EUROPEAN COMMISSION
Directorate-General for Communications Networks, Content and Technology

Electronic Communications Networks and Services
Radio Spectrum Policy Group
RSPG Secretariat

Brussels, 12 November 2014
DG CNECT/B4/RSPG Secretariat

RSPG14-580

RADIO SPECTRUM POLICY GROUP

1st Progress Report of the RSPG Working Group on "Spectrum issues on Wireless Backhaul"

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1st Progress Report of the RSPG Working Group on "Spectrum issues on Wireless Backhaul"

The first meeting of the working group on "Spectrum issues on Wireless Backhaul" was held on 2 October 2014 in Budapest, at the NMHH office.

Representatives of 6 Member States were present, from Finland, France, Germany, Hungary, Sweden and the UK.

At the meeting the draft work item was introduced which had been developed for the RSPG plenary meeting in June 2014. There was no proposal to modify the draft work item, so it was taken as a basis for the work. In relation with this the group discussed what should be included in the draft report taking the scope of the work item into account.

The scope was defined in the document RSPG14-567:

- identifying and analyzing strategic spectrum issues relative to wireless backhaul for mobile networks (lessons learnt, various types of backhaul, trends, needs, etc.) due to:
  - higher capacity needs for existing macro-cellular sites
  - the densification of base stations and the small cells approach (trends, foreseen impact on spectrum management, non-line of sight wireless backhaul issues) in mobile networks infrastructures
- reviewing of state-of-the-art developments and trends in wireless backhaul in public mobile cellular networks (including use of small cells and mesh networks) including identification of any relevant spectrum sharing and spectrum efficiency issues and an assessment of any implications for spectrum management policies at the EU level.

After considering these issues a skeleton of the draft report has been developed and the relevant documents have been identified.

At the meeting the participants agreed to develop the draft report mainly by correspondence, however some meetings are needed in order to make good progress in this work item.

Identifying relevant documents

A number of relevant documents has been identified that can be used as a basis for the draft report. For outlining the current and future trends regarding the usage and the technological development in the fixed service systems (mainly wireless backhaul) and how to improve spectrum efficiency some CEPT documents were added to the

list of relevant documents. Additionally ITU and ETSI and some other documents were identified as potential relevant documents.

Structure of the Draft Report

To cover all the issues that had been defined in the scope of the work item the main sections of the draft report have been worked out.

The participants agreed that beside the current and midterm future trends the longterm aspects should also be mentioned with regard to both the broadband mobile network and wireless backhaul for mobile infrastructure. For the longterm trends only a general outline, while for the current and midterm trends band specific and also general review will be developed.

Outline of the longterm trends is important with respect to working up the future spectrum strategy.

The section "Country information" in the draft report is to be based on small cell backhaul experience in member states for which a questionnaire (information from the member states or from the service providers) might be needed but it will be further considered in the working group. If there are already some information regarding this issue it can be used avoiding the duplication of work.

Timetable

The milestones for the working group:

- 1st WG meeting in Budapest on 2 October 2014
- 1st Progress Report and Draft Report at RSPG#35 on 12 November 2014
- 2nd WG meeting in Budapest on 2 December 2014 (fixed)
- Draft final report at RSPG#36 on 19 February 2015
- Final report at RSPG#37 on 11 June 2015

Probably further meetings will be needed between the plenary meetings (might be one more in January and between RSPG#36 and RSPG#37).

ANNEX

Draft RSPG Report on Spectrum issues on Wireless Backhaul

1. INTRODUCTION

Mobile networks are evolving to respond to an increased broadband usage. To respond to related need for higher capacity and speeds, the densification of mobile networks is under investigation. Against this background, mobile operators are considering various forms of backhauls including wireless ones (point to point, non-line of sight[1]). New forms of base stations are under study by market players: small cells[2]. The small cells intend to provide cellular coverage in a limited range. An increase in the number of wireless backhaul links required for the small cells could then be foreseen. Moreover, wireless backhaul solutions in frequency bands already licensed for Wireless Broadband (WBB) under harmonized technical conditions could be of interest to the current license holders.

Both wired and wireless solutions are able to meet this backhaul market demand. Various technical solutions could be considered by market players to facilitate roll out, reduce the backhaul cost, and to meet the traffic needs such as optical fibre or wireless and fixed links.

Wireless backhaul links are basically deployed through fixed links under the 'Fixed Service' defined in ITU's RR. Nevertheless wireless backhaul is only one application of the fixed service. A fixed service application in the core network should not be considered as wireless backhaul in the scope of this work. In this report, wireless backhaul should then be understood as the intermediate/last wireless link to connect various forms of base stations[3] with either the core network or the backbone network.

Wireless backhaul to deliver higher broadband traffic within the mobile/cellular networks and to the mobile/cellular base stations will face strategic challenges due to mainly:

- Increased wireless backhaul capacity needs for existing macro-cellular sites
- Expected increasing number of wireless backhaul links required for the small cells

Various frequency bands for wireless backhauling are already subjected to ECC recommendations which harmonize frequency plans. These deliverables are revised within CEPT if needed and where appropriate (i.e. to introduce new frequency plan for example). According to national demand and circumstances, the frequency bands nationally available for fixed links vary from country to country.

New strategic spectrum challenges on wireless backhaul (non-line of sight wireless backhaul issues, capacity and number of links and its impact on spectrum

[1] A direct line of sight does not always exist in dense urban

[2] Various definitions exist for small cells: current ITU definition under drafting refers to some criteria to define small cells : power limitation, frequency above 2 GHz, coverage less than 50m, indoor only. "Micro cells" are small cells. Pico cells: "Pico cells" are cells, mainly indoor cells, with a radius typically less than 50 meters.

[3] Macro, pico cells including small cells

management, the potential interest of WBB frequencies for wireless backhauling in the context of the service neutrality, etc.) and small cells issues are to be anticipated. These market trends impact the spectrum management which should be assessed for the next 5 and 10 years.

2. SCOPE

This Report intends to identify and analyze strategic spectrum issues relative to wireless backhaul for mobile networks (lessons learnt, various types of backhaul, trends, needs, etc.) due to:

- higher capacity needs for existing macro-cellular sites
- the densification of base stations and the small cells approach (trends, foreseen impact on spectrum management, non-line of sight wireless backhaul issues) in mobile networks infrastructures

This Report includes a review of state-of-the-art developments and trends in wireless backhaul in public mobile cellular networks (including use of small cells and mesh networks) including identification of any relevant spectrum sharing and spectrum efficiency issues and an assessment of any implications for spectrum management policies at the EU level.

3. DEFINITIONS

[e.g. “small cell”, “macro-”, “micro-” and “picocell” based on ITU def.]

4. BROADBAND MOBILE NETWORK

Mobile architecture development in the mid term
Dense urban areas
Suburban areas
Rural areas
Fronthaul
Cloud computing

Mobile architecture development in the long term
Millimetre wave networks

5. WIRELESS BACKHAUL FOR MOBILE INFRASTRUCTURE [ECC Report 173]

[general text needed]

Topology of the networks
[general text for PP and PMP]

Point-to-point links

i. LOS
[specify 60, 70, 90 GHz]

ii. NLOS
Self backhauling

Point-to-multipoint networks

Wireless broadband spectrum used for backhaul

Low frequency bands
Mid frequency bands
High frequency bands

6. TECHNOLOGY TRENDS AND SPECTRUM EFFICIENCY [ECC Report 173]

a. **Modulation (including adaptive modulation)** [ECC Report 198]
b. **ATPC** [ECC Report 198]
c. **Bandwidth adaptive systems** [ECC Report 198]
d. **Polarization**
e. **MIMO**
f. **Adaptive antenna systems**
g. **Full duplex radios (echo cancellation)**
h. **Increasing channel width**
i. **Asymmetrical point-to-point links** [ECC Report 211]

7. COUNTRY INFORMATION

[Questionnaire needed ? (identifying relevant questions) – can be considered later]

8. CONCLUSION