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DG INFSO/B4

RSPG07-175 Final

REQUEST BY THE EUROPEAN COMMISSION
TO THE RADIO SPECTRUM POLICY GROUP
FOR AN OPINION
ON

ASPECTS OF A EUROPEAN APPROACH TO ‘COLLECTIVE USE OF SPECTRUM’

1. INTRODUCTION

In accordance with Article 4 of the Commission Decision establishing the Radio Spectrum Policy Group (RSPG Decision) and with Article 6 of the provisional Rules of Procedure of the RSPG (document RSPG03-12), the European Commission hereby requests the RSPG to develop and adopt an Opinion on “aspects of a European approach to collective use of spectrum”.

2. CONTEXT

In order to improve spectrum management in Europe, the European Commission has commissioned several studies assessing various spectrum management approaches¹. In this context, the Second Annual Report of the Commission to the Council and Parliament on EU spectrum policy², which presents the overall proposed strategy at EU level, advocates that a balanced approach should be sought between all spectrum models. The licence-exempt model is one of the possible models. Therefore, the present Request for an Opinion should be seen as complementing the two previous RSPG Opinions regarding market-based approach

¹ Namely the studies on secondary trading and on collective use of spectrum. More detailed information can be found on the website of the European Commission at:
http://ec.europa.eu/information_society/policy/radio_spectrum/archives/index_en.htm#compl_studies

² Document COM (2005)411, ‘a forward-looking radio spectrum policy for the European Union: Second annual report’. This document can be consulted at:
<http://europa.eu.int/eur-lex/lex/LexUriServ/LexUriServ.do?uri=CELEX:52005DC0411:EN:NOT>

(i.e. the Opinion on secondary trading) and on flexibility of use (i.e. the Opinion on WAPECS).

The Council and European Parliament also expressed their views on the appropriateness of different spectrum management models. The report adopted by the European Parliament in February 2007³, for example, “...welcomes the Commission's proposal to adopt differentiated spectrum management models including the unlicensed model which provides additional flexibility by allowing for free access within some technical limitations; considers that developing the right mix between the different types of licensing model will be important in achieving EU policy objectives”. In December 2006 the European Council identified “the development of spectrum allocation models meeting all objectives” as an immediate priority⁴.

Simultaneously with the abovementioned development of general views the Commission has also issued two Mandates to CEPT (in 2004 and 2005) to address more specifically the topic of Short Range Devices (SRDs) in Europe; the first one concerning harmonisation of SRD spectrum, the second concerning improvement of the effectiveness and flexibility of spectrum availability for SRDs⁵. CEPT's reports in response to these mandates were received in 2004⁶ and 2006⁷. On the basis of these reports the Commission proposed a framework Decision on EU harmonisation of spectrum for SRDs, the SRD Decision, which was adopted in 2006⁸. This Decision, together with several other Decisions adopted by the European Commission, relies on licence-exempt use of radio spectrum. These Decisions demonstrate the importance of the licence-exempt approach in spectrum management.

Member States already today allow licence-exempt use of spectrum, albeit in various ways (non-specific allocations, specific allocations, etc.). In addition certain alternative ways of issuing spectrum usage rights seem to be similar but not identical to licence-exempt usage, as for example the cases for light-licensing, underlay and overlay usage of spectrum.

All these approaches have in common that they rely on collective usage of spectrum (without licence or at least with a very light licensing regime not limiting the number of users) instead of individual usage rights (with the intention to permit exclusive usage or at least limit the number of users). The spectrum management model which is to be looked at in the context of the present Request for Opinion can thus be called ‘collective use of spectrum’ (CUS).

³ European Parliament Report “Towards a European Spectrum Policy”, 14 February 2007.

⁴ Presidency conclusions of the European Council of 14 & 15 December 2006 (16879/1/06 REV 1).

⁵ RSCOM04-07 & RSCOM05-07 rev1

⁶ RSCOM04-66Rev1

⁷ RSCOM06-77

⁸ Commission Decision of 9 November 2006 on harmonisation of the radio spectrum for use by short-range devices (2006/771/EC)

In a document⁹ submitted to RSC#18 in December 2006 (attachment), the Commission services presented their initial views on the future use of this approach in the European context. This document provides preliminary elements of the Commission services reflection on this management model. Given the importance and potential of this management model the Commission services are of the opinion that broader attention and further clarification is necessary to identify more clearly its potential benefits (or costs) as well as specific application conditions.

In order to support the Commission the RSPG is requested to participate in the reflections on this model and to give its views on several relevant issues of this spectrum management approach. In the conduct of this activity, the RSPG is requested not to restrict itself to licence-exempt use by Short Range Devices (SRDs), but to consider the model in the broader context of CUS as an important spectrum management approach as described above and in the next chapter.

3. SUBJECT

3.1. Collective use of Spectrum (CUS)

In the document prepared for RSC#18 the term "Collective Use of Spectrum" (CUS) was defined as: "a spectrum management approach which allows more than one user to occupy the same range of frequencies at the same time without the need for individual (exclusive) licensing". Currently CUS is predominantly associated to spectrum used on an unlicensed basis by Short Range Devices (SRDs), but this spectrum management model should be seen in a broader context than merely unlicensed usage by 'low power radio'. 'Light licensing' regimes (registration or notification), underlay (UWB) and overlay (using cognitive radio techniques) approaches and possible future types of spectrum sharing (for example 'private commons') are also captured under this approach. The key difference between traditional spectrum management approaches (licence based regimes) and the CUS approach can be exemplified by the different notions of usage rights and interference management. Licence based approaches generally grant individual (exclusive) usage rights and interference management is organised by the spectrum management authority via spectrum regulation and licence conditions. The CUS or licence-exempt approach, in contrast, grants collective usage rights to an unspecified number of users and interference is dealt with by spectrum regulation in combination with self-regulation between users. In principle this approach allows for a reduction of technological and regulatory constraints and increases the responsibilities of spectrum users to share spectrum efficiently, manage interference and to accept interference in certain cases.

3.2. Relevance

Innovative radio technologies are increasingly able to share spectrum amongst themselves or with other spectrum users (i.e. RLAN, UWB, SRDs, RFIDs). In addition technological developments are expected to offer more sophisticated sharing possibilities, for example cognitive radio may result in genuine overlay sharing of spectrum. In general these increased sharing capabilities will lead to

⁹ RSCOM06-93

increased spectrum efficiency. Such advancements are needed in a information society that is expected to become more dependant on wireless applications, resulting in a growing importance of a collective use approach to spectrum management.

A coherent CUS approach to spectrum management can stimulate the development of sharing technologies in Europe. The Commission services believe that spectrum available under the CUS model therefore has the potential to stimulate innovation by offering technology developers comparatively easy access to spectrum. The benefits of such a regulatory environment can be exemplified by recent innovations and new products relying on unlicensed use which have been developed in other parts of the world and are now used in Europe (i.e. WiFi, micro FM-transmitters). However, such benefits are offset by the costs of the necessary technology, which may at the end outweigh the costs of accessing spectrum via traditional individual licences.

The Commission services are of the opinion that the CUS model with its easy access to spectrum and minimal regulation can potentially contribute to the widespread adoption of wireless technologies by empowering the users to decide how to use the spectrum and how to cope with interference. And thus advance to objectives of the i2010 strategy and contribute to the Lisbon goals of economic growth and job creation.

An EU-wide Internal Market with harmonised spectrum is pivotal for many products relying on collective use spectrum. It supports the competitiveness of the manufacturing industry as a result of increasing economies of scale which simultaneously result in lower costs for consumers. In addition, the perspective of larger markets for products could stimulate innovation. Consumers would also benefit, they can use the applications throughout the European Union.

Harmonised collective use spectrum can also contribute to other EU policy objectives than the completion of the Internal Market and promotion of innovation in the information society. Certain specific policies (for example eInclusion for hearing aids and social alarms) also rely on the EU-wide availability of collective use spectrum.

A common understanding of the CUS model for spectrum management in Europe is necessary in order to apply this model coherently in the Member States. In addition such a common understanding is also necessary to apply the model at EU-level through harmonised conditions of use, where appropriate, which in turn support the functioning of the Internal Market for devices and services depending on a CUS approach and other EU policy objectives.

4. MAIN OBJECTIVES

The main objective of this Commission's Request for an RSPG Opinion is to obtain policy-level advice from the RSPG on the strategic elements of a European approach to collective use of spectrum. This should enable the Commission to make proposals for the optimal usage and application of the 'Collective use of Spectrum' model in Europe.

5. TASKS TO BE PERFORMED AND ISSUES TO BE ADDRESSED IN THE OPINION

In order to reach the objectives mentioned under point 4 above and in line with 6 (2) of the RSPG provisional Rules of Procedure the Members of the group are hereby invited to adopt an Opinion which:

- (1) **Develops a common definition** of Collective Use of Spectrum as a generic spectrum management model, and **clarifies the relevant terminology** in a common glossary (e.g. terms like “light licensing”, “exclusive use”, “shared use” among others).
- (2) **Reflects on the benefits of the Collective Use of Spectrum model at EU level**, and explores the possibilities and limitations for combining this model with other spectrum management models to achieve synergies in order to maximise spectrum efficiency and to improve interference management in Europe. The following questions could be addressed when reflecting on this aspect:
 - What criteria could be used to determine when to use this management model and in what ways can this model be combined with other management models (what are the possibilities to regulate the same bands with different management models)?
 - How can the various ways to implement collective use (generic allocations, application specific allocations, underlay, overlay, light licensing, private commons, politeness protocols, etc) be integrated in a strategic approach?
- (3) **Assesses the impact of expected technological, societal and economical developments** on the need to manage spectrum under a ‘Collective Use’ model and identifies subsequent policy-related challenges and issues to be addressed. Among others, the following question could be addressed when assessing this aspect:
 - To what extent do these developments suggest a wider recourse to the CUS approach?
 - What is the anticipated trend? (relevant technological trends, their maturity over time and their costs)
 - Beyond short range devices, are there other radio applications which could be envisaged to be covered by this CUS model?
- (4) **Explores ways to compare the societal and economical value of alternative spectrum management approaches**. The following question could be explored when reflecting on this aspect:
 - How can the value or benefits of technologies that depend on the CUS model be compared with those of technologies that depend on exclusive usage rights?
- (5) **Assesses the implications of increased usage of the CUS model for spectrum regulation in Europe**. Relying more on spectrum users to manage interference will change the current division of responsibilities between spectrum regulators and spectrum users, how can such a shift best be addressed? The following questions could be addressed when assessing this aspect:

- Consider the added value of EU-wide harmonisation of usage conditions as the default when allocating spectrum for collective use spectrum in the EU. What would this mean for the current institutional spectrum management environment?
 - Consider the need for and consequences of a global harmonisation of collective use spectrum?
 - Consider possible changes in the role of the spectrum regulator as a result of increased use of the CUS model in Europe.
- (6) **Reflects on the ‘innovation potential’ the CUS model offers.** How can this model best be applied in order to contribute to the development and adoption of wireless techniques and assist in advancing the objectives of the i2010 strategy?

6. TIMING

- RSPG#13 (8 May 2007): formal acceptance of the request for an RSPG Opinion.
- RSPG#14 (22 November 2007): discussion on the proposed definition and the glossary.
- RSPG#15 (1st quarter 2008): adoption of midterm Report addressing task 1 and 2.
- RSPG#16 (2nd quarter 2008): adoption of final Opinion.

7. ORGANISATION OF WORK

In accordance with Article 10 of the provisional Rules of Procedure of the RSPG, a working group may be established.

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EUROPEAN COMMISSION
Information Society and Media Directorate-General
Electronic Communications Policy
Radio Spectrum Policy

Brussels, 24 November 2006
DG INFSO/B4

RSCOM06-93

INTERNAL DOCUMENT

RADIO SPECTRUM COMMITTEE

Working Document

Subject: Follow-up of RSC#17: ‘Collective Use of Spectrum’ - discussion paper

This is a Committee working document, which does not necessarily reflect the official position of the Commission. No inferences should be drawn from this document as to the precise form or content of future measures to be submitted by the Commission. The Commission accepts no responsibility or liability whatsoever with regard to any information or data referred to in this document.

INTRODUCTION

The final CEPT report¹⁰ in response to the second SRD Mandate was discussed during RSC#17. The Commission Services presented a first reaction to this report¹¹ during that meeting.

Recently, a study commissioned by the European Commission on 'Legal, Economic & Technical Aspects of Collective Use of Spectrum in the European Community' (CUS Study) was completed¹².

The current review of the Electronic Communications Framework¹³ also touches upon issues related to collective use of spectrum.

The study, the report and the review, as well as input from industry on how to address the issue of collective use of spectrum (CUS) suggest developing thoughts on the role of collective use of spectrum in Europe in the context of spectrum management and its reform. In this document the Commission Services present initial views on the future approach to the collective use of spectrum in the European context.

Member States are invited to comment on these views.

¹⁰ See document RSCOM06-77

¹¹ See document RSCOM06-78.

¹² The Study on legal, Economic & Technical Aspect of 'Collective Use' of Spectrum in the European Community (2006) can be found on:
http://ec.europa.eu/information_society/policy/radio_spectrum/activities/studies/index_en.htm

¹³ See the Communication on the Review of the EU Regulatory Framework for electronic communications networks and services (COM(2006) 334 final).

8. COLLECTIVE USE OF SPECTRUM: INTRODUCTION AND CONTEXT

Collective Use of Spectrum (CUS) is a spectrum management approach which allows more than one user to occupy the same range of frequencies at the same time without the need for individual (exclusive) licensing. Currently CUS is predominantly associated to spectrum used on an unlicensed basis by Short Range Devices (SRDs), but this spectrum management model should be seen in a broader context than merely unlicensed usage by low ‘power radio’. ‘Light licensing’ regimes (registration or notification), underlay (UWB) and overlay (using cognitive radio techniques) approaches and possible future types of spectrum sharing (for example ‘private commons’) are also captured under this approach.

At present, the regulatory framework for electronic communications formally positions general authorisations for the provision of networks and services as the ‘default’ approach. This also applies to issuing spectrum usage rights. The Authorisation Directive¹⁴ states that a ‘general authorisation’ is the preferred option when assigning spectrum. This principle of general authorisations is naturally met by the CUS model. In practice, however, general authorisations, although being the preferred approach in the EC regulatory framework, are not predominantly used, and issuing individual spectrum usage rights on an exclusive basis prevails at national level.

It is estimated that the European market for products and services depending on collective use of spectrum is currently around €15 billion annually and is likely to grow to more than €25 billion in 2009¹⁵. In addition, it is expected that the value of future applications falling within the collective use model (for example UWB) will also be substantial.

The European Commission believes that spectrum needs to be managed more efficiently to cope with increasing demand. In the Second Annual Report¹⁶, different ways of managing spectrum were discussed. It is pointed out in that document that each spectrum management model has certain advantages. **The Commission Services propose that a reflection is needed on the role collective use of spectrum can play in the European mix of spectrum management approaches and which actions could be taken to optimise this mix.**

9. NEED FOR A COMMON APPROACH IN EUROPE

The development of a single market for wireless equipment is an objective of the R&TTE Directive¹⁷. Placement on the market and putting into service of wireless equipment throughout the EU is regulated by this Directive. If equipment falls under the so-called ‘class 1’ category, it may be used in all Member States without restrictions. For equipment falling within the collective use approach, at present mainly SRDs, diverging conditions of use often

¹⁴ Article 5(1) of Directive 2002/20/EC on the authorisation of electronic communication networks and services.

¹⁵ Study on legal, Economic & Technical Aspect of ‘Collective Use’ of Spectrum in the European Community (2006), page 6.

¹⁶ COM (2005)411, ‘a forward-looking radio spectrum policy for the European Union: Second annual report’.

¹⁷ Directive 1999/5/EC on Radio Equipment and Telecommunication Terminal Equipment and the mutual recognition of their conformity.

prevent such EU-wide usage. Is it not clear exactly what kind of added value divergent national regulations in low cost mass market devices bring to consumers and industry. The Commission Services believe that especially for mass market and/or portable products such as SRDs the same usage conditions throughout the EU should be aimed at. Harmonisation of radio spectrum usage conditions realizes this goal, supporting several horizontal EU policy objectives such as the completion of the internal market and promotion of innovation as well as to specific policies for which dedicated equipment plays a key role. Harmonised spectrum throughout the European Union will also create a single market for these products, supporting the competitiveness of the manufacturing industry as a result of increasing economies of scale, and also resulting in decreasing costs for consumers.

Today, such equipment often falls under specific national regulation, mostly as a result of legacy situations. **The Commission Services believe that traditional divergences of regulation concerning spectrum for which CUS is applied should and can gradually be faded out.**

Equipment and applications which would benefit from the CUS approach are expected to gain in importance. They have a considerable potential in terms of innovation potential, size of related economic activities and benefits for the consumer. New products suitable to the CUS approach are under development and put new challenges to the management of spectrum. It is therefore necessary to look into ways to react to this trend by a suitable spectrum management approach and to develop future proof concepts which avoid building up new fragmentation of regulation for related spectrum resources. In order to complement the objectives of the R&TTE Directive and increase the benefits of the collective use model for consumers and manufacturers **the Commission Services believe that the CUS model will need to be approached in a consistent manner at EU-level.**

10. ELEMENTS OF COMMON APPROACH TO COLLECTIVE USE OF SPECTRUM

(a) A common approach to the collective use of spectrum model requires criteria about when to use the model.

Since the CUS model is in the Commission's Services view only one amongst several approaches to spectrum management, it is necessary to define criteria to determine where the CUS model is suitable. A first tentative list of characteristics of applications / devices for which CUS seems to be appropriate or at least a viable option is given below:

- Devices operating over short distances and typically emitting at low power
- Devices which are in operation occasionally and can therefore share spectrum over time, and/or in a geographically limited space
- Devices which function autonomously (i.e. without connection to a wide area wireless network)
- Equipment using interference resistance receivers and intelligent transmitters, sustaining 'polite' spectrum usage and capable of operating in a 'interference polluted' spectrum environments
- Devices which are low-cost (i.e. the cost of acquiring exclusive spectrum usage rights would be disproportionate to the cost of the devices),

- Devices which are by nature and to a large extent used under a nomadic scenario (it would be impractical to obtain a licence in each location of operation)
- Devices for applications which can tolerate lower quality transmissions

These criteria can be met individually or in combination.

(b) Potential spectrum users need to know under which conditions spectrum can be used in a shared manner.

Common use of spectrum is not equivalent to an absence of rules with regards to the usage conditions. However, the CUS model brings its full potential only if these constraints can be kept to a generic and minimal level.

Current allocations for spectrum managed by the CUS model often contain specific restrictions (for example only to be used by specific devices, ‘duty cycle requirements’ or ‘no audio’ restrictions on devices designed for communication). The Commission Services believe that as much restrictions as possible should be removed and that only the restrictions needed to prevent harmful interference should remain.

Also, information about the conditions of use is difficult to find and the legal status of such specifications is often unclear, as well as the modalities for their enforcement. The information which can be found is fragmented and often not accurate. The Commission Services believe that there is room for significant improvement.

One possible option to ease the situation for spectrum users would be to introduce a simplified structure of the categories of collective use of spectrum¹⁸. Such a categorisation could be based on generic characteristics concerning performance and the risk of interference. These characteristics would be valid for a range of similar applications, resulting in a set of typical spectrum usage conditions for each category. As opposed to this approach, the current categories used for short range devices are typically device based and vary from very generic definitions (e.g. ‘non-specific SRDs’) to the individual applications (e.g. ‘social alarms’). The Commission Services believe that by introducing well defined generic categories the information for potential users of spectrum and indeed the management of spectrum to which CUS is applied could be simplified.

(c) The amount of spectrum to be allocated under the CUS model should be determined and future needs estimated to allow for a timely planning of radio resources to become available.

Questions about the appropriate amount of spectrum to be allocated and how to address future needs have to be answered. Given the difficulties of re-farming spectrum once allocated to collective use, the Commission Services believe that early and continuous efforts are needed when allocating new spectrum according to the CUS model. Information on the actual usage of spectrum, the market developments and the economic impact would need to be gathered proactively when discussing such issues.

The Commission Services believe that CUS is intimately linked to technical progress with respect to interference resistant and intelligent transmission techniques, a trend which can be

¹⁸ not to be confused with the class 1 and class 2 classification under the R&TTE Directive.

observed already today and which is expected to gain momentum. Developments in this respect can be actively and directly encouraged (e.g. via promoting research activities) but are also influenced by the supply of CUS managed spectrum compared to radio resources made available on exclusive basis. Therefore, deciding on how much ‘CUS spectrum’ to make available is not exclusively an issue of *reacting* to trends (technology availability, new devices hitting the market etc.), but should also be viewed as a tool to *pro-actively* spur this trend with a view to lower hurdles to accessing spectrum and increasing efficiency of its usage.

(d) Reflection on interference models applicable to CUS

CUS involves a novel approach to use spectrum since the protection of users sharing a band from interference is no longer primarily guaranteed through regulatory provisions as the case when issuing exclusive usage rights (where in simple terms interference is eliminated by preventing other users to share a specific band). As far as overlay and underlay usage of spectrum is concerned, new approaches of interference prevention need to be considered, as bands in these cases are shared amongst exclusive users of spectrum and ‘CUS users’.

Looking into interference models requires addressing novel approaches to assess interference levels (e.g. by applying statistical methods or empirical validation of theoretical studies), as well as defining the performance of additional mitigation techniques which are expected to proliferate in future.

The Commission Services estimate that a successful usage of CUS requires a better understanding of interference models and the development of methods to objectively assess interference mitigation measures and techniques. The Commission has recently launched a study to look into these matters.

11. PAST AND FUTURE ACTIVITIES IN THE CUS CONTEXT

As pointed out above, one objective behind considering CUS is to foster the internal market of equipment and services. This requires managing spectrum subject to the CUS approach in a consistent manner across Europe.

The Commission has in certain number of cases used the provisions of the Radio Spectrum Decision to adopt harmonisation measures in effect paving the way for CUS¹⁹. Also, the Commission has initiated harmonisation measures concerning the usage conditions by underlay applications²⁰.

The CEPT has been dealing with coordination of spectrum usage conditions for short range devices since many years. The Short Range Devices Maintenance Group (SRD MG) has prepared and currently maintains Recommendation 70-03. Provisions of this document reflect a best possible consensus amongst CEPT members, which however are not legally enforceable. The SRD Decision adopted pursuant to the Radio Spectrum Decision covers a subset of these recommendations to transform them in binding regulation. Furthermore, the Decision foresees a mechanism of permanent review in order to be able to adapt the technical provisions according to technical changes, new devices being proposed etc. CEPT has been

¹⁹ Decisions on R-LAN 5GHz, RFID & SRDs

²⁰ SRR for 24 GHz / 79 GHz; UWB for short range communications (work under progress)

given a permanent mandate to feed technical recommendations into this permanent review process, in order to realise an up-to-date and legally enforceable environment for a growing number of short range devices.

The Commission Services tentatively identify the following lines action for the future:

- Adopting harmonisation measures relating to CUS, pursuant to the Radio Spectrum Decision, where EU policies of horizontal or sectorial nature are at stake. Where possible, use the SRD Decision to implement such harmonisation measures.
- On short range devices, enlarge the coverage scope of the technical annex of the SRD Decision by including more categories of applications after receiving proposals for common usage conditions pursuant to the permanent mandate to CEPT; eliminate as much as possible restrictions still attached to items already covered by the SRD Decision.
- Improving information availability on usage conditions for CUS cases. A draft Commission Decision on Spectrum Information Availability is currently discussed in RSC precisely with the objective of addressing this type of issue.
- Develop a new system of categorisation of CUS related usages and related generic spectrum usage conditions. Once stable, this categorisation could be introduced in the annex of Short Range Devices Decision.
- Develop a better understanding of interference models and their impact on spectrum management in the CUS case.
- Monitor the development of new technologies facilitating CUS; support R&D activities facilitating the usage of the CUS model.
- Establish a permanent assessment mechanism to determine the mid and long term spectrum needs for CUS. This implies also a permanent assessment of the suitable balance between CUS and licenced spectrum usage rights
- Reinforce the mechanism of coordination between Member States to enable a consistent and common approach to CUS. The current review of the Electronic Communications Framework aims at strengthening the mechanisms already in place.

12. NEXT STEPS

Delegations are encouraged to provide suggestions and comments to the ideas developed in this paper.

RSC members are in particular encouraged to identify actions to be pursued at RSC level, i.e. proposals for harmonisation measures to be initiated on the basis of the provisions of the Radio Spectrum Decision.

It is currently investigated whether RSPG might be tasked to develop an Opinion on the more strategic impact and implications of the CUS approach.

The Commission intends to prepare a Communication on collective use of spectrum in 2007 to submit stable ideas and outline its intentions on promoting CUS.

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