

ECC opens up major bandwidth for mobile broadband in 3.4-3.8 GHz

New very high-speed mobile services, for applications such as enhanced internet browsing, video streaming and video calls, require significantly broader frequency channels and much more spectrum to accommodate their demands. This is a top issue in current spectrum management and a key issue for the European Parliament which is calling for at least 1200 MHz of spectrum to be made available for mobile data traffic (including the spectrum already available for mobile applications), anticipating a huge growth in demand for several years to come. Certainly the present rate of growth is remarkable. See the ECC PT1 group's survey on the growth of traffic in its [Report on Mobile Broadband Landscape](#) (September 2011) shown here in Figure 1.

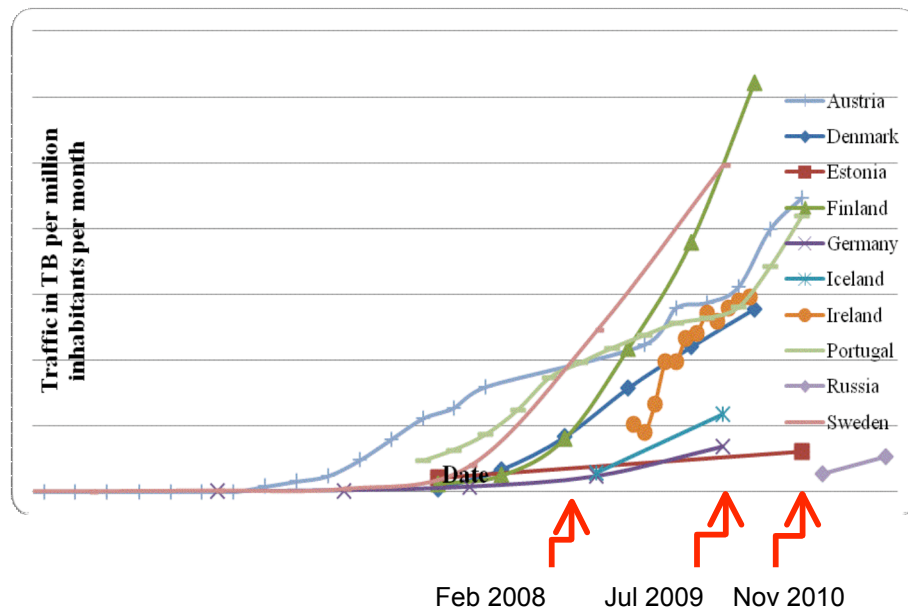


Figure 1: growth in mobile data traffic in some European Countries 2007-2010

At its last plenary meeting in December 2011, the ECC took a firm step towards making this future mobile environment a reality by adopting a Decision on harmonised frequency arrangements for mobile/fixed communications networks (MFCN) in the bands 3400 - 3600 MHz and 3600 - 3800 MHz (ECC/DEC/(11)06). This ECC Decision is the result of around two years of intensive debates within ECC PT1, the ECC group responsible for International Mobile Telecommunications (IMT) systems¹, in order to identify proper harmonised frequency arrangements. This article gives some background to that decision and also outlines other initiatives now underway in these bands in order to improve the harmonisation framework.

The ECC harmonised frequency arrangements for these bands enhance the regulatory framework, and this in turn should reduce the development and implementation costs of manufacturing equipment, secure long term investments by providing economies of scale, as well as reduce the complexity of spectrum cross border coordination, allowing spectrum to be used more efficiently. The improvement of the harmonisation framework, is an important strategic objective for the ECC, particularly in the context of the current financial and economic situation.

A unique opportunity with a contiguous 400 MHz of radio frequency spectrum

Why choose these frequencies? The 3.4-3.6 GHz range has been identified for IMT in the ITU Radio Regulations since 2007. There are existing harmonisation measures in this range for fixed and broadband wireless access services (BWA). Although lower frequencies such as the 800 MHz ('Digital Dividend') and 900 MHz bands can bring mobile broadband to wider areas, in areas of greatest demand the higher capacity requirements need higher frequencies to support them (so as to provide higher bandwidths). So the ECC decided in 2007 to examine the 3.6 to 3.8 GHz band for IMT as well.

With a contiguous 400 MHz of radio frequency spectrum, these two frequency bands offer a unique opportunity to meet some of the new demands for mobile broadband. Transmission of higher data rates requires increased channel bandwidths. Technological development is ongoing for wider channel bandwidths taking us beyond the previous 5 MHz blocks: Report ITU-R M.2134² refers to a scalable bandwidth up to 40 MHz. The ECC surveyed current usages within the CEPT in these bands in 2008, and then, at the beginning of 2010, it decided to develop harmonised frequency arrangements in bands: 3.4 to 3.6 GHz and 3.6 to 3.8 GHz.

Harmonisation of frequency arrangements as a major step forward

The ECC launched this additional harmonisation activity for these bands, taking into account the regulatory framework which was already in place. An EC Decision, [2008/411/EC](#) based on CEPT Report 15 and, which is binding for EU Member States, includes the specification of the least restrictive technical conditions. Those LRTC are based on the so-called 'Block Edge Masks' (BEM) earlier defined in ECC Recommendation (04)05, designed on the assumptions of BWA³. Also, ECC Decision (07)02⁴ designated these frequency bands to BWA but did not provide a harmonised frequency arrangement. Therefore, the ECC decided to develop the missing strategic element needed for mobile broadband: harmonised frequency arrangements for the high data rate mobile/fixed communications networks (MFCN), including IMT, utilising larger channel bandwidths than those envisaged in the existing regulatory framework. This was to be an evolution of the frequency plan rather than a requirement for the replacement of the currently deployed systems.

The ECC identified that the use of the 3600-3800 MHz band for the fixed satellite service (FSS) is generally more intensive than in the 3400-3600 MHz band. It also varies from one country to another within the CEPT across the whole band. It was also recognised that the 3400-3410 MHz band was not available for MFCN/IMT due to its use by land, airborne and naval military radars and other applications in some CEPT countries. Moreover, the current Radio Regulations context led the ECC to develop separate harmonised frequency arrangements for the 3400-3600 MHz and 3600-3800 MHz bands.

For 3600 to 3800 MHz, the ECC easily agreed on a TDD (Time Division Duplex)-based harmonised frequency arrangement with block size of 5 MHz, as shown on Figure 2 below: adjacent blocks can be combined to form higher capacity channels. This took into account the unanimous views expressed from industry, and significant technical and operational considerations. This is that the TDD mode would allow for more efficient spectrum use considering the coexistence with the existing FSS systems in the case of geographical sharing, harmonisation with countries implementing IMT only in a part of the band, etc.

Also, ECC PT1 noted that it would be beneficial to synchronise the TDD networks of different operators to avoid some blocks (the so-called ‘restricted blocks’) having more stringent spectrum emission requirements than necessary, as well as removing the need for frequency guard bands between operators. The ECC concluded though that the synchronisation (frames’ timing and/or alignment of the uplink/downlink time slots ratio) of TDD networks of different operators in the same geographical area should be managed at a national level (e.g. voluntary agreements between operators or national regulatory measures). The use of frequency filters in base stations has also been identified as another solution to avoid restricted blocks / guardbands between those TDD networks.

The debates largely focused on the lower 200 MHz of the band (3400-3600 MHz) and, due to balanced positions expressed, decided to harmonise TDD and FDD (Frequency Division Duplex) arrangements in this frequency range with no expression of preference between them; these are shown in Figures 3 and 4. Nevertheless, the ECC will review the frequency arrangements not later than 2013, in order to identify a preferred one.

The harmonised frequency arrangements

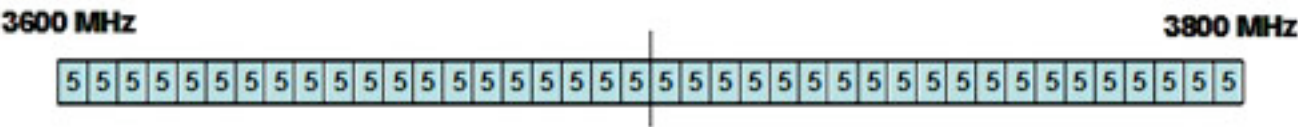


Figure 2 Harmonised TDD frequency arrangement of the 3600-3800 MHz

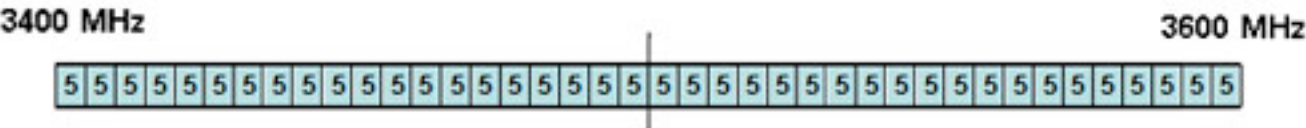


Figure 3 Harmonised TDD frequency arrangement for the 3400-3600 MHz

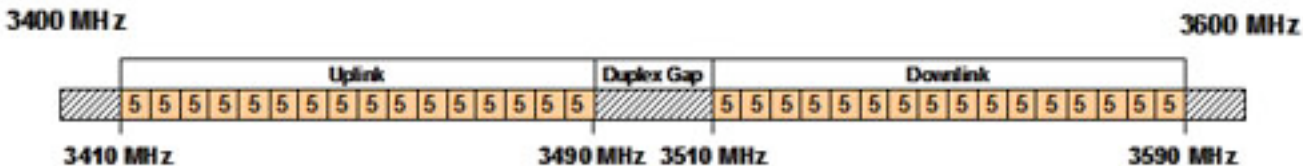


Figure 4 Harmonised FDD frequency arrangement for the 3400-3600 MHz

This ECC Decision is expected to be progressively implemented due to the current legacy context. The administrations and regulators need flexibility to adapt the current use of these bands to national circumstances. The most suitable regulatory measures may need to be chosen at a national level. This may include a range of approaches, such as: refarming of the band, planning of renewal or extension of authorisations where BWA is to be maintained, and withdrawal of authorisations already issued but where no system has been deployed or where the systems deployed do not fulfil the obligations of the authorisations.

Other measures to improve the harmonisation

This new ECC Decision relates to the organisation of the frequencies for mobile broadband. But we are also taking three other initiatives to further improve the level of harmonisation in these frequency bands.

LRTEC/BEM: There are existing technology-neutral conditions defined for the band, but these are designed for BWA. Based on a technical analysis carried out by ECC PT1, the ECC concluded that these technical conditions, currently defined in the form of Block Edge Masks (see above) are not suitable for the high data rate IMT applications provided by systems having larger channel bandwidths. The existing 3.5 GHz BEM are technically justified only when there is no commonly agreed frequency arrangement and maximum flexibility is needed. When harmonised frequency arrangements are adopted, there is no need for the unnecessarily tight BEM. Consequently, the ECC decided, as a further regulatory step, to adjust those BEM to the expected future usage in order to facilitate affordable equipment, increase spectrum efficiency (e.g. by reduced guard bands) and thus maximise the usable amount of spectrum. We expect to finalise this activity around the end of 2012.

Cross-border coordination: In order to maximise spectrum efficiency and avoid spectrum wastage, it is important to have appropriate cross-border coordination procedures and conditions applicable to services which use a given frequency range. For the band 3.4 - 3.8 GHz, ECC PT1 is working on the development of appropriate triggering coordination thresholds and other technical conditions. Additionally, ECC PT1 intends to combine several ECC Recommendations applicable to various mobile frequency bands and technologies in a single ECC Recommendation so as to develop one single document that will gather all the information in a harmonised format for all frequency bands.

Additional technical considerations: In the next few months, ECC PT1 will also focus on the coexistence between adjacent TDD networks (e.g. synchronisation, additional filtering, site coordination, restricted blocks/guard-bands), and the sharing studies between FDD and TDD systems at the 3600 MHz boundary. The assessment of the spectrum management migration issues from the current situation to the framework described in the new ECC Decision has also been identified. Of course, national regulation and competition issues are outside of the scope of this activity.

Due to the current EC Decision [2008/411/EC](#) in force, the ECC has already informed the European Commission on the recent finalisation of these frequency arrangements. And on the result of its analysis on the non-suitability of the least restrictive technical conditions (LRTEC) in force with future usage conditions as high data rate mobile/fixed communications networks expected in these bands. Under the Spectrum Decision, the ECC is ready to contribute to the enhancement of the current EC framework in force in these bands.

Ultimately, end users simply want high speed mobile applications that work, and care little about how this is achieved. That's for us to worry about and these regulatory measures are a big step towards meeting some of the future demands for mobile broadband and providing end users with the services on which they are coming to rely.

Didier Chauveau

Chairman of ECC PT1 – responsible for IMT matters

¹International Mobile telecommunications. The term IMT encompasses IMT-2000 (such as UMTS or its enhancement LTE) and IMT-Advanced (also known as "4G") systems. A wide range of systems are in competition: 6 IMT-2000 radio interfaces, 2 IMT-Advanced radio interfaces

²requirements related to technical performances for IMT-Advanced radio interfaces

³ guidelines for accommodation and assignment of Multipoint Fixed Wireless systems in frequency bands 3400-3600 MHz and 3600-3800 MHz

⁴ the availability of frequency bands between 3400-3800 MHz for the harmonised implementation of Broadband Wireless Access (BWA) systems

Programme Making and Special Events in CEPT – What's on?

Entertainment is a vital part of or enjoyment of life. And, although it is easily overlooked, the radio spectrum plays an essential role behind the scenes in making it all happen.

The vast array of entertainment and similar activities available today depend on the radio spectrum to ensure they are seen and heard. The term Programme Making and Special Events (PMSE) is used to describe radio (wireless) applications used for:

- *Programme Making*: radio applications used in the making of a programme for broadcast, the making of a film, presentation, advertisement or audio or video recordings, and the staging or performance of an entertainment, sporting or other public event.
- *Special Events*: radio applications used for an occurrence of limited duration, typically between one day and a few weeks, which take place in specifically defined locations. Examples include large cultural, sport events (football matches, Tour de France etc.), entertainment, religious and other festivals, conferences and trade fairs. In the entertainment industry, theatrical productions may run for considerably longer.

PMSE also describes radio applications used for Services Ancillary to Programme making³/ Services Ancillary to Broadcasting ⁴, Electronic News Gathering (ENG)⁵ and applications used in meetings, conferences, cultural and education activities, trade fairs, local entertainment, sport, religious and other public or private events for perceived real-time presentation of audiovisual information.



Self-evidently, these applications lend themselves to privately operated systems. Their nature can vary a lot from very simple audio circuits with a modest quality requirement through to multiple high-definition TV camera signals concentrated at a single location; requiring a good enough interference environment to work satisfactorily.

Review of PMSE spectrum

The World Radiocommunication Conference 2007 adopted Agenda Item 1.5 to consider worldwide/regional harmonisation of spectrum for ENG (i.e. including some PMSE applications) in accordance with Resolution 954 (WRC-07) which led to a review of the bands available in Europe for those systems. The ECC Conference Preparatory Group (CPG), which is the CEPT leading group for the World Radiocommunication Conference (WRC), decided that it is more suitable to satisfy the Agenda Item by preparing a solution in the form of an ITU-R Recommendation/Report within the normal study cycle of the ITU-R study groups.

This approach will leave the opportunity to react quickly to changes necessary in conjunction with ENG frequency harmonisation in a rapidly changing environment.

The introduction of digital TV in the UHF band and the intended use of the upper part of the UHF band (790-862 MHz) for mobile services may reduce the amount of spectrum available for PMSE operation in some CEPT countries. Considering the strong economic, cultural and political interest to ensure continued use of PMSE in the future, [CEPT Report 32](#)⁴ investigated approaches for its use in the UHF band and common solutions outside the UHF band. Based on these considerations, it was decided that the centre gap (823-832 MHz) of the channel plan for Mobile systems will still be available for PMSE (see [Rec. ERC 70-03](#)⁵).



A New Project Team to lead PMSE activities

In order to finalise the review of the needs of PMSE devices, the ECC's Frequency Management Working Group (WG FM) established a new Project Team, FM51, in October 2011 under the Chairmanship of Lindsay Cornell from the BBC. In addition to the review, FM51 will collate, summarise and analyse the regulatory procedures used by administrations in granting access to spectrum for PMSE and incorporate the results into ECC deliverables. FM51 met for the first time in November 2011 and the first main output is a revision of the definition of PMSE.

Based on the information collected, FM51 is expected to update existing ECC deliverables (for example ECC Report 002⁶) and/or develop any new ones. The review of the spectrum requirements may also need to consider the relevant development in the field of PMSE technologies such as digitalization, reduction of the intermodulation product, and enhancement of audio quality etc.

More to come

A number of activities within CEPT are related to PMSE:

- The [ECC Newsletter from October 2011](#) provided an article dealing with a review of the frequency range 1452 - 1492 MHz undertaken by FM50 for which PMSE is one of the candidate future applications.
- Within the framework of WG FM, a correspondence group lead by Benoist Deschamps (France) is responsible for the monitoring and investigation of Cognitive Radio Systems (CGS), in order to develop a relevant regulatory framework for those devices. In particular, it was tasked by WGFM to consider the protection of PMSE on the basis of guidance given in ECC Report 159 dealing with white space devices.
- The ECC Spectrum Engineering Working Group SE 7 (compatibility and sharing issues of Mobile Service) is currently investigating the adjacent band compatibility between the mobile networks and PMSE (wireless microphones) in the 1800 MHz range.

The studies underway within SE7 and ECC deliverables developed in the past could also provide material to prepare CEPT Reports in response to the European Commission (EC) Mandate under development on PMSE. The EC's Radio Spectrum Committee has approved a new Mandate to CEPT on PMSE in order to identify technical conditions and options to make EU harmonised spectrum available for wireless radio microphones and cordless video-cameras. The aim of the mandate is to create a baseline for economies of scale and the functioning of the internal market. It is expected that WG FM will take the lead on this activity within the ECC.

So PMSE remains very firmly on our agenda and the scope of work currently underway is designed to safeguard its continued performance.

Marc Le Devendec
Deputy Director of the ECO

¹ Services Ancillary to Programme making (SAP) support the activities carried out in the making of ‘programmes’, such as film making, advertisements, corporate videos, concerts, theatre and similar activities not initially meant for broadcasting to general public.

² Services Ancillary to Broadcasting (SAB) support the activities of broadcasting industry carried out in the production of their programme material.

³ Electronic News Gathering (ENG) is the collection of video and/or sound material by means of small, often hand-held wireless cameras and/or microphones with radio links to the news room and/or to the portable tape or other recorders.

⁴ On ‘Continuation of PMSE operating in the UHF, including the assessment of the advantage of an EU approach’

⁵ On ‘Short Range Devices (SRD)’

⁶ ON ‘SAP/SAB spectrum use’

The ECC streamlines its structure

In March 2010, the ECC approved its new multiannual strategic plan. Like every successful organisation, in order to achieve its strategic goals and serve its member countries, the industry and European society in the most effective and efficient way possible, the ECC reviewed its structures and processes to make sure that its large commitment is fit for purpose.

To review its structure and some associated aspects of its working practice, the ECC set up a task group (TG5). TG5 was chaired by Philippe Horisberger of Switzerland (Ofcom) and its most pressing objectives were to improve the quality of the ECC's outputs and the efficiency of its structure through more seamless workflows. The review took into account the numerous meetings of the ECC's various working groups and large and small project teams, to deal with its on-going business. This is a very large effort which reflects the breadth and complexity of the subjects the ECC deals with, the impact of its deliverables, and its commitment to applying its expertise to get the best answers supported by a consensus of its 48 member administrations. As the work of the ECC is mainly based on contributions from its member administrations, particular attention was paid to reducing public sector expenditure in the light of the on-going financial climate.

With regard to its structure, the ECC concluded that applying the model of concentrating all activities for applications across the board would leave the directing working groups with too much business to handle. If concentrated in one group, or if spread across two or more groups, there would be some artificial distinction between them; and there could be an unhelpful pressure to compete for the most high-profile subjects.

Therefore, the ECC maintained the distinct roles of its Frequency Management Working Group (WG FM) and Spectrum Engineering Working Group (WG SE). Firstly, this allows, particularly between their associated project teams, the sequential treatment of interdependent issues in an orderly manner, giving (just) enough time for the necessary research and analysis between meetings. Secondly, the existing structures allow experts to attend only meetings that are relevant to them, and to minimise time wasted on less relevant parts of a longer meeting agenda. Joint planning of work by groups covering different aspects of the same subject, or group of subjects enables logistics to be optimised, notably with some co-location of meetings, or else deliberately planned for an optimum time spacing between them.

The ECC recognised that the Regulatory Affairs Working Group (WG RA) had tackled some strategically important work in recent years. Much of this was project oriented, and the present cycle of these projects was largely completed. Another part of its work was more concerned with the internal management of the ECC which no longer needed the full attention of a dedicated working group, WG RA having successfully instigated a number of reforms in recent years. Therefore, the ECC decided to discontinue WG RA and redistribute its functions. Internal management functions are now the responsibility of the ECC and its Steering Group with the support of the European Communications Office (ECO) as before, and regulatory work has been integrated into WG FM, which will also allow for the speedier development of deliverables.

Some groups are evidently self-contained, notably the Numbering and Naming Working Group (WG NaN), which had only recently been itself reviewed and restructured, and the Conference Preparatory Group (CPG) and, as a result, remain unchanged.

Additionally, the ECC decided that Project Team 1 (PT1) was demonstrably of a manageable size. For the time being the high profile and high volume of work relating to mobile, and especially with the pressure for mobile broadband services, justifies its continuation as a project team. PT1 will continue to report directly to the ECC plenary and collaborate with other ECC entities as necessary.

We believe that streamlining our structure in this way puts us in good shape for the period ahead.

Of at least as great in importance as structure, is the strongly increasing trend towards the use of electronic working methods and tools. Alexander Gulyaev's article in this newsletter gives more background to the range of tools now being developed for and used by the ECC where appropriate. Amongst other possibilities, the ECC decided that some work could be taken forward by groups which would hold predominantly electronic rather than physical meetings.

Thomas Ewers, Chairman of the ECC

Stelios Himonas, Vice-Chairman of the ECC

Mark Thomas, Director of the ECO

Must you fly? Meeting participation in the Internet Age

Nowadays organisations and companies all over the world connect employees, partners and customers by means of live interactive audio and video conferencing. Virtual collaboration tools can increase the efficiency of the working process, broaden participation, and at the same time reduce expense. The ECC has a huge geographical reach and relies on interpersonal contact to get work done, with the pooling of a wide range of expertise and a consensus-based approach. With so many meetings necessary (see the article in this newsletter on our recent structural changes), the incentive to use these tools is strong.

Participants to meetings in the ECC and its groups were very relieved more than 15 years ago when they no longer needed to carry heavy bags of paper around the airport terminals of Europe. Email and various other information systems integrated into the ECC working process, notably document downloading, heralded a small revolution.

ECO Forum

An important next step was made in January 2007 with the launch of the ECO Forum (at that time the ERO Forum). It was seen as a means to discuss mainly non-technical topics so that the history of discussions could be maintained in one place and consulted in the future, if needed. One of the correspondence groups within the Regulatory Affairs Working Group: (RA GSMOBV) developed a draft ECC Decision on the harmonised use of GSM onboard vessels (ECC/DEC/(08)08) using solely this Forum, without email correspondence and physical meetings. However, the limited functionality of the ERO Forum didn't encourage its wider use within the ECC at that time.

But a new, more advanced, web platform was implemented towards the end of 2008. This led to a significant increase in the use of the Forum. The new system allowed files to be attached to eposts, and provided an intuitive user interface and a high level of security. This made EWM attractive to many other ECC groups, as well as those working on technical issues. Gradually the use of the ECO Forum has been increasing within the last two years. With the creation of forums for sub-groups within ECC Project Team 1 (responsible for IMT Systems) and Frequency Management Working Group (WGFM) project teams during 2010-2011, this electronic tool became widely recognised within the ECC. In 2011, the ECC established a particular category of group, 'forum groups', which are expected to work mainly by this means.

Do you need to meet to go to a meeting?

The next obvious step was to explore to what extent physical attendance at meetings could be replaced by virtual (electronic) participation. Within the ECC these are assumed to include *web-meetings*, *virtual participation in physical meetings* and *webinars*. When considering the introduction of the web-based collaboration arrangements back in 2008, the ECC requested its WGRA, which has been until recently responsible for the regulatory aspects of EWM, to develop a step-by-step implementation plan so that the impact of the new tools would be constructive rather than disruptive to the ECC working process.

The preparatory work carried out by WGRA and supported by the European Communications Office (ECO) resulted in a number of recommendations to the ECC. The main two were:

- to launch a trial period within the ECC in order carefully to assess individual advantages and limitations of the three virtual participation EWM, and
- for the ECO, to evaluate, propose and aid practical implementation of a suitable web-platform for virtual participation.

The trial period for the implementation of the new virtual working arrangements took place from October 2009 to September 2011. This was marked by a gradual but steady increase in use of the tools, mostly among the lower level ECC entities which were creating deliverables rather than taking final decisions. The 'GoToMeeting' software platform proposed by the ECO was quite successful, notably where all participants were connected that way ('web-meetings'). Certain technical difficulties arose, which reduced in frequency

as users gained experience. The 'ECO Guidelines on the use of GoToMeeting platform', which are now a part of a more general document '[ECO Guidelines on EWM](#)', helped to improve the quality of participation in web-meetings for less experienced users.

A total of 64 virtual meetings (including webinars) were reported to WGRA during the trial period which corresponds to four meetings per month on average. 91% of these meetings were web-meetings while 6% of them were physical meetings with virtual participants. The table below gives an idea of the pace and the scope of use of the GoToMeeting platform within the ECC during the trial period. There is however some evidence that the actual number of virtual meetings which took place during the trial period was significantly greater than the table below suggests (only reports sent to WGRA are counted in the table).

Table

	<i>February – April 2010</i>	<i>May – August 2010</i>	<i>September 2010 – January 2011</i>	<i>January – August 2011</i>
<i>Overall number of reported to WGRA virtual meetings</i>	13	17	16	15
<i>Web-meetings</i>	11	16	15	15
<i>Virtual participation in physical meetings</i>	2	1	1	
<i>Webinars</i>		Cognitive Radio- webinar in May 2010	NLF-webinar in September 2010	"White Spaces"- webinar in January 2011
<i>Average number of participants per meeting</i>	6	7	6	8
<i>Problems reported in</i>	60% of the meetings	36% of the meetings	50% of the meetings	34% of the meetings
<i>Average effectiveness score</i>	7	8	8	8,8

The trial period was generally regarded by the ECC as successful and, based on yet another report produced by WGRA, the 30th ECC meeting in December 2011 recognised the three virtual participation EWM as complementary ECC working arrangements, in addition to the traditional ones.

Since September 2011, the ECO has been observing not only more and more frequent web-meetings of the WGFM, WGSE and ECC PT1 sub-groups, but also increasing demand for virtual participation in physical meetings, both in small groups (e.g. FM Maritime Forum Group with 19 physical and 3 virtual participants) and relatively large ones (most recently, a Com-ITU meeting with 32 physical and 4 virtual participants). This is largely new territory, and brings significant opportunities and challenges.

For virtual participation in large physical meetings to be successful there is more to be done by the Chairman (probably requiring an additional assistant) and in the meeting discipline followed by all participants. The technical facilities and the procedures to use them need to be appropriate, especially to provide proper audio function. The ECO has implemented an effective solution in one of its meeting rooms in Copenhagen, and is considering extending this to the other, and will then consider the options for a portable version.

It is unlikely that participants in ECC work will become strangers to airports in the near future. Collaboration and consensus run more smoothly when people know each other. But equally there is no doubt - especially under the current economic circumstances – that EWM is here to stay, and will grow in

use. The availability of the EWM toolkit has become a vital element to maintain or improve the high efficiency of the ECC work while keeping the associated costs to an acceptable level.

Alexander Gulyaev

ECO Expert in Spectrum Management