standICT.eu 2026

ICT Standardisation Observatory and Support Facility in Europe

Case Study 6

FRAND, Standard Essential Patents, and Open Source Software

Ciarán O'Riordan (OFE)

Funded by the European Union

February 2026

This case study lends substantially for its analysis on Blind, K., & Böhm, M. (2019). "The Relationship Between Open Source Software and Standard Setting".

1. Introduction

The European Union is reforming its standardisation system to make it more agile, inclusive and better aligned with the twin green and digital transitions. The European Standardisation Strategy (2022) and the ongoing review of Regulation 1025/2012 emphasise the speed and quality of standards, as well as the need for balanced stakeholder representation. These reforms come at a time when software has become a decisive layer of most ICT infrastructures and when open source software (OSS) has become a widely used mechanism for software development and diffusion.

At the same time, the digital economy continues to rely on technical standards protected by Standard-Essential Patents (SEPs). Their licensing generally follows the "fair, reasonable and non-discriminatory" (FRAND) principle, originally intended to ensure that implementers could access patented technologies under comparable conditions. This model has long underpinned innovation in hardware-based sectors such as telecommunications.

The increasing "softwarisation" of society and consequently of standards has brought into sharper focus the differences between FRAND-based SEP licensing and the licensing norms of open source communities. OSS licences typically grant royalty-free rights to use, modify and redistribute the source code and usually do not accommodate per-copy royalties or the need for separate bilateral negotiations.

The interviewees for this study noted that this tension has implications for Europe's competitiveness, technological sovereignty, cyber-resilience and market openness. It can also affect the speed and quality of standard-setting, because collaborative OSS projects often provide early implementations of emerging standards that help with testing and deployment.

This case study aims to highlight a core structural tension in the European ICT-standards landscape: the continued reliance on SEP-based FRAND licensing, which evolved for hardware-oriented industries, versus the royalty-free, collaborative OSS model that has become central to much modern software development.

2. Background: SEPs, FRAND and the Tension with OSS

A Standard-Essential Patent protects a technology that is indispensable for implementing a particular standard. Without a licence, a product cannot conform to that standard. To avoid the risk of exclusion of competitors, many Standards Development Organisations (SDOs) require their participants to license any essential patents on FRAND terms.

By contrast, widely used open source licences—such as the GNU GPL, Apache 2.0 or MIT licences—permit anyone to use, modify and redistribute code and typically include an explicit or implicit royalty-free patent grant. The obligation in most FRAND schemes to negotiate and pay per-copy royalties is generally viewed by open source actors as incompatible with decentralised redistribution, where copies cannot realistically be counted.

3. Core Tensions and Impacts

Legal and economic incompatibility

The OSS stakeholders interviewed for this report have observed that FRAND-based SEP regimes create legal uncertainty and transaction costs for open source projects. Even very low per-unit royalties cannot easily be reconciled with the open-ended distribution of OSS. As a result, some OSS communities avoid implementing standards that rely on royalty-bearing SEPs, while others accept a risk of infringement.

Innovation and competition effects

The experts as well as studies on the topic argue that, where compliance with a standard is required for market entry, SEP licensing costs may disadvantage SMEs and new entrants that lack the resources to negotiate licences. The difficulties encountered in licensing the HEVC video-coding standard are frequently cited in the literature as an example of such barriers.[1] Other stakeholders, however, contend that FRAND royalties are necessary to incentivise patent-based innovation.

Governance and cultural gaps

According to Böhm and Blind (2019), SDOs operate through formal, consensus-driven decision-making shaped by statutory obligations, whereas OSS communities rely on voluntary, merit-based collaboration. SDO leaders can adopt decisions even against a minority of members; OSS projects tend to depend on broad consensus and the technical authority of maintainers. These governance differences can slow or complicate collaboration unless there is significant overlap in stakeholders active on both sides.

Impact on European standardisation efforts

The interviewees emphasised that this tension can complicate the EU's aim to produce faster, more inclusive standards. For example, in the standardisation work linked to the EU Cyber Resilience Act, the Commission has encouraged compatibility with OSS implementations. If essential patents remain under royalty-bearing FRAND terms, OSS actors may find it difficult or impossible to contribute reference implementations—potentially limiting the breadth of uptake and interoperability.

1 Baron, J., Cattaneo, G., & Renda, A., "Empirical Assessment of Potential Challenges in SEP Licensing," 2023, University of Edinburgh / European research project. The authors identify HEVC licensing as a typical illustration of "cumulative complexity" in SEP regimes, citing fragmented ownership, overlapping SEP portfolios, royalty stacking, and uncertainty over essentiality as barriers — particularly for open source or small-scale implementers; European Commission, "Q&A: Commission proposal on SEPs," Press Corner, 2023. In its explanation, the Commission acknowledges that in practice the SEP regime may give rise to **licensing difficulties**, including lack of transparency over essential patents and uncertainty in enforcement.

4. A Way Forward: Collaborative Models

The Böhm and Blind (2019) study offers the most detailed examination of how open source and standards development can interact. It identifies three patterns: specification-first, implementation-first, and a parallel approach in which specification and OSS implementation evolve together.

That research finds the parallel model can shorten development cycles and improve quality because OSS projects often serve as reference implementations, allowing early testing of draft specifications. According to the study, collaboration tends to be most effective where stakeholders overlap between the SDO and the OSS project and where IPR arrangements are transparent and largely royalty-free. Positive experiences have been reported in areas such as cloud computing and IoT.

Conversely, the report notes that when large SEP holders insist on royalty-bearing FRAND licences, OSS contributors are often discouraged from participating, and cooperation tends to fail. These findings suggest that "freedom to operate", predictable governance and aligned incentives are key pre-conditions for successful collaboration.

5. Policy Challenges and Strategic Implications

The European Commission's 2023 proposal for a Regulation on SEPs (COM 2023/0133), which was later withdrawn, sought primarily to improve transparency in royalty determination and allocation among SEP holders. The interviewees for this case study welcomed the original proposal as a step towards greater legal certainty, though stated that it does not directly address the incompatibility between royalty-bearing FRAND licences and OSS-based implementations.

The Malamud ruling of the Court of Justice (C-588/21 P, March 2024)—requiring that harmonised standards cited in EU law be made publicly accessible—signals a broader expectation of openness and has prompted discussion among experts about whether similar principles could in the future affect access to essential patents, though opinions remain divided on that point.

Further challenges relate to governance and financing. The European Standardisation Strategy calls for SDOs to become faster and more inclusive, yet several SDOs continue to depend on income from licensing or sales of standards documents. Moving towards royalty-free, OSS-compatible licensing models would possibly require alternative funding arrangements and closer links between SDO processes and collaborative software development.

Stakeholders looking at this tension from an open source perspective tend to believe that without reforms Europe risks slower uptake of standards, reduced participation by SMEs and OSS communities, and continued dependence on non-European SEP holders. Others underline that any shift away from FRAND royalties would need to safeguard incentives for patent-driven research investment. The debate therefore reflects divergent assessments of how best to balance innovation incentives with open implementation.

6. Conclusion

This case study has aimed to highlight a core structural tension in the European ICT-standards landscape: the continued reliance on SEP-based FRAND licensing, which evolved for hardware-oriented industries, versus the royalty-free, collaborative OSS model that has become central to much modern ICT development.

Rather than prescribing a solution, the case points to several avenues for further exploration—for example, more flexible SEP regimes, clearer governance rules, hybrid OSS–SDO development models, or alternative funding approaches for SDOs. How to strike the appropriate balance between the rights of patent holders and the need for open, implementable standards remains an open and actively debated policy question.

standICT.2026.eu

ICT Standardisation Observatory and Support Facility in Europe

Disclaimer

This case study has been developed for informational purposes only and does not represent any official position of the European Commission. It is part of a broader series of case studies launched under StandICT.eu to explore emerging challenges and developments in the ICT standardisation landscape. The series aims to stimulate critical reflection and discussion among stakeholders on topics of strategic relevance to the European and global standardisation ecosystem. The views expressed are those of the authors and interviewees and do not necessarily reflect the views of the European Commission, any SDOs or any affiliated organisation.

Funded by
the European Union