a national basis (see [CEPT Report 18](#)). The satellite segment of the L-band has been designated for use by Satellite Digital Audio Broadcasting Systems by [ECC Decision \(03\)02](#).

After the Maastricht agreement was revised in Constanța in 2007, the more flexible utilisation framework sought to encourage administrations to grant licences. However, the ECC survey indicated that the L-band remains to this day, unused in most European countries. In particular, almost none of the T-DAB and S-DAB deployment and usages have actually materialised in the band. This lack of take-up was also identified by the Radio Spectrum Policy Group survey in a Report on the future of digital audio broadcasting³. A harmonised approach to use of a frequency band provides for more technical efficiency, and the CEPT has a strong interest to find a new harmonised approach for the L-Band. This approach should achieve a more efficient actual use of this frequency range, to provide services that people will use.

The candidates

The ECC is considering proposals for the following as possible future applications in the L-band:

- Terrestrial broadcasting for distribution of audio and video content in a one-to-many mode based on DAB technology or other standard (e.g. DVB-H, DVB-T2...).
- Mobile broadband: digital terrestrial system providing data (IP-) access to mobile devices.
- Mobile multimedia downlink providing a supplemental downlink to carry text, voice, images, sound and video content in unicasting, multicasting and/or broadcasting mode to associated mobile station receivers.
- Satellite broadcasting: digital satellite, or hybrid terrestrial satellite, system for distribution of audio and video content in a one-to-many mode.
- Programme Making and Special Events (PMSE): wireless microphone systems used in commercial applications like installations in sport / events centres, musical and theatres, conference centres and city halls.
- Public Protection and Disaster Relief (PPDR) radiocommunications used by responsible agencies and organisations dealing with maintenance of law and order, protection of life and property, and emergency.
- Broadband Direct-Air-to-Ground Communications (BDA2GC) to deliver broadband connectivity from ground stations to aircraft to be used by passengers onboard.

A new Project Team to lead the L-band review

In May 2011, WG FM established a new project team, **FM50**, in order to identify which future use(s) of the L-band would be the most appropriate for the CEPT area. The work is expected to be conducted in collaboration with other groups within the ECC, and other organisations (e.g. ETSI, EBU, etc.). Impact analysis will be a significant element of the work. As agreed by the project team, the following criteria will be considered to carry out this analysis: compatibility with the current regulatory framework; possibility to combine/share with other applications/uses; extent (maximisation) of social and economic benefits; timeframe for availability of equipment on a large scale and for application deployment - status of standardisation; potential for economy of scale (need and potential for harmonisation within and outside CEPT).

FM PT 50 held its first meeting at the end of July 2011 at the ECO's premises and elaborated its study outline together with the outline of the draft ECC Report that will have to be developed. The 2nd meeting, in Rome in September 2011, finalised the description of the study criteria and started the analysis of the candidate applications.

The outputs of the work are expected to be finalised in the summer of 2012, and the ECC will then have a basis to consider its next move with this potentially valuable range of spectrum.

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²The ITU Radio Regulations allocate the band 1452 - 1492 MHz to the Fixed, Mobile, Broadcasting and Broadcasting Satellite Service on a co-primary basis in all Regions with the exception of the mobile aeronautical service which is excluded in Region 1.

³See RSPG10-349 and its Annex, http://rspg.groups.eu.int/rspg_opinions/index_en.htm#reports

Ready to support European interests in WRC-12

With the World Radiocommunication Conference 2012 (WRC-12) fast-approaching, the CEPT has been focused on getting the final preparations in place to support European interests at this major conference.

The ECC's Conference Preparatory Group (CPG) has been working actively to resolve many outstanding issues and has already adopted European Common Proposals (ECP) on two-thirds of the WRC-12 agenda items.

But the road has not always been easy. For example, the CPG is still struggling to balance, on the one hand, the requirement of commercial mobile satellite operations in the L band and, on the other hand, the need to enforce the priority given in this band to aeronautical satellite communications, which would be of benefit to the satellite component of SESAR (Single European Sky ATM Research). However, the mood is in favour of a compromise and there has been tremendous progress since the beginning of 2011 in many difficult WRC-12 agenda items.

The most striking one relates to the digital dividend band (790-862 MHz) where there has been a hot debate on the regulatory procedure to be applied for the coordination between countries wishing to use this band for mobile services and countries having deployed an aeronautical radionavigation system, e.g. the Russian Federation. During the ITU's Conference Preparatory Meeting for WRC-12 (CPM), in February 2011, discussions took place between the Regional Commonwealth in the field of Communications (RCC)¹ and CEPT, which resulted in a process to ensure that all necessary bilateral agreements will be reached before WRC-12 with satisfying conditions for the operation of both services. In this case, the details of the regulatory provisions in the Radio Regulations, discussed under WRC-12 agenda item 1.17, will become irrelevant. A framework agreement was agreed and, since then, bilateral/multilateral agreements have already been signed between Hungary and Ukraine, the Baltic countries and the Russian Federation, Poland and the Russian Federation, Finland and the Russian Federation.

Another impressive progress has been made in the area of procedures applying for coordination and notification of satellite networks. All satellite operators rely on ITU rules for their legal rights in spectrum and orbit access. These rules are based on the principle of a maximum period (i.e. seven years) between the time when the procedure is initiated and the time the satellite is brought into use, so as to avoid pre-emption of the resource. However, the ambiguity in the procedures (e.g. what is meant by 'bringing into use'? how to take into account a suspension in the operation of your satellite? how to demonstrate that the satellite is really in operation?) has led to an increased number of 'paper satellites', an exacerbated scarcity of the resource in all bands, some difficulties for the ITU in applying and controlling the rules, etc. The CEPT will submit a forward-looking proposal for modification and clarification of the rules, prepared by the satellite industry and administrations, which will be a significant step towards achieving a clear level playing field for satellite operators.

High on the political agenda is also the request to have a new agenda item for the next WRC (in 2015 or 2016) to respond to the increasing spectrum requirement of mobile broadband in a harmonised way through the identification of spectrum for International Mobile Telecommunications (IMT). The CEPT administrations had various views on the objective of such an agenda item, in particular regarding potential candidate bands, but reached an agreement for a clear and open agenda item which is likely to trigger many studies in the next few years!

The next step is to finalise all remaining ECPs at the CPG meeting in November. Then, CEPT will be ready for WRC-12 and in a strong position to support European interests on this important world stage.

Eric Fournier

Chairman of the ECC's Conference Preparatory Group

¹The RCC's members are almost all members of the CEPT, but in this case the balance of preference differed between these groups of members as a whole.

Europe's Broadband Spectrum Strategy for Public Safety

We all know that the public safety services (police, fire, ambulance, coastguard, etc.) need reliable radiocommunications to do their job effectively. Some high-profile incidents over the years have highlighted the benefits of coordination between the services, and the problems which arise when this is not in place. In the 1990s many authorities have implemented the TETRA radio system, which has helped, although that is only part of the equation.

The ECC took a step forward in 2008 with its Decision (08)05. This replaced and augmented an earlier Decision (Dec(96)01, harmonising frequencies for voice and lower speed data in the range 385-390 and 390-395 MHz) with one setting out arrangements also for wideband data (effectively up to 500 kbit/s) in a wider range extended up to 470 MHz. This recognises that the detailed frequency availability within this range varies from country to country due to existing commitments. The Decision also recognises the term 'Public Protection and Disaster Relief', a fairly self-explanatory term which is defined more precisely by the ITU in its Recommendation M2033.

But now there is a demand in the PPDR community for higher bandwidth broadband communications. The requirement is for high resolution pictures to be sent from the field to the control room. European agencies are working together in the ECC to establish a harmonised frequency band for these public-safety broadband services.

The ECC's Frequency Management Working Group (WG FM) has established a new Project Team, FM49. It focuses on medium and long term (before year 2025) spectrum realisation and will develop a roadmap on the timeframes and necessary steps needed. European-wide harmonisation of spectrum brings benefits of market size for equipment and technical efficiency in spectrum use. Here, the evaluation of suitable bands (for both below and above 1 GHz), will also take into account cross-border-communication issues and PPDR application requirements including issues such as inter-operability needs, whilst not ignoring the opportunities and constraints specific to individual countries.

Public safety broadband requirements from a range of industry and public safety users have already been described in the ETSI System Reference Document TR 102 628 and have been from ETSI to WG FM.

The formation of the new project team FM49 follows two significant workshops on PPDR. The ECC's WG FM organised a workshop on spectrum needs for public protection and disaster relief (PPDR) communication systems in March 2010. This was followed by an EU workshop organised by DG Information Society and Media (INFOS) of the European Commission in March 2011.

To set out a background for the work, WG FM developed a questionnaire on the radio spectrum demand for public safety systems. After the European Communications Office had conducted the questionnaire exercise, WG FM identified some main conclusions based on the responses:

- The use of existing and new data applications (high speed data) by PPDR users will increase rapidly;
- Increased data usage, especially for mission critical communications, will have a significant effect on the frequency need and justifies requirements for additional spectrum;
- There are many requirements and conditions for the use of PPDR, which lead to the need to use dedicated PPDR networks. However, in addition to the dedicated networks, commercial/public networks are and will also be used for non-mission critical data applications.

As well as the **ECC Decision (08)05** on the harmonisation of frequency bands for PPDR in the 380-470 MHz range, other relevant existing deliverables are:

- **ECC Recommendation (08)04** on the identification of frequency bands for the implementation of BBDR (Broadband Disaster Relief) radio applications in 5 GHz
- **ECC Decision (06)05** regarding Air-Ground-Air operation (AGA) of the Digital Land Mobile Systems for the Emergency Services and
- **ERC Decision (01)19** regarding DMO frequencies for Emergency Services.

The new FM49 aims to bring together the regulatory authorities as well as an array of stakeholders and experts in telecommunications used for public protection and disaster relief purposes. This will facilitate the collection of further information and exchange of views and ideas concerning the future PPDR systems, especially the broadband systems and is a unique opportunity to discuss some key issues relating to PPDR and the frequency bands to be used for these systems in the future.

The ideal frequency bands sought by PPDR services are also used or sought by other applications. FM49 will recognise this in its recommendations, so that the ECC can reach a balanced position taking all these factors into account as far as possible.

Thomas Weber
ECO Expert in Frequency Management