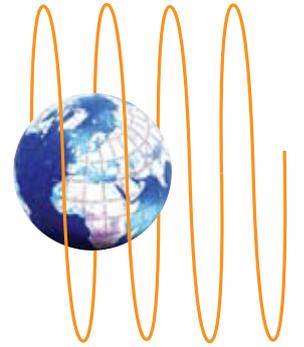


The 7th Annual European Spectrum Management Conference

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19th - 20th June 2012

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Introduction

The 7th Annual European Spectrum Management Conference 2012 was held on 19-20 June in Brussels. The Conference was attended by over 250 delegates from across Europe and the rest of the world. As with previous events, the conference focused on key policy issues relating to the management of the radio spectrum. The conference aims to discuss those issues which have an impact on industries where spectrum is the key input (such as mobile broadband, broadcasting and satellite) or where spectrum availability is increasingly key to operations (e.g. emergency services, utilities, transport). The conference brought together all the major stakeholders from these industries, including senior policy makers and industry representatives, equipment manufacturers and expert consultants, facilitating a rounded discussion with differing viewpoints, and an exceptionally high quality of debate.

The Conference was organised by **Forum Europe** with Knowledge Partners, **Aetha Consulting** and **NERA Economic Consulting**, providing support with the development of the agenda and identification of speakers for the event. **Alcatel-Lucent**, **Ericsson**, **Huawei** and **Lemay-Yates Associates** were the Platinum Sponsors of the event. **The European Satellite Operators' Association (ESOA)** and **SES** were Gold Sponsors, whilst **Analysys Mason**, **Intel**, **Qualcomm** and **the TETRA and Critical Communications Association** were Silver Sponsors. **MLex** was the Media Partner to the event. **Qualcomm** additionally sponsored the lunch breaks and **Motorola Solutions** was the Cocktail Sponsor.

The Conference followed the well-proven format used in the previous annual conferences comprising a mixture of keynote

speeches, presentations on topical issues and extensive panel discussions on each major topic area. In addition, there was plenty of scheduled time for formal and informal networking.

This report, prepared by Aetha Consulting and NERA Economic Consulting, summarises the main discussions held during the Conference, including an overview of each of the main presentations. We begin by highlighting some of the major themes that emerged across the conference, followed by a summary of the event in chronological order. Readers who would like to view specific presentations can contact event manager **Tom Chinnock** on **+44 (0) 2920 783025** or **tom.chinnock@forum-europe.com**

Conference highlights

A number of major themes emerged during the conference, many of which cut across the different topics discussed in each of the panel sessions:

- **The request from politicians for the industry to be more ambitious** – Several of the keynote speakers highlighted that the EU Digital Agenda targets may not be sufficiently ambitious and that we need to prepare for a world where even higher data rates become a necessity. In these efforts, we need to ensure that spectrum availability does not become the barrier to the realisation of this vision. Several calls were made for “Europe to get back to the top” of developments in the mobile world.
- **The risk of Europe losing its influence on major spectrum harmonisation decisions** – Speakers referred

to the unexpected decision at WRC-12 to seek to make a co-primary allocation to Mobile in the 694-790MHz band in Region 1 from 2015 and how Europe was unprepared for this. The importance of Europe understanding the spectrum needs of other regions and accommodating these within its own objectives and aims was noted.

- **The need for Europe to make a quick and smart decision about the 700MHz band** – A rapid decision of the future use of the 700MHz band in Europe is needed to ensure that the region is able to influence the overall debate and benefit from global harmonisation. In particular, Europe needs to quickly reach a decision on whether the future use of this sub-band will be for broadcasting, for mobile/wireless broadband or for a mixture of the two (e.g. through a converged technological platform) and it should strive for a coordinated recommendation on the future band plan for this sub-band.

- **Consideration of whether the needs of other sectors can be met through platform convergence** – In addition to the cases for additional spectrum for the mobile industry, several other sectors including the emergency services, utilities and military highlighted their need for high-bandwidth wireless services to support innovative applications. The European Commission highlighted that we should all be considering whether such applications can be supported using converged platforms or through the sharing of spectrum.
- **The identification of potential new bands for the harmonisation of wireless broadband networks** – The spectrum inventory has identified a number of bands where spectrum is currently under-utilised and/or increased levels of sharing may be possible. Additionally, several speakers discussed the potential future use of the 1452-1492MHz band (as a supplemental downlink band) and of the 2300-2400MHz band (for unpaired technologies such as the TDD variant of LTE) as a means of supporting the asymmetric levels (comparing downlink and uplink) of mobile data traffic.
- **“Capacity crunch” does not necessarily equate to “spectrum crunch”** – Several speakers indicated that the explosive growth of mobile traffic levels does not necessarily lead to a spectrum crunch as use can be made of other means of increasing network capacity. Some suggestions regarding how to increase this capacity included the increased spectral efficiency of the latest wireless technologies, re-farming of spectrum being used by older technologies, considering (licenced) shared access to spectrum and the use of new network architectures including the deployment of small cells and off-loading to WiFi networks.

Day 1 – Main sessions

The morning of the first day of the conference featured keynote speeches and a panel discussion on the implementation of the Radio Spectrum Policy Programme (RSPP) which was adopted by the Parliament in Council in March 2012. In the afternoon, discussions initially focused on the increasingly global nature of spectrum policy followed by two breakout sessions on the spectrum inventory and spectrum auctions. The morning sessions were chaired by **Gerry Oberst**, Partner at Hogan Lovells, while the main afternoon session was chaired by **Magnus Franklin**, Journalist at MLex.

Keynote presentations

The first keynote presentation was delivered by **Roberto Viola**, Chairman of the Radio Spectrum Policy Group (RSPG) and Secretary General of AGCOM. Mr Viola highlighted the need for additional spectrum to be found to support the growth in mobile broadband traffic levels and outlined the options for the 700MHz band at the European level that are currently being considered by the RSPG. He also highlighted recent developments in several Member States including Finland, Italy and the UK.

Jean-Pierre Bienaimé, Chairman of the UMTS Forum and SVP of Strategy and Communications Wholesale for Orange then gave a presentation highlighting many of the issues associated with the provision of additional spectrum to support the growth in traffic levels on mobile networks including the re-farming of existing 2G bands, the identification of new bands and the introduction of inter-band carrier aggregation technologies. Mr Bienaimé also highlighted the importance of a harmonised approach to avoid fragmentation of frequency bands – not just within the EU – but increasingly worldwide and the importance of a coordinated approach by European bodies towards WRC-15.

Gunnar Hökmark, Member of the European Parliament and Rapporteur for the Radio Spectrum Policy Programme (RSPP), then gave a rousing presentation starting with noting the successful adoption of the RSPP but indicating that this initiative was not sufficient and that Europe needed to move faster than competing Asian economies – and therefore be more ambitious, particularly in respect of the Digital Agenda targets and making spectrum available for mobile broadband services. Mr Hökmark highlighted the case of the 700MHz discussions during WRC-12 where Europe remained “passive and hesitant” in relation to making this band available for mobile broadband. He drew on the relationship between the growth in data traffic and economic growth. If Europe wants to achieve such growth, Mr. Hökmark suggested that we must take the global lead – including intensifying its discussions on the future use of the 700MHz band. He also raised the idea of a unified framework for Europe-wide spectrum licences.

Ed Vaizey, Member of Parliament and Minister for Culture, Communications and Creative Industries in the UK Government

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then gave a video presentation highlighting the importance of increasing spectral efficiency, that markets tended to deliver better results than regulators and discussing the importance of a mix between licensed and licence-exempt spectrum. Mr Vaizey went on to highlight the on-going review of the Communications Act in the UK, which incorporates spectrum policy.



The final keynote presentation of the morning was delivered by **Neelie Kroes**, Vice President and Commissioner for the Digital Agenda in the European Commission. Vice President Kroes highlighted the developments in spectrum policy since last year's conference including the use of spectrum for 4G services, increasing progress on the switchover to digital television and the adoption of the RSPP ahead of schedule. The Vice President mentioned that one of the biggest challenges for European spectrum policy will be to free up 1200MHz for mobile services and then moved on to evaluate the 700MHz band discussions at WRC-12. She also highlighted the need for Europe to "not react to global developments, but to be involved in shaping needs" and discussed the potential scope for a converged broadcast/mobile platform - moving broadcasting from high power transmissions to low power single frequency networks.

Speed-pitch session

Will the RSPP allow the EU to take the global lead?

Following the keynote speeches, the conference moved onto a panel session to discuss what steps (if any) in addition to the RSPP need to be undertaken by Europe in relation to spectrum policy. However, prior to the commencement of the panel session, conference participants were invited to take part in an interactive voting session on a number of topics relating to the RSPP. This highlighted that the vast majority

of participants (88%) were "fairly familiar" or "very familiar" with the RSPP and had a fairly balanced view across whether the RSPP's objectives are highly achievable, somewhat achievable or optimistic.

The panel session then commenced with each participant being invited to give introductory remarks for a period of no more than five minutes each:

- **Adrian Grilli**, Technical Adviser to the European Utility Telecoms Council, highlighted the importance of radio spectrum in ensuring Europe's energy efficiency targets are met and identified specific amounts of spectrum and indicative frequency ranges for each of the key new applications required by the utilities sector.
- **James Cemmell**, Policy Advisor, Inmarsat substituted for Aarti Holla, Secretary General of the European Satellite Operators' Association, and highlighted the importance of ensuring that Europe retains its global leadership in satellite communications and that the spectrum inventory must utilise a methodology which takes account of the differing types of use to which spectrum is put.
- **Hans Borgonjen**, Vice Chairman of the TETRA and Critical Communications Association, used the example of the Royal Wedding held in London in 2011 to illustrate the intensity of spectrum use for emergency service communications and made the case for additional spectrum to be released for emergency services broadband communications.
- **Lasse Wieweg**, Director of Government and Industry Relations in Ericsson, continued the theme of the need for additional spectrum to be found to support the explosive growth in mobile data connections and traffic levels and highlighted how Europe should have been better prepared for the 700MHz discussions at WRC-12.
- **Daniel Pataki**, Director ETNO, highlighted the increasing importance of spectrum to achieving Europe's wider policy goals (e.g. closing the digital divide, supporting a competitive European industry/ecosystem) and that Europe needed to "speed-up" and develop a new story to rival GSM (which is now over 20 years old).
- **Lars Backlund**, Chairman of Broadcast Networks Europe, highlighted the importance of the digital terrestrial television platform to Europe's citizens, noting the continuing widespread use of the platform in many countries and that

it would be premature to make rapid decisions on the future use of the 700MHz band whilst Europe was still to realise the benefits from making the 800MHz band available for mobile broadband.

Following the presentations, discussions amongst the panel session members focused on a wide range of topics, most of which arose from questions posed by conference participants. The topics discussed included whether cellular networks could meet the needs of the emergency services and utilities sectors, in particular through giving priority treatment to such services. It was also discussed how mobile operators could take additional steps such as the deployment of small cells and off-loading to fixed networks in order to reduce their need for additional spectrum and the scope for increasing the degree to which use of spectrum is shared between different uses and users. Questions were raised about whether utilities and broadcasters should be exposed to the opportunity cost of their spectrum use and the panellists were queried on their view regarding the issue of whether the RSPG targets should be revised towards more ambitious levels.

Finally, prior to the lunch break, a further round of interactive voting by conference participants was undertaken. This highlighted the overwhelming view of the audience that the EC should be considering potential use of the 700MHz band for mobile broadband services and a balanced view on whether work on the next RSPG should begin "immediately", "fairly soon", or whether the current legislation is sufficient at present.

Global spectrum policy

The main afternoon session discussed the increasingly global nature of spectrum policy decisions and explored developments in spectrum policy in other regions of the world.

François Rancy, Director of Radiocommunication Bureau, International Telecommunication Union, delivered a keynote presentation on the work of the ITU to identify new spectrum for mobile technologies, including an overview of the discussions held and the outcome of WRC-12.

Simon Wilson, Head of Spectrum Policy, Telefónica highlighted the challenges of band fragmentation, especially for multi-national operators, noting that Telefónica currently holds licences in 14 different bands across its operations. He stressed the need for cross-regional harmonisation where possible to facilitate hardware implementation.

Eric Fournier, Director of Spectrum Planning and International Affairs, ANFR and RSPG Representative, provided an overview of the work being undertaken by the RSPG including the support of the RSPG's objective to identify 1200MHz of spectrum for wireless broadband services by 2015. Mr Fournier noted that Europe had already identified more spectrum above 1GHz than any other region in the world and discussed several of the candidate bands for harmonisation in Europe (including 1.5GHz and 2.3GHz).

Sudhir Gupta, Principal Advisor Spectrum Management, Telecom Regulatory Authority of India gave a detailed overview of the Indian telecoms market and the plans of the Government for infrastructure deployment, the re-farming of the 800MHz and 900MHz bands and making new spectrum bands (e.g. 700MHz) available for mobile services.

Julius Knapp, Chief of Office of Engineering & Technology, Federal Communications Commission, then gave an overview of the developments in the USA that are taking place in order to meet future spectrum demand, including the re-allocation of the 700MHz D-Block, the incentive auction process, use of unlicensed spectrum/TV white spaces, the identification of additional unlicensed spectrum at 5GHz and the specification of minimum receiver performance standards.

All speakers then participated in a short question and answer session which included a discussion on whether the current lack of receiver equipment performance standards had led to the emergence of a 'compensation culture' as well as a discussion of the future use of the 700MHz A-Block in the USA in respect to whether LTE equipment would become available. It was also questioned how Europe's partners are likely to react to Europe aiming to (re-)take the lead on developments in the mobile sector, especially regarding the 700MHz band.

Day 1 – Breakout sessions

In the second part of the afternoon, attendees were given the option to attend one of two breakout sessions on the spectrum inventory and on the role of spectrum auctions in delivering universal access to high-speed broadband. Afterwards, participants continued their discussions at the event's cocktail reception.

Matching supply and demand: The role of the spectrum inventory

Breakout Session 1 focused on the role of the spectrum inventory in identifying additional spectrum that could be made available and matching this with future demand. The session was chaired by **Andreas Geiss**, Deputy Head of Unit for Radio Spectrum Policy in the European Commission who opened proceedings by delivering a presentation which highlighted the context to, and importance of the inventory in considering commercial, military and other (government) uses of the spectrum and identifying spectrum bands where the efficiency of existing spectrum use could be improved. Dr Geiss also stressed the need to ensure the inventory did not impose a disproportionate burden on individual Member States.

Didier Chauveau, Head European Affairs, ANFR then held a presentation discussing the inventory from the perspective of a Member State. He explained how the inventory was structured to minimise the load on Member States and highlighted how the initial findings from the inventory work were compatible with the expectations of regulators and industry.

Thomas Weber, Frequency Management, European Communications Office, highlighted how the existing EFIS database formed a starting point for the inventory and how EFIS is being enhanced to collate the additional information required for the inventory.

Johanne Lemay, Co-President, Lemay Yates Associates gave a presentation on the demand side of the inventory, focusing on the future spectrum needs of mobile operators and assessing their efficiency of use of existing spectrum holdings.

Scott Marcus, Director, WiK Consult, gave an extensive overview of the pilot spectrum inventory project that is currently being undertaken for the European Commission by a consortium led by WiK. This included a discussion of the process adopted for the collation of information and the approach used for the assessment of spectrum efficiency and the preliminary results of the technical efficiency assessments.

Wassim Chourbaji, Chair of the spectrum working group, DigitalEurope, highlighted the key areas of priority in respect

of spectrum policy to DigitalEurope, noted the compatibility of the inventory with these, but also stressed that the inventory process should not hold-up on-going harmonisation processes within CEPT (e.g. 1.5GHz and 2.3GHz bands).

The presentations were followed by a panel session comprising all of the speakers which included further discussions on how military use of spectrum was considered in the inventory, how the efficiency of use in individual bands was assessed and how further work is to be undertaken by the Commission on the demand-side.

Can spectrum auctions deliver universal access to next generation wireless broadband?

Breakout Session 2 discussed the role of spectrum auctions as a means to providing access to high-speed mobile data services across Europe. The session consisted of several case studies of past, current and future auctions as well as a presentation on the impact of coverage obligations on spectrum valuations and auction prices. The session was chaired by **Richard Marsden**, Vice President at NERA Economic Consulting who gave an introduction to the topic by looking at the key features of auctions and thereby highlighting the prominent role played by coverage obligations in recent (800MHz) auctions across Europe. He also presented a short overview on some examples of coverage obligations seen in recent auctions, including the Swedish 800MHz auction in 2011.

Finn Petersen, Deputy Director General at the Danish Business Authority then presented the approach of the Danish authorities to awarding the 800MHz band. The auction, which was on-going at the time of the presentation, was based on the CCA format, featured two novel designs, namely a very detailed interference map to avoid problems with broadcasting services as well as a set of coverage obligations which are defined to ensure the availability of mobile services at 10Mbit/s in areas currently underserved by fixed broadband.

Thomas Kenschak, Senior Manager for Spectrum Policy at Deutsche Telekom assessed the impact of the German 'big-bang' spectrum auction to date. He provided a short overview of the main auction which featured an SMRA format and awarded 360MHz of spectrum across 5 bands. Particular emphasis was placed on the coverage obligation in the 800MHz band which was defined to prioritise rural areas within each federal state. These rules have incentivised operators to deploy LTE800 in 12 of 16 federal states by May 2012.

Catalin Marinescu, President of the National Authority for Management and Regulation in Communications (ANCOM) of Romania concluded the set of national case studies by introducing the auction rules governing the multi-band auction planned in Romania in September 2012. The key objectives of ANCOM are to maximise the benefits to end users, stimulate competition in the market and support the development of MVNOs. The auction also features a coverage obligation which is designed to cover about 700 localities which are currently not covered by mobile broadband services.

Marc Eschenburg, Manager at Aetha Consulting rounded the session off by discussing the impact of coverage obligations on the value of spectrum to mobile operators and the resulting influence on auction outcomes. He gave an overview of a typical methodology applied to derive the value of spectrum and showed how different types of coverage obligations can have varying implications for operators. He also highlighted the fact that many coverage obligations can lead to uniform discounts on valuations which may break the feedback loop between publicly visible auction results and an immediate assessment of how bidders viewed the coverage obligation.

Following the individual presentations, the audience engaged in a lively discussion with the panel speakers. Several clarification questions were asked on each of the case studies with the audience making use of the fact that they were able to directly address spectrum policy decision makers. Further questions focused on how to address interference concerns with DTT below the band and the resulting impact on spectrum valuations. Moreover, questions were asked regarding the suitability of spectrum caps to reach the goal of increased market competition.

Day 2

The second day of the conference focused on solutions to the 'spectrum crunch' including re-allocation/re-farming of existing spectrum bands, future use of the 700MHz band, technological innovations and scope for increased use of market mechanisms. **Amit Nagpal**, Partner at Aetha Consulting chaired the morning's sessions with **William Webb**, Chief Technology Officer at Neul and **Chris Doyle**, Director at Apax Economics chairing each of the afternoon's sessions.

Scope for spectrum re-allocation to meet increasing levels of demand

The first session of the second day's proceedings considered the extent to which spectrum re-allocation could meet the forecast growth in wireless broadband traffic levels.

Richard Marsden, Vice President at NERA Economic Consulting, gave an introductory presentation which highlighted the many different approaches to solving the spectrum crunch which, in addition to re-allocating spectrum, included the use of spectrum market mechanisms, the impact of new technologies and demand-side measures to reduce traffic growth levels. Mr Marsden then discussed several of the approaches that are currently being considered and questioned if a major reorganisation of mobile bands is required to support more contiguity and an increased efficiency of use.

Roberto Ercole, Senior Director of Spectrum Regulation at the GSM Association, then gave a presentation highlighting how the number of bands that could be incorporated within a mobile device is limited and how important it is for Europe to ensure that harmonised bands (optimally consistent with those currently assigned for mobile use in Europe) are amongst those incorporated in mainstream devices. Part of this involves Europe being sensitive to the timelines of developing nations – with WRC-12 being a good example of the new reality.

Benoit Deschamps, Head of Spectrum Engineering at ANFR and Chairman of ECC PT FM50, then gave a presentation on the status of harmonisation of the 1452-1492MHz band within CEPT. An impact assessment is currently being undertaken on two options (use of the band for mobile broadband and supplemental downlinks, use of 20MHz in the band for broadband direct air to ground communications) as well as on a counterfactual scenario with no change. The final draft ECC Report is due to be published in the third quarter of this year.

Alessandro Casagni, Head of EU Wireless Regulatory Policy at Huawei, then delivered a presentation on the use of LTE in the 2300MHz-2400MHz band including current examples of deployments across the world. He highlighted how the introduction of Licensed Spectrum Access could help to unlock availability of the band in some EU markets.

Gerard Lapierre, Radio Spectrum Project Officer at the European Defence Agency (EDA) then gave a presentation highlighting how much spectrum had been historically released by the military for civilian use and how studies undertaken on behalf of the EDA had shown that the hypothetical value of commercial use of the spectrum currently used by the military was a fraction of the economic value generated by continuing military use of the spectrum.

The presentations were followed by an interactive panel session which debated a wide range of topics including whether the demand for spectrum really is as great as the traffic growth projections would imply, the degree to which WiFi off-loading was the solution to the spectrum crunch – and the implication that more unlicensed spectrum (at 5GHz) should be made available, the impact of cognitive technologies and the scope for increased sharing of military spectrum with other users.

Future use of the 700MHz band

Following a coffee break, a range of speakers was invited to consider the question of whether there is a need for a second digital dividend through the medium of a panel based discussion. The panellists had a wide variety of backgrounds (European policymaker, African policymaker, broadcaster, mobile operator, public safety equipment manufacturer and economist/consultant) in order to capture a wide variety of perspectives on this important issue. The panel session commenced with each participant being invited to give brief introductory remarks:



- **Pearse O'Donohue**, Head of the Radio Spectrum Policy Unit at the European Commission, started the discussion by stressing that discussions on the 700MHz band were not part of the digital switchover process/debate which was now largely complete and has led to the creation of the 800MHz band. Mr O'Donohue stressed that this was a separate question and it was important for Europe to show leadership in this area by making a quick decision on which future use scenario to follow.

- **Catherine Smadja**, Head of Special Projects, Policy and Strategy at the BBC raised concerns about the dangers of acting too quickly highlighting the critical role played by terrestrial broadcasting platforms of protecting vulnerable groups and the recent consumer investment in new digital equipment. Ms Smadja went on to suggest that perhaps 2022-23 would be the right timescale for creation of a 700MHz band and that the broadcast community would require confidence that discussions on the 700MHz would not then lead to calls for a 600MHz band.

- **Thomas W. Hazlett**, Professor of Law & Economics at George Mason University stressed that it is important to consider the marginal value of spectrum in decision-making and discussed the low utilisation of the UHF TV band in the USA. Professor Hazlett then went on to discuss the FCC's incentive auction process and described an alternative approach of using overlay auctions.

- **Andy Hudson**, Head of Spectrum Policy at Vodafone Group discussed the importance of the 694-790MHz band in aligning Europe with the rest of the world and also described the two primary band plan options under consideration namely alignment with part of the APT 700MHz band plan which is being adopted across Region 3 or the alternative use of the band as a supplementary downlink-only band. Mr Hudson stressed the need for quick decision-making on this topic.

- **Bashir Gwandu**, Executive Commissioner of the Nigerian Communications Commission, provided further background on the use of sub-1GHz spectrum for GSM and CDMA in Africa before moving on to present the full range of band plan options that were available to Region 1 for a harmonised approach to the 700MHz and 800MHz band.

- **Mike Pellon**, Vice President of Research at the Chief Technology Office in Motorola Solutions highlighted the importance of making a dedicated spectrum allocation for public safety broadband and described the initiatives underway in other parts of the world.

A lively debate amongst panel members then followed. Initial discussions focused on the question of whether existing digital terrestrial coverage levels could be maintained in the event of the creation of the 700MHz band and whether it would be appropriate for Europe to look further ahead and consider the bold step of migrating broadcast television to other platforms (satellite, cable, Internet). The use of converged platforms

to support multiple services (e.g. use of mobile broadband network infrastructure to provide low power broadcasting services and emergency services broadband applications) was also considered and the degree to which a regulatory intervention to create the 700MHz band was required versus leaving developments to market forces to be more in line with the USA's approach.

Technology solutions to the spectrum crunch

Discussions after lunch moved onto the topic of how technology solutions can help alleviate the spectrum crunch. **William Webb** introduced the session by reminding participants that the "spectrum crunch" was really a "capacity crunch" and there were other aspects to resolving this in addition to spectrum and then invited all speakers to make introductory presentations.

Janette Stewart, Senior Manager at Analysys Mason, gave an introductory presentation highlighting the need for spectrum applications beyond wireless broadband including machine to machine communications, smart metering, WiFi usage growth and public safety, concluding with a discussion on the need to balance the availability of both licensed and licence-exempt spectrum to support such a wide range of applications.

Peter Pitsch, Associate General Counsel and Executive Director of Communications Policy at Intel Corporation, then discussed how the USA has increasingly made use of market-based policies and is now looking at increasing the sharing of spectrum through leasing – which could require the introduction of a cloud-managed dynamic spectrum sharing system.

Jussi Kähtävä, Director, Technology Policy at Nokia continued the theme of spectrum sharing describing the cases where there is a primary user and where there is no primary user (collective use of spectrum) and discussing how the technological solutions to sharing are similar, regardless of the licensing model.

Cengiz Evcı, Director, European Spectrum Policy at Alcatel-Lucent described the changing nature of mobile networks with the increasing adoption of small cells leading to significant increases in hotspot capacity at a fraction of the traditional cost.

Cécil Ameil, Senior Manager European Affairs in SES, highlighted the key role of satellite in delivering broadcast television services and the use of a hybrid/terrestrial solution to provide both broadcast and non-linear viewing options to

consumers in the most efficient way. Mr Ameil went on to discuss the satellite sector's role in the provision of defence and safety of life services as well as the current sharing of spectrum between satellite and other services including fixed links.

Luis Filipe Girao, Head of Mechanical at the Electrical and Telecom Equipment Unit within the European Commission, then gave a presentation on the consumer perspective in respect to technology evolution and equipment availability.

A short panel discussion followed these presentations including discussion of topics such as the scope for increased sharing of spectrum between satellite and other services and the importance of receiver performance standards to increasing spectral efficiency. It was also questioned whether a virtuous circle between spectrum and technology exists which will go a long way in alleviating a future "spectrum crunch". Dr Webb concluded the session by asking the question of whether the move toward a small cell architecture meant that the need for high frequency spectrum (relative to low frequency spectrum) was likely to increase in the future.



Market solutions to the spectrum crunch

The final session of the conference focused on the increased use of market mechanisms as a means of alleviating the spectrum crunch. Following introductory remarks from **Chris Doyle**, speakers were invited to give a short presentation:

Julius Knapp returned to give a second presentation at the conference, this time on the status of the incentive auctions in the USA including the key issues under consideration.

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Chris Woolford, Director of International Spectrum Policy at Ofcom, provided background on the introduction of incentive pricing for spectrum in the UK. He discussed how this had largely appeared to be successful citing specific examples of where incentive pricing had resulted in the users of spectrum releasing part of their spectrum holdings for new uses – the primary current example being that of the Ministry of Defence.

Inge Hansen, Head of Spectrum at Everything Everywhere, challenged how successful incentive pricing in the UK had been citing what actions the incentive was sought to be encouraging, described incentive pricing as an “input tax” on the mobile industry resulting in higher prices for consumers and highlighted the considerable uncertainties faced by mobile operators in relation to the future cost of spectrum in bands that are subject to incentive pricing.

Antonio Nicita, Associate Professor of Economic Policy at the University of Siena, provided an introduction to Authorised Shared Access (ASA) as a means of encouraging increased sharing of spectrum and overcoming the puzzle of underutilisation of spectrum at a national level versus a harmonised approach at the European level. He did so by drawing on references to Greek tragedy referring to regulators as potential “Dei ex Machina” to solve these issues.

Peter Goulding, Public Safety Specialist at Motorola Solutions, gave the last, and by far the most dramatic presentation of the conference, highlighting the importance of spectrum to the work of the emergency services and the social value created by this, in a style imitating that of a traditional British policeman.

The final presentation roused the conference participants leading to a lively final discussion of questions posed by the audience which included topics such as whether the European Commission should take action to introduce incentive pricing across the EU and whether the needs of the public safety community for broadband access could be met through use of commercial mobile networks. In particular, the question on the evaluation of AIP as an appropriate regulatory tool led to heated debates amongst the panellists. It was also questioned whether spectrum trading could ever evolve as a useful tool in ensuring an efficient allocation of spectrum.

Following the conclusion of the panel session, Mr Nagpal formally closed the conference by summarising several of the themes arising from the discussions including the request from politicians for the industry to be more ambitious, the need for Europe to make quick decisions on the future use of the 700MHz band, the spectrum needs of sectors other than wireless broadband and the role of technology and network architecture in helping to alleviate the demand for spectrum.

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Looking forward to the 8th Annual European and 2nd Annual Americas conferences

The conference continues to attract very favourable feedback from delegates, with several indicating that the highly successful mix of keynote presentations, panel sessions and networking discussions should continue at future events.

"I'm glad this is becoming an annual opportunity for me to meet you, the frontline experts on spectrum developments!", Neelie Kroes, Vice President, European Commission

"Very pleasant formula of moderators, speakers and debate. The level of expertise and high level abilities of these people is of course very important! Go on like that, don't change a winning formula!", Jean-Pierre Le Pesteur, Chairman of the Board, ANFR

"I really enjoyed the well-run conference and believe it was a "value add" for all the attendees", Gerry E. Oberst, Partner, Hogan Lovells

"Great conference! Keep up the good work", Andy Hudson, Head of Spectrum Policy, Vodafone Group

Aetha Consulting and NERA Economic Consulting look forward to working with Forum Europe to produce another successful conference in June 2013. We also look forward to the 2nd Annual Americas Spectrum Management Conference being held in Washington, D.C. in October 2012, which follows a similar format to the European conferences, but with an agenda that places greater emphasis on the topics that are currently of most relevance in the Americas including the incentive auctions in the USA, the forthcoming 700MHz auction in Canada and initiatives supporting wireless broadband network deployments in Central and South America.

For more information on this year's 2nd Annual Americas Spectrum Management Conference, please visit www.spectrum2012.com



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