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3rd Progress Report of the RSPG Working Group on Spectrum issues on Wireless Backhaul

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The working group had one meeting after the RSPG #36 (19 February 2015) where the Draft report on Spectrum issues on wireless backhaul and the 2nd progress report were presented. The working group meeting was held on 4th March 2015 in Budapest where representatives of the following Member States and organizations were present: EC, ETSI, Finland, France, Germany, Hungary, Sweden.

At the RSPG preparatory and plenary meeting some comments had been made on the structure and the content of the report that were taken into account and discussed at the working group meeting. The main points that had been raised were:

- The text should be more focused on the issues defined in the scope based on the description of the work item
- The text should be more general and not so technical in order to be read easier
- The main body of the document should be shortened highlighting the essential parts
- Regarding the frequency use the in-band sharing between mobile and fixed service systems should be more highlighted (self-backhaul)

After considering these comments the group decided to have a more clear and structured text in the main body and remove the technical details and put those text parts into annexes. The group agreed to remove the whole 6th chapter (Technology trends and spectrum efficiency in FS systems) and put into Annex 4. The detailed background text on Broadband Mobile Network can be now found in Annex 1 and Annex 2 that was previously included in the main text (Chapter 4). Details on the network evolution regarding architecture and microwave network topology can be found in Annex 3.

Several contributions were received in order to improve the text in the aspect of better wording and also having a more focused and compressed text.

At the meeting the group agreed that no more physical meeting would be needed until the deadline for submission and further work can be arranged by correspondence. During this period numerous proposals for modification were received and the text was being improved in many steps.

The current text has been drafted based on the constructive comments and contributions, also taking into account the considerations made by the RSPG. After re-structuring and amending the report the final version has been elaborated. The content is summarized below:

1. **Introduction:** describes the background of the work item, why it is an important issue, what aspects should be taken into account regarding small cells and defines precisely what should be meant by backhaul

2. **Scope:** defining the main issues that have to be dealt with:

- a review of state-of-the-art developments and trends in new generation broadband mobile networks and wireless backhaul in public mobile cellular networks (including use of small cells and mesh networks)
- the identification of any relevant spectrum sharing and spectrum efficiency issues
- a review of different kinds of backhaul topologies (outlining the advantages and disadvantages)
- different assignment methods that can be used in FS systems and coordination aspects
- a consideration of the applicability of the combination of access networks and wireless backhaul solutions (self-backhauling)
- frequency bands that could be used for wireless backhaul for new generation mobile networks
- and an assessment of any implications for spectrum management policies at the EU level.

3. **List of abbreviations**

4. **Broadband mobile networks backhaul requirements:** this chapter deals with the mid-term (4G) and the long-term (5G) aspects of the mobile networks – developments, requirements for the future, trends (densification of cells, technology) taking into account the two extreme deployment scenarios: rural and dense urban environment.

- Requirements on backhaul in the mid term
 - Backhaul requirements for dense urban areas
 - Backhaul requirements for rural areas
 - Requirements of wireless backhaul used for front haul links
- Backhaul requirements in the long term
 - Mobile access in frequency bands above 6 GHz
 - Ultra dense networks
 - Backhaul capacity requirements
 - Form factor for small cells
 - Latency requirements

5. **Wireless backhaul for mobile infrastructure:** identifies new general backhaul requirements to meet enhanced broadband mobile demand, considers issues on channel width, benefits and drawbacks of different kind of backhaul topologies, assesses the potential applicability of self-backhaul solutions and review the potential frequency bands

- Potential frequency bands to meet wide channel requirements
- Increasing channel width
- Topology of the networks
 - Point-to-point links (LoS and NLoS)

- Point-to-multipoint networks
- Multipoint-to-multipoint networks
- Self-backhauling in mobile frequency bands
- Wireless broadband spectrum used for backhaul
 - Low frequency bands (below 11 GHz)
 - Mid-range frequency bands (11 to 23 GHz)
 - High frequency bands (above 23 GHz)

6. **Fixed service assignment methods:** this chapter deals with different categories of licensing methods with respect to wireless backhaul (LSA approach is also mentioned as a solution)

7. **Cross-border frequency coordination:** coordination of PP and PMP links is an important issue with regard to minimizing interference

8. **Analysis and conclusion:** this chapter contains the relevant points that should be taken into account in relation with wireless backhaul when defining requirements for mobile systems conclusions (how can the future requirements be fulfilled with wireless backhaul considering technological and spectrum issues, as well)

- Wireless backhaul for 4G mobile networks
- Wireless backhaul for 5G mobile networks
 - Spectrum aspects of requirements for 5G
 - Mobile access networks above 10 GHz
 - Spectrum aspects and requirements for FS
 - Assignment methods and cross-border frequency coordination

9. **Summary:** an extract, highlighting the most important points of the draft report

Annex 1: Broadband mobile network

Annex 2: High level description of 5G

Annex 3: Network evolution

Annex 4: Technology trends and spectrum efficiency in FS systems

Annex 5: Frequency bands where higher channel widths have recently been introduced

As the report has been finalized (in line with the RSPG working program) RSPG Plenary Meeting #37 is invited to consider and approve the Final Draft Report on Spectrum issues on wireless backhaul.

The Rapporteur would like to thank all the group members and other people who contributed to the work and supported in order that the report could be drafted for the deadline. All comments and proposals were helpful in the aspect of improving the text.

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