**CEPT roadmap for 5G**

(Version 7, Revised 26 October 2018)

The 43rd ECC Plenary meeting in Prague, 15-18 November 2016, approved a comprehensive list of actions regarding the fifth generation of mobile technology (5G) named “CEPT roadmap for 5G”.

It outlines the CEPT’s actions for 5G, taking into account the views from all stakeholders expressed during the CEPT Workshop on 5G from 2-4 November 2016 in Mainz.

It also identifies, when appropriate, the related ECC activities (such as Work Items (WI) in the [ECC Work Programme](http://eccwp.cept.org/)) and the areas where further considerations are expected.

The CEPT roadmap for 5G will be reviewed at each ECC Plenary meeting with an assessment of the related activities.

History:

* Version 1: approved 18 November 2016 (43rd ECC Plenary);
* Version 2: approved 3 March 2017 (44th ECC Plenary). No change to the Roadmap list of actions. Update of the related ECC activities;
* Version 3: approved 28 June 2017 (45th ECC Plenary). Further update of the related ECC activities and minor modification to action B6 related to the ITU-R activities on 5G characteristics;
* Version 4: approved 17 November 2017 (46th ECC Plenary).
  + Modifications and reordering of actions B1 to B4 related to WRC-19 in order to reflect the progress of the studies and other considerations regarding future 5G bands in Europe.
  + New action A3.2 on the development of a toolbox supporting introduction of 5G in 26 GHz with FS in operation.
  + Update of the related ECC activities for the relevant actions.
* Version 5: approved 2 March 2018 (47th ECC Plenary). Update of the related ECC activities, in particular to reflect the progress achieved within ECC and the decisions taken during this Plenary meeting.
* Version 6: approved 6 July 2018 (48th ECC Plenary):
  + Modifications to actions A1 (3.5 GHz), A3.1 and A3.2 (26 GHz) and D4 (60 GHz);
  + Suppression of actions (A5, B5, B6, C5) no longer relevant;
  + Update of the related ECC activities for the relevant actions.
* Version 7: approved 26 October 2018 (49th ECC Plenary). Update of the related ECC activities, in particular to reflect the related deliverables recently approved and the progress achieved for WRC-19 preparation. Extension of the scope of the action D3 related to FS channelling relevant for backhauling.

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| List of actions (Approved 18 November 2016, Revised 6 July 2018) | Related ECC activity (Updated 26 October 2018) |
| 1. **Harmonisation** | |
| **A.1** Revise the harmonisation measures for 3.4-3.8 GHz so as to make it suitable for 5G | Work completed:   * Revision of ECC/DEC/(11)06 approved by ECC#49 for publication . * Related work in response to EC Mandate on 5G: [CEPT Report 67](https://www.ecodocdb.dk/document/3357) published in July 2018. |
| **A.2** Provide guidance to administrations for defragmenting the 3.4-3.8 GHz band, in which there are existing licences in many CEPT countries and for developing plans and intended timescale for the future utilization of this band. | * Defragmentation of the frequency band 3400-3800 MHz, ECC Report 287 approved for publication at ECC#49; * [WI PT1\_17](http://eccwp.cept.org/WI_Detail.aspx?wiid=660) on options for synchronization between MFCN: draft ECC Report 298 approved by ECC#49 for public consultation |
| **A.3.1** Develop an harmonisation decision setting the conditions for the introduction of 5G in the 26 GHz band, taking into account, as appropriate, the compatibility and protection with all existing services in the same and adjacent frequency bands. | Work completed:   * [ECC Decision (18)06](https://www.ecodocdb.dk/document/3361) published in July 2018. * Related work in response to EC Mandate on 5G: [CEPT Report 68](https://www.ecodocdb.dk/document/3358) published in July 2018. |
| **A.3.2** Develop additional guidelines to support the implementation of ECC Decision (18)06, including:   * a tool box to help the national decision process supporting introduction of 5G in 26 GHz with FS in operation providing mechanisms which allow for continued FS operation, where necessary; * Guidelines to facilitate introduction of 5G while ensuring the coexistence with EESS/SRS and FSS earth stations; * Options for synchronisation between MFCNs. | * Toolbox for IMT-FS coexistence ([WI PT1\_11](https://eccwp.cept.org/WI_Detail.aspx?wiid=651)); * Draft ECC Recommendation approved by ECC#49 for public consultation in relation to EESS/SRS earth stations ([WI PT1\_15](http://eccwp.cept.org/WI_Detail.aspx?wiid=658)); * Draft ECC Recommendation under development in relation to FSS earth stations ([WI PT1\_16](http://eccwp.cept.org/WI_Detail.aspx?wiid=659)); * Guidance and options to identify the most appropriate synchronisation framework at national level ([WI PT1\_19](https://eccwp.cept.org/WI_Detail.aspx?wiid=675)) |
| **A.4** Review ECC decisions in MFCN bands to ensure they are suitable for 5G | * 3.4-3.8 GHz: See A.1. * 700 MHz, 800 MHz and 1.5 GHz ECC Decisions are already suitable for 5G (technology neutral and no AAS assumed in these frequency bands). * 2.1 GHz: draft revised ECC Decision (06)01 and associated draft ECC Report 297 approved by ECC#49 for public consultation. * 2.6 GHz: [WI PT1\_13](http://eccwp.cept.org/WI_Detail.aspx?wiid=656) to review ECC Decision (05)05. * 1800 (and 900 MHz): draft revised ECC Decision (06)13 and associated draft ECC Report 296 approved by ECC#49 for public consultation. * Related work in response to EC Mandate on 5G in MFCN harmonised bands. |
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| 1. **WRC-19 (IMT>24 GHz)** | |
| **B.1** Signal clearly that CEPT supports an IMT Identification in the 24.25 – 27.5 GHz band and intends to harmonise this band in Europe for 5G before WRC-19 through the adoption of an harmonisation decision and to promote it for worldwide harmonisation | * CPG and PT1 activities on WRC-19 AI1.13 * Reflected in draft CEPT Brief on AI 1.13 * Articles in the ECC newsletters (see [December 2016](http://apps.ero.dk/eccnews/dec-2016/cept_roadmap_-_guiding_the_way_for_5g_in_europe.html) and [August 2018](http://apps.cept.org/eccnews/august-2018/europe_gets_closer_to_the_rollout_of_5g.html).) |
| **B.2** Signal clearly that, in addition to the 26 GHz band (see B.1), CEPT considers that the bands 40.5-43.5 GHz and 66-71 GHz have good potential for future harmonisation in Europe. The process for developing harmonisation decisions for the additional bands may be launched immediately after WRC-19. | * CPG and PT1 activities on WRC-19 AI1.13. * Reflected in draft CEPT Brief on AI 1.13. * Draft ECPs under development for the IMT identification of the 26 GHz, 40.5-43.5 GHz and 66-71 GHz bands. |
| **B.3** Signal clearly that Europe has harmonised the 27.5-29.5 GHz band for broadband satellite and is supportive of the worldwide use of this band for ESIM. This band is therefore not available for 5G. | * CPG activities * Reflected in draft CEPT Brief on AI 1.5 and on 1.13 * Articles in the ECC newsletters (see [December 2016](http://apps.ero.dk/eccnews/dec-2016/cept_roadmap_-_guiding_the_way_for_5g_in_europe.html) and also [October 2016](http://apps.ero.dk/eccnews/oct-2016/index.html) in relation to ESIM.) |
| **B.4** Engage in discussions with other regional organisations to facilitate consensus at WRC-19 | CPG activities |
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| 1. **Verticals** | |
| **C.1** Monitor common use cases for functional requirement of verticals (e.g. PPDR, industrial automation, automotive, utilities, rails, …) which would require spectrum harmonisation measures | To be taken into account by WGFM through monitoring of relevant standardisation activities (e.g. ETSI, 3GPP).  CEPT workshop on spectrum solutions (including but not limited to 5G based solutions) for vertical sectors planned in May-June 2019. |
| **C.2** Consider how 5G standardisation will accommodate the verticals specific requirements | To be taken into account by ECC/PT1 and WGFM. |
| **C.3** Investigate the possibility for verticals to share common platforms (e.g., a shared private network or hosted on a mobile operator network) | To be considered by WGFM in its existing activities relating to verticals, e.g. for rail ([FM 56](http://www.cept.org/ecc/groups/ecc/wg-fm/fm-56/page/terms-of-reference/)).  Preliminary discussions in ECC/PT1 relating connectivity by means of MFCN in the band 3.4-3.8 GHz (e.g. for connected cars), in response to the 5G Mandate. |
| **C.4** Investigate the impact of the use of licensed-exempt regime for critical applications of verticals (e.g. automotive), | WG FM to investigate the matter (e.g. work on ITS under EC Mandate for 5.9 GHz). |
| **C.5** Review spectrum regulations applicable to verticals to assess whether these are “5G compatible” | To be considered by ECC/PT1 and WGFM, taking into account the list of harmonisation decisions (and recommendations) [for review](http://test.ecodocdb.dk/docdb/document/category/ECC_Decisions/review) . |
| 1. **Other spectrum challenges** | |
| **D.1** Take into consideration what satellite solutions can bring for 5G | Work completed: [ECC Report 280](https://www.ecodocdb.dk/document/2989) on satellite solutions for 5G published in May 2018. |
| **D.2** Investigate new sharing opportunities and challenges that new technologies (e.g. AAS) can bring. | ECC/PT1 to report on this matter, taking into account its work on 24.25-27.5 GHz and 3.4-3.8 GHz |
| **D.3** Carry out activities on FS channelling, potentially suitable for 5G backhauling. | Work completed for the 92-105 GHz and 130-175 GHz bands: [ECC Report 282](https://www.ecodocdb.dk/document/6034), [ECC Recommendation (18)01](https://www.ecodocdb.dk/document/2012) for the 130-175 GHz band, revised ECC Recommendation(14)01 and [ECC Recommendation (18)02](https://www.ecodocdb.dk/document/6037) on 92-115 GHz published.  Ongoing activities (WI [SE19\_40](https://eccwp.cept.org/WI_Detail.aspx?wiid=664)) to consider the doubling of maximum channel width for some selected FS bands in the range from 11 to 38 GHz, in order to meet the increasing demand for capacity. |
| **D.4** Ensure least restrictive, flexible and streamlined regulations in the band 57-71 GHz which would accommodate 5G and WiGig technologies and applications, also taking into account ITS in this frequency range. | Draft ECC Report 288 on Conditions for the coexistence between Fixed Service and other envisaged outdoor uses/applications in the 57-66 GHz range approved for public consultation by WG SE in September 2018.  Related WI [SRD-MG\_44](http://eccwp.cept.org/WI_Detail.aspx?wiid=563) on the evaluation of proposals for a relaxed regulation for wideband data transmission systems in all or parts of 57-66 GHz. Main results included in draft CEPT Report 70, approved for public consultation by ECC#49, in response to the EC Mandate on Short Range Devices.  ECC agreed to look at the band 66 - 71 GHz for license-exempt use in the future. ETSI TR 103 583 is expected. |
| **D.5** Investigate the impact of the use of spectrum for 5G in higher frequency bands (>24 GHz) in relation with general authorization regime, | To be considered by ECC/PT1 for future activities as appropriate. |