Methodologies for FRAND determination: evidence from global case law

A survey of court cases around the world involving the determination and assessment of fair, reasonable and non-discriminatory (FRAND) terms and conditions for the licensing of standard-essential patents

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Executive Summary

Europäisches Patentamt
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In collaboration with
BRELA

Foreword

Technology standards are drivers of the digital economy and economic progress. The patent system plays a key role in standardisation by incentivising the research and development needed to bring the best technical solutions into standards. A balanced framework for licensing standard-essential patents (SEPs), one that rewards investment in high-quality technical solutions while ensuring that implementers can access standards on fair terms, is essential to strengthening Europe's competitiveness.

Fair, reasonable and non-discriminatory (FRAND) licensing commitments are designed to preserve this balance. However, FRAND commitments do not prescribe a fixed royalty rate, and most SDOs deliberately refrain from providing a more specific definition. This flexibility has the advantage of allowing licensing terms to reflect the circumstances of each case, but it can also give rise to disagreements over what constitutes FRAND terms and conditions. Such disagreements may prolong negotiations and, in some cases, lead to litigation. Greater clarity regarding how FRAND rates are determined is therefore valuable for SEP holders, implementers, courts, competition authorities and policymakers.

The Patents and standards programme at the EPO Observatory on Patents and Technology, aims to improve transparency and predictability in the relationship between patents and standards. Following the publication of "Standards and the European patent system" and the launch of the Patents Standard Explorer, the present study turns to the licensing of standard-essential patents. It examines how courts around the world determine FRAND terms based on the most comprehensive global corpus of judicial FRAND determinations compiled to date. This study, prepared in collaboration with BRELA, sets out to make that information more accessible to the broader community. It does not advocate for any particular methodology; rather, it seeks to describe how courts have approached FRAND determinations in practice.

The study shows that, despite differences in legal frameworks, courts share a common understanding of FRAND as a mechanism to balance fair compensation for patent owners with broad access to standards for implementers. It also shows that FRAND case law is moving from defining licensing conditions in the abstract to applying them through concrete methodologies. Comparable licences have emerged as the main method relied on by courts, while the top-down approach is used less frequently and often as a cross-check. Both approaches raise implementation challenges, from selecting and adjusting complex agreements to determining aggregate royalty rates and apportioning them to the relevant portfolio. Patent data is central to both methodologies, although several indicators remain contested. Future work under the Patents and standards programme will continue to support users of the system by improving access to relevant information and analytical tools.

This project was carried out in collaboration with 17 national patent offices across Europe: Austria, Belgium, Bulgaria, Croatia, Czech Republic, Finland, France, Germany, Italy, Latvia, Luxembourg, the Netherlands, Portugal, Spain, Sweden, Türkiye and the United Kingdom. We look forward to continuing this fruitful co-operation as we expand our efforts to improve knowledge and tools at the intersection of patents, standards and innovation.

Executive summary

Technology standards underpin much of the modern digital economy, enabling interoperability across connectivity and multimedia technologies such as 5G, Wi-Fi and the major video codecs. These standards routinely incorporate patented inventions since patents provide the incentive to invest in the research and development on which standards depend. This creates an inherent tension between rewarding that innovation and ensuring the widest possible access to the resulting standard. To preserve this balance, standards development organisations (SDOs) require participants to commit to licensing their standard-essential patents (SEPs) on fair, reasonable and non-discriminatory (FRAND) terms.

The FRAND commitment, however, does not prescribe a single fixed royalty rate, and most SDO policies deliberately refrain from providing a more specific interpretation of FRAND. The lack of a specific definition of FRAND allows for a range of permissible outcomes depending on the circumstances of the case. Because the content of FRAND is left undetermined, SEP holders and implementers disagree on occasion over what terms a given licence should carry. Such disagreement raises the cost of licensing by prolonging negotiations and, when bilateral negotiation fails, it can escalate into litigation. Greater clarity on how FRAND terms are determined may therefore be of considerable benefit to all parties by reducing both the duration and the cost of reaching agreement.

The meaning of FRAND has been concretised over time through court decisions, scholarship and policy guidance. A substantial body of literature has reviewed these contributions, explaining why FRAND matters and identifying the methods courts tend to favour. Nevertheless, important gaps remain. Existing reviews often cover selected decisions rather than a comprehensive and consistently assembled corpus of case law. Therefore, there is a lack of evidence showing how consistently methods are applied across decisions and how robust the underlying data and indicators are. Furthermore, existing reviews rarely examine how patent data is used to apportion value, scale between portfolios and unpack existing licences. Such uses of patents data (which are not limited to any specific methodology for the determination of FRAND rates) have important implications for the reliability of FRAND determinations.

This study intends to fill these gaps. It assembles the most comprehensive global corpus of judicial FRAND determinations to date and covers 65 court documents across seven jurisdictions. It analyses this corpus systematically to identify the methodologies that courts use, the principles and frameworks within which they operate, and the points of convergence and divergence across jurisdictions. It pays particular attention to how these methodologies are applied in practice and to the role of patent data within them. The study examines how essentiality, validity and patent valuation are used in apportionment, scaling and the unpacking of comparable licences. The goal of the study is empirical and descriptive – it presents the methodologies that courts have adopted in different cases and analyses the challenges and issues of different approaches, but it does not seek to draw legal conclusions on the current status of the case law of any individual jurisdiction.

The study forms part of the EPO's "Patents and standards" programme run under its Observatory on Patents and Technology, which aims to improve transparency regarding the relationship between patents and standards. The programme pursues dialogue with a broad range of stakeholders, including SEP implementers, SEP holders, licensing pools and standard development organisations. This study arises from that context and has benefited from that exchange. Prior initiatives within the programme include the 2025 study "Standards and the European patent system" and the Patent standards explorer.

Key findings

1 The study assembles the most comprehensive global corpus of judicial FRAND determinations to date, spanning 65 court decisions across seven jurisdictions.

To map how courts worldwide determine FRAND terms, the study collates 65 court decisions, including different types of court orders and guidelines, across seven jurisdictions into three categories. The first category comprises cases in which a court itself sets a FRAND rate. This category includes 20 cases and 33 reasoned decisions, counting first-instance and appeal decisions separately when the rate-setting analysis appears at both stages. For this category, the collection aims to be exhaustive, with a cut-off date of March 2026. The second category, which accounts for 19 decisions, covers FRAND rate assessments, i.e. decisions on whether a given rate or offer is FRAND. The third contains 13 documents on the admissibility of specific methods, mainly US court decisions on *Daubert motions*, as well as court guidelines from other jurisdictions. The second and third categories represent a non-comprehensive sample of decisions that is intended to illustrate a broad range of methodological aspects of FRAND rate determinations and assessments, but does not purport to be representative of the overall population.

Over the past thirteen years, the number of FRAND rate determinations per year has fluctuated between zero and six, with no clear trend in volume. The geographic composition, however, has shifted markedly: the United States and Japan led rate-setting between 2013 and 2015, whereas China, the United Kingdom and, more recently, India have become the leading venues over the last decade. The decline in US determinations after 2017 partly reflects the prevalence of jury trials in the US, which fall outside the corpus but is captured in the larger set of US *Daubert motions* in the third category. FRAND rate assessments are heavily concentrated in the European Union, and particularly Germany, which has emerged as the principal forum for assessing the FRAND character of licensing offers in the context of SEP injunction litigation under EU competition law, joined in the most recent years by the UPC.

Table E1

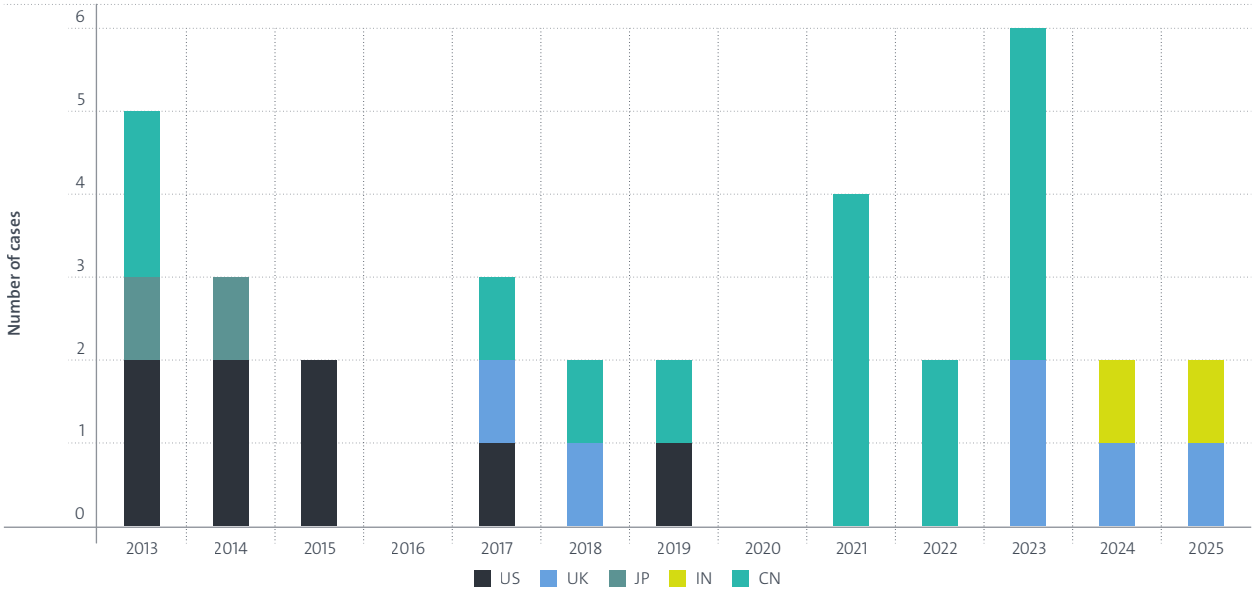
Composition of the corpus of court documents on FRAND

Category	What the court does	Cases	Decisions/ documents
FRAND rate determinations	Sets a FRAND rate	20	33 decisions
FRAND rate assessments	Decides whether a given rate is FRAND or within a FRAND range	16	19 decisions
Admissibility of FRAND determination methods	Rules on whether a method may be used to determine a FRAND rate	n/a	13 decisions
Total			**65 decisions**

Notes: the corpus combines three distinct categories of court decisions. A "case" refers to a distinct dispute between identified parties and "decision" refers to a court ruling within that case (first instance or appeal). The collection of FRAND rate determinations is intended to be exhaustive, with a cut-off date of March 2026. The collections of FRAND rate assessments and admissibility decisions are not exhaustive but are intended to be representative of the breadth of relevant scenarios. The category of admissibility decisions combines US Daubert rulings with a smaller, heterogeneous set of court orders and guidelines from other jurisdictions. Selection criteria, including the sampling filters applied, are set out in Box 1.

Figure E1

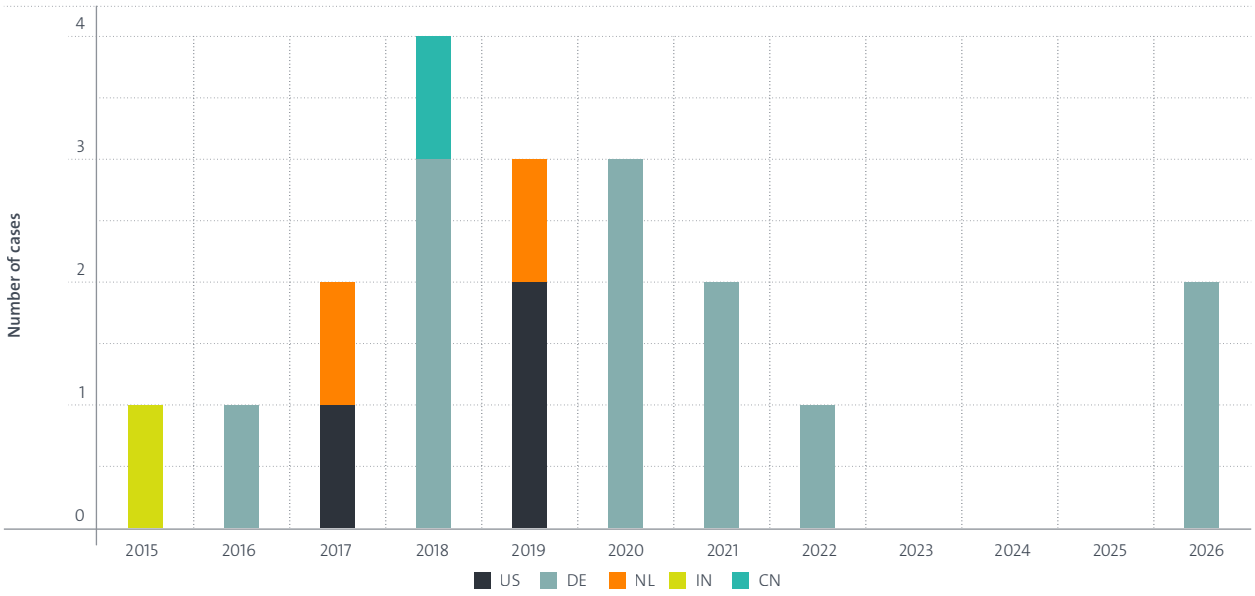
Yearly distribution of FRAND determination decisions by jurisdiction



Note: Based on the sample of 33 FRAND rate determination decisions listed in Table 2, which aim to represent the entire available corpus up to March 2026.

Figure E2

Yearly distribution of FRAND assessment decisions by jurisdiction



Note: Based on the sample of 19 FRAND rate assessment decisions listed in Table 3. This sample is non-exhaustive and does not represent all the case law on FRAND rate assessments.

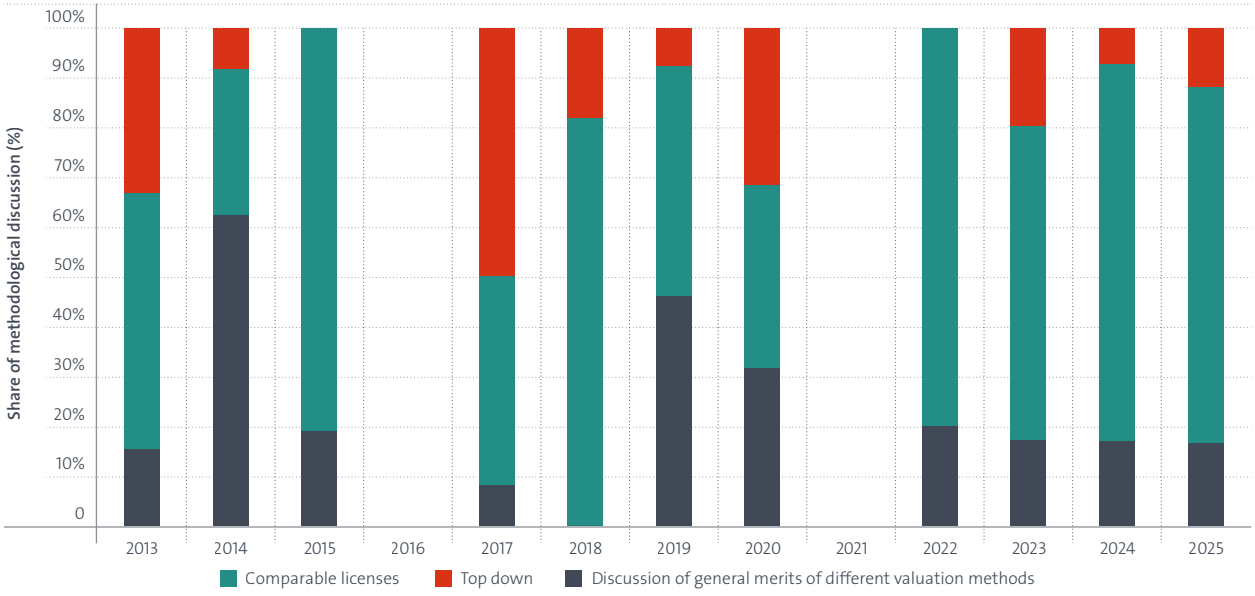
2 Despite operating under different legal frameworks, courts across jurisdictions have converged on a common purpose for FRAND and a shared conceptual framework, and the focus has shifted from defining FRAND to applying it.

Under contract law in the US and UK, competition law in the EU, and a mix of contract and antitrust grounds in China, courts articulate the same underlying purpose: FRAND must allow for a fair reward for the patent owner while ensuring the widest possible adoption of the standard. This balance appears in materially equivalent terms in *Huawei v. ZTE* (CJEU), *Unwired Planet v. Huawei* and *InterDigital v. Lenovo* (UK), *Microsoft v. Motorola* (US), *Huawei v. InterDigital* (China) and *Ericsson v. Lava* (India). Courts in the US have also converged on the hypothetical-negotiation construct, which is adapted to FRAND through the modified *Georgia-Pacific* analysis in *Microsoft v. Motorola* and *In re Innovatio*, and expressed in the analytically equivalent willing-licensor / willing-licensee test in the UK. A further point of alignment is the rejection of a *most-favoured-licensee* reading of the non-discrimination prong of FRAND in the United Kingdom, the United States and Germany.

The framing has also evolved over time. The earliest determinations treated FRAND principally as a safeguard against hold-up and royalty stacking, thus anchoring the rate in the patented technology's ex ante value. Later US decisions qualified this, holding that hold-up cannot be presumed and must be evidenced (*Ericsson v. D-Link*, *CSIRO v. Cisco*), while the CJEU and subsequent decisions from national courts in the EU, as well as UK courts placed hold-up and hold-out on the same footing as co-equal "mischiefs" (*Unwired Planet v. Huawei*, Supreme Court). Reflecting this, the centre of gravity in the case law has moved from a definitional phase – dominated in 2013–2015 by discussions of FRAND principles – to a methodological phase in which the application of FRAND through comparable-licence analysis (and, to a lesser extent, top-down) dominates from 2022 onward.

Figure E3

Changing focus of FRAND valuation analysis over time



Note: Share of snippets that focus on a given methodological discussion (comparable licences, top-down, and general discussion of valuation methods) by year. Based on 1 095 snippets containing information on methodological discussions, collected from 19 FRAND rate-determination decisions across 14 cases. The six FRAND determinations from China are excluded from the analysis because no publicly available documents providing the necessary information could be identified.

3 Two methodologies dominate FRAND rate determinations – comparable licences and the top-down approach – with comparable licences emerging as the primary method in most cases and top-down used mainly as a cross-check.

Of the 19 decisions for which the primary methodology can be classified, comparable licences are the primary methodology in 13, the top-down approach in five, and in one case both have been applied in parallel (*Oppo v. Nokia*). The comparable-licences approach derives the FRAND rate from real-world agreements concluded between similarly situated parties on the rationale that such agreements reflect how the market actually prices the patents.

The top-down approach is used as a secondary cross-check or as the primary method mostly where suitable comparables were unavailable or unreliable (*Huawei v. Conversant*; *In re Innovatio*; *Samsung v. Apple*; *Siemens v. Xiaomi*); in *TCL v. Ericsson*, the court applied top-down for the 'fair and reasonable' prong while relying on comparable licences for non-discrimination. The top-down approach proceeds in two stages: first, it fixes an aggregate royalty rate for all SEPs reading on the standard, and then it apportions a share of that aggregate to the patentee's portfolio.

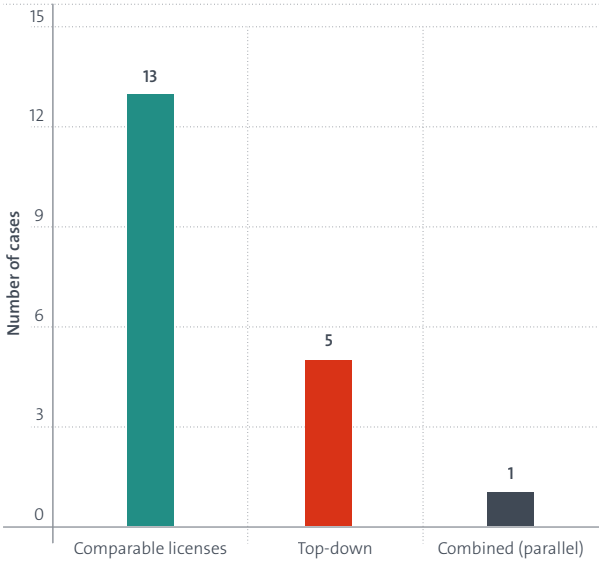
A few decisions combine the two, either as a mutual check (*Unwired Planet v. Huawei*; *TCL v. Ericsson*) or in parallel for different parts of the dispute (*Oppo v. Nokia*: top-down for the 5G single-mode rate, comparables for 4G).

Other methods discussed in the literature – bottom-up and cost-based approaches and theoretical benchmarks such as the Shapley value – have gained no traction in the case law and have at times been explicitly rejected as unsuitable.

Similar to FRAND rate determinations, FRAND rate assessments also primarily rely on comparables with top-down being the second most often used method, with 9 cases relying on comparables as the primary methodology and only four on top-down.

Figure E4

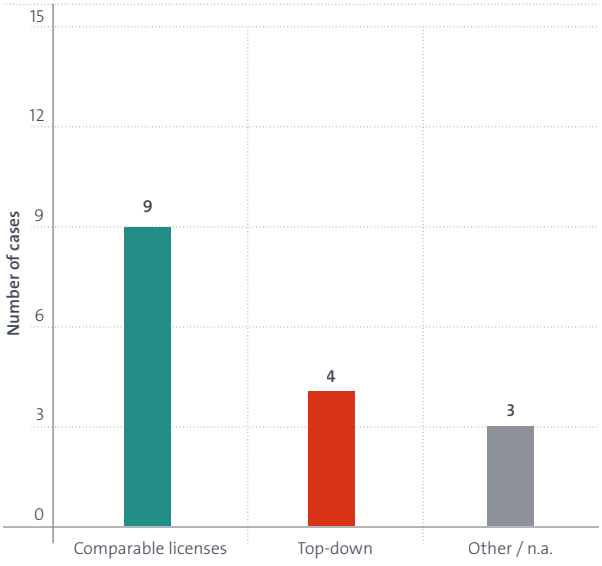
Primary methodology for FRAND rate determinations



Note: Based on the 19 FRAND rate determination cases in which the decision explicitly sets out the methodology applied. *Oppo v. Nokia* applies both methods in parallel, using a top-down approach for the 5G single-mode rate and comparable licences for 4G. Spreadtrum v. ASR is excluded because the available information does not specify how the damages or rate were calculated, although it identifies the case as one concerning patent infringement damages. In a few decisions, courts rely on comparable licences as the primary method and use a top-down approach as a cross-check, or vice versa

Figure E5

Primary methodology in FRAND rate assessments



Note: Based on the 16 FRAND rate assessment cases. Wilus v. ASUSTeK is classified as top-down because that approach was used to assess the SEP holder's offer, which was the primary subject of the assessment while comparable licences were considered separately to evaluate the implementer's counteroffer. The "Other/n.a." category includes Intellectual Ventures v. Telefónica and GE/Access Advance v. Vestel, both of which were decided on the basis of specific substantive defects in the licensing offers rather than a rate methodology, as well as Nokia v. Daimler, which settled before any FRAND methodology was applied.

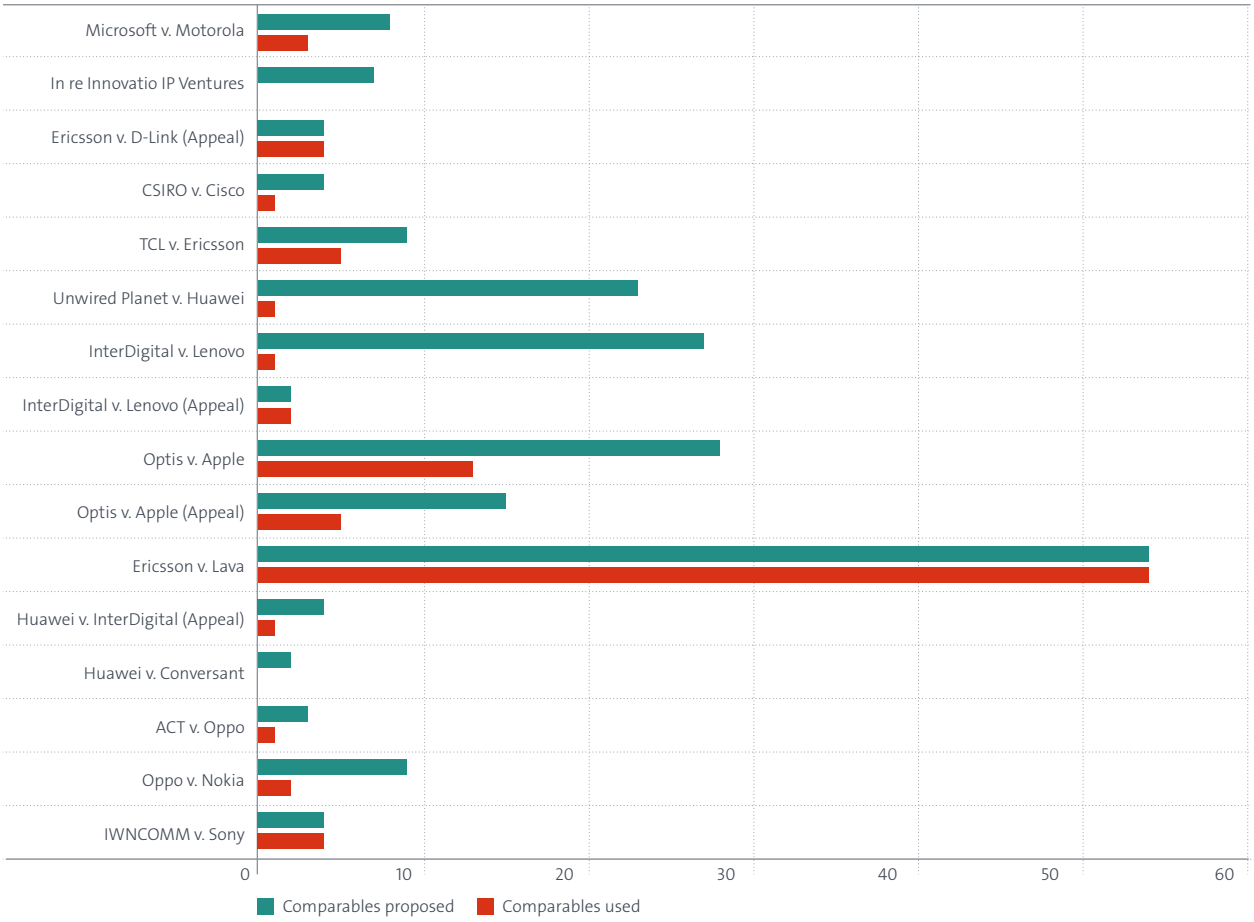
4 Case law has gradually refined the methodology for the main steps of the comparable licences approach: selection, unpacking and adjustments.

While comparable licences are the most commonly used starting point for FRAND rate determinations, courts are presented with many more proposed comparables than they ultimately accept as truly comparable. Across the surveyed cases, the number of proposed comparables ranges from 2 to 54, and three sets of challenges recur. The first is selection: courts must assess whether a proposed licence covers sufficiently similar technology, parties, scope and time period and whether it is itself untainted by hold-up or hold-out. Second is unpacking: when the comparable is a lump-sum agreement, a cross-licence, or a licence to a larger portfolio, the effective rate is not directly observed and must be recovered through net-present-value calculations, portfolio-strength ratios and apportionment across standards. Courts have generally held that the fact that a licence requires unpacking does not mean that the licence must or can be excluded from a comparable licences analysis. The third is adjustments: when only comparables involving different portfolios exist, courts must adjust for differences in relative portfolio value; when the only existing comparable licences are affected by non-FRAND factors, these factors must be accounted for in order to derive a FRAND rate.

Each step rests on significant assumptions that are a frequent source of disagreement between expert witnesses and between first-instance and appeal courts.

Figure E6

Number of licences proposed and accepted as comparables



Note: Based on 16 FRAND rate determination decisions for which the full document is publicly available and thus provides data about the comparable licences proposed and used.

5 The top-down approach combines the determination of an aggregate royalty rate with an apportionment that usually relies on patent counting. Patent counting is subject to known limitations, which new datasets may help address.

The top-down approach derives a FRAND rate in two steps: first, it establishes an aggregate royalty rate (ARR) representing the total royalty burden for all SEPs reading on the standard; second, it apportions a share of that aggregate to the portfolio at issue. Both steps are methodologically contested.

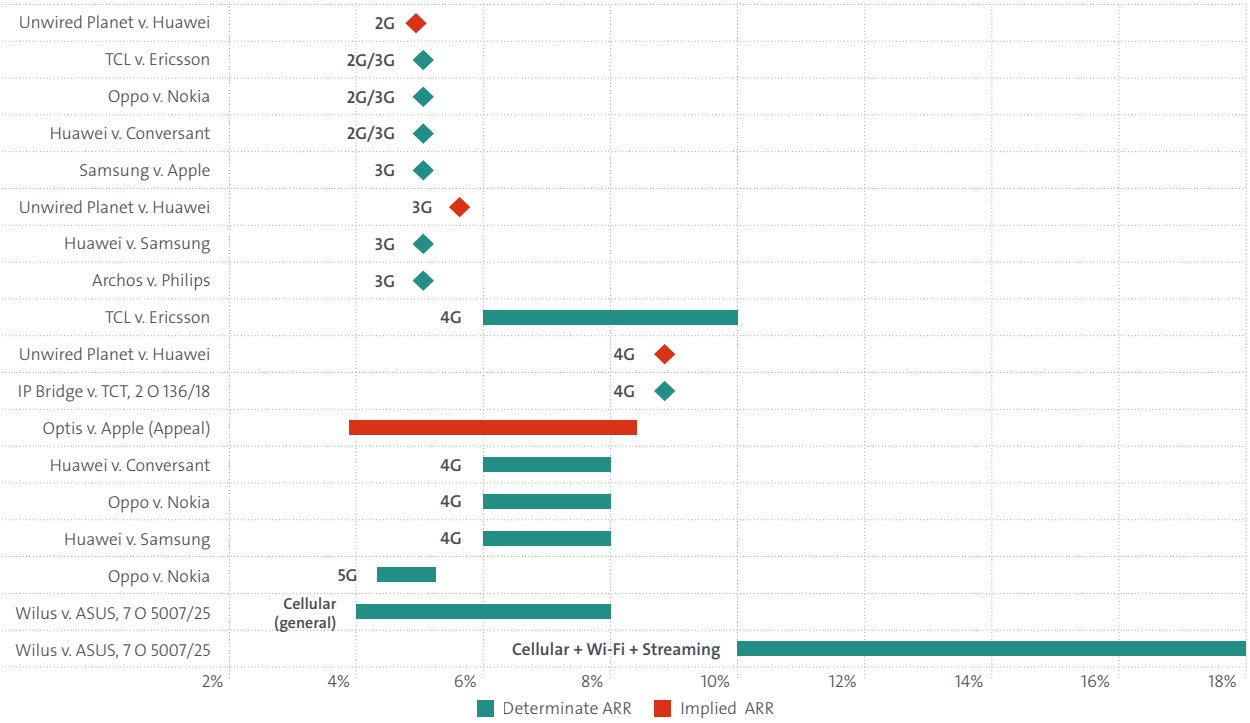
For the ARR, courts have relied on four main sources: public statements by SEP holders; rates accepted in earlier court decisions; calculations based on the available profit margin in the smallest saleable patent-practising unit (SSPPU); and hedonic regression models estimating the standard's incremental contribution to device value. No single approach governs. The 5% figure for 3G and the 6–10% range for 4G that recur across US, UK, Chinese and German decisions owe their persistence largely to cross-referencing of earlier decisions rather than independent re-derivation, raising questions about the robustness of the apparent convergence.

Apportionment is the more contested of the two steps. It relies primarily on patent counting, and courts have consistently cautioned that *"mere patent counting and dividing is not enough."* The specific challenges that patent counting raises in this and other contexts are addressed in the next key finding.

The top-down approach also lacks a uniform methodological status across jurisdictions. US and Chinese courts have used it as a primary rate-setting method, while UK and German courts have generally confined it to a cross-check role. Across all jurisdictions, courts broadly acknowledge that top-down analysis can be informative while also recognising its methodological vulnerabilities.

Figure E7

ARRs set in each court decision across the different technologies



Note: The figure is based on the 19 ARRs found across the case law and listed in Table 8. *In re Innovatio* is excluded for visualisation purposes because it is the only decision in the sample that reports a per-unit royalty.

6 Patent data plays a central but contested role in FRAND determinations; the limitations of current patent-counting approaches represent an open methodological gap that improved datasets can help address.

Patent portfolio strength assessments pervade FRAND determinations. They arise not only in the apportionment step of the top-down approach but also in the scaling of comparable licences across portfolios, in the unpacking of cross-licences using portfolio strength ratios, and in adjustments to account for portfolio changes over time. These use cases cut across both main methodologies and share common methodological challenges.

Courts have generally favoured patent counts over contribution counts, on the grounds that patent data tracks actual legal rights and can reflect portfolio changes resulting from transfers, expirations and acquisitions. However, courts have also consistently cautioned that *"mere patent counting and dividing is not enough."* The principal challenges that recur are: the gap between declared and truly essential SEPs, which can be large and non-uniform across licensors; the treatment of pending applications and expired patents, on which case law diverges; and the absence of a universally accepted method for incorporating validity considerations into portfolio assessments.

Beyond these specific issues, the case law illustrates that patent counts are widely used because they are objective and manageable, not because courts consider them fully satisfactory. A spectrum of approaches exists, from purely quantitative declared-patent counts to more refined exercises incorporating essentiality screening, validity adjustments, family deduplication and technical evaluation. Indicators of individual patent value — forward citations, family size, timing and technical evaluation — have been explored but none has been accepted as a comprehensive or universal measure. This methodological gap is widely recognised but largely unresolved in existing case law.

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