

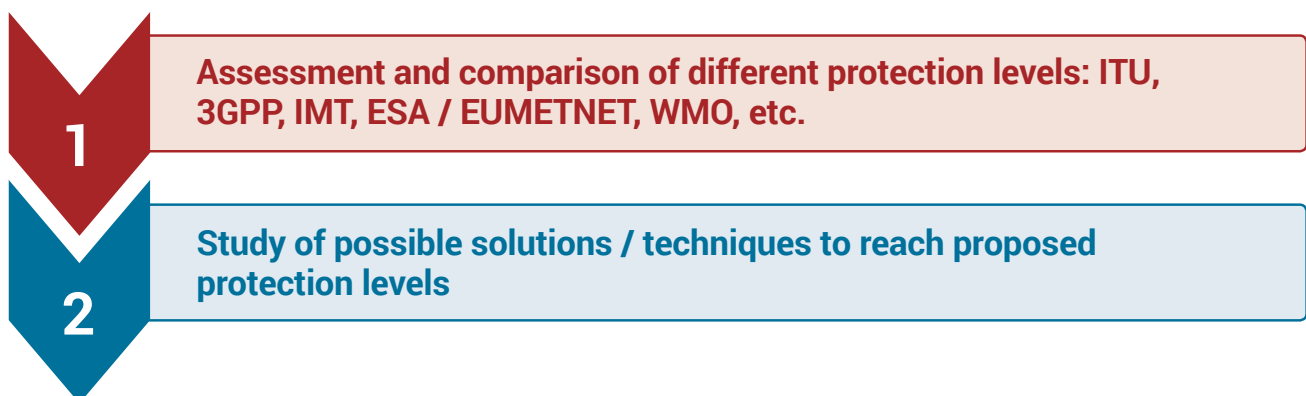
RATIONAL SPECTRUM ALLOCATIONS TO ACHIEVE OPTIMAL RESULTS

Every new spectrum identification has challenges. Sometimes they are technical, sometimes they are economic.

The Fraunhofer IIS conducted an analysis to assess how proposed unwanted emission limits to protect EESS could be met, considering 5G/IMT 3GPP system standards.

- ▶ The 26 GHz band (24.25-27.5 GHz) is a prime candidate for global 5G/IMT identification at WRC-19. Important questions have been raised about how much of this band can actually be made available for 5G/IMT given the need to protect the Earth Exploration Satellite Service (EESS) passive sensors operating in the 24 GHz band (23.6-24 GHz). Debate continues around the maximum level of unwanted emissions that should be permitted from 5G/IMT into the EESS band, ranging from -20 to -55 dBW/200 MHz.
- ▶ Research by the Fraunhofer Institute of Integrated Circuits IIS shows that the 5G/IMT community can fully exploit the entire bandwidth at 26 GHz (3.25 GHz), without causing unacceptable interference to the EESS operating in the 24 GHz band and without the need to encroach on the 28 GHz band (27.5-29.5 GHz) which is critical to the present and future growth of high-capacity satellite broadband services.

Study Methodology¹:



¹ <https://gscoalition.org/cms-data/case-studies/FHIFinalReport.pdf>

Results Summary:

Phase 1 (Base Stations)

July 2019

Considered 5G/IMT base stations:

Analysis of employable terrestrial 5G/IMT systems techniques to reduce unwanted emissions into the EESS band.

Fraunhofer IIS considered 5G/IMT 3GPP standards-based system architectures, prudent equipment design, and the cost and feasibility of a variety of commercially available technologies.



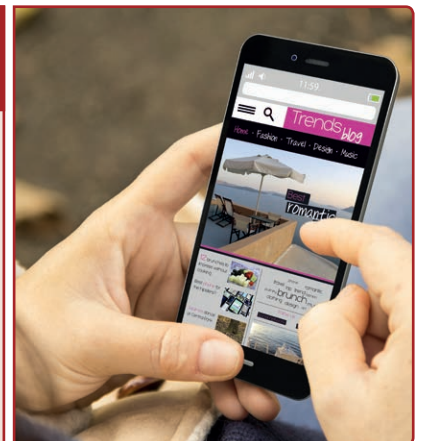
Phase 2 (User Equipment)

October 2019

Addressed 5G/IMT user equipment:

Concluded that various proposed EESS protection levels can often be met with careful radiofrequency chain design, in particular power amplifier design, without requiring additional filtering.

Fraunhofer IIS explains that the current 3GPP standard includes a requirement for a base station to command user equipment to adjust its output so that unwanted emissions satisfy the required limit.



To the extent the 5G/IMT radiofrequency chain, power amplifier design, and signaling command do not satisfy unwanted emission limits, the Fraunhofer IIS study identifies additional low-cost commercial filtering technology that is available.

Examples of low-cost existing technology in miniature radiofrequency filters are available that show the feasibility of developing cost and size-effective solutions.

In a letter to ministers, GSMA has suggested² that even mid-range protection requirements for EESS would result in about one-third to one-half of the 26 GHz band being unusable for 5G/IMT base stations. The Fraunhofer IIS study demonstrates that EESS limits can be met and the entire band can be used by 5G/IMT with care in design of the radiofrequency chain.

The Global Satellite Coalition calls on regulators to note the conclusions of the Fraunhofer IIS study, which demonstrate that irrespective of the Protection Criteria agreed at WRC-19, design options are available that allow IMT to successfully exploit the entire 26 GHz band.

A constructive approach from the 5G / IMT community will allow a 'Win' for EESS at 24 GHz, a 'Win' for 5G/IMT at 26 GHz and a 'Win' for FSS at 28 GHz.



²<https://www.gsma.com/gsmaeurope/wp-content/uploads/2018/06/CTO-high-level-letter-26-GHz-technical-conditions.pdf>