UK intervention on SEPs including rate setting swims against the tide

Proposals in the UK IPO's Consultation on SEPs would increase bureaucracy and administrative burdens on the standard-essential technology innovators the UK relies on to provide economic growth the nation desperately needs right now. These prospective new demands are contrary to latest government policy. Under the headline "Reeves vows to abolish more regulators" a Financial Times article on 11th September 2025 stated:

> "Rachel Reeves has pledged to "take out more regulators" and slash the red tape the chancellor said was hampering government efforts to boost growth.
>
> Reeves told an audience of private equity professionals yesterday that she wanted to make it easier for businesses to build and grow, and renewed her attack on regulators.
>
> The chancellor and Prime Minister Sir Keir Starmer have blamed excessive bureaucracy and regulation for holding back the economic growth they want to encourage".[1]

While "the chancellor announced an audit of the country's 130 or so regulators in February, promising to look at whether some should be scrapped", these pronouncements also beg the question whether agencies in general should be reducing rather than increasing their interventions including price setting?

In addition to the EU abandoning its proposed SEP regulation including essentiality checking and rate setting requirements, the US has also eschewed FRAND rate-setting regulation and stipulation of rote valuation methods by withdrawing guidance from government agencies including the US Patent and Trademark Office (USPTO), National Institute of Standards and Technology (NIST) and Department of Justice (DoJ), while proposed law-making for this has not proceeded. Following a couple of months' public consultation on a draft Policy Statement issued December 2021,[2] in June 2022 the USPTO, NIST and DoJ formally withdrew their joint 2019 Policy Statement on SEPs while also indicating that the 2013 Policy Statement was not being reinstated.[3] These agencies decided that the courts were best placed in furthering "the interests of innovation and competition" in SEPs and FRAND licensing, "and as enforced by DoJ and other agencies," without any of these three policies.[4] The May 2022 draft US Standard Essential Royalty Act (SERA) including proposed creation of a US judicial tribunal, to be known as the "Standards Royalty Court," to determine FRAND rates for US SEPs went nowhere.[5]

Some of the UK IPO's proposals on SEPs are unworkable and benefits are unclear. For example, while it might be claimed that centralised rate setting for an entirely new Internet of Things (IoT) application would provide clarity and predictability, such rates would be

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[1] Reeves vows to abolish more regulators, https://ft.pressreader.com/v99c/20250911/281522232228129

[2] U.S. Dep't of Just., Draft Policy Statement on Licensing Negotiations and Negotiations and Remedies for Standards-Essential Patents Subject to Voluntary F/RAND Commitments (Dec. 6, 2021).

[3] U.S. Dep't of Just., Withdrawal of 2019 Policy Statement on Remedies for Standards-Essential Patents Subject to Voluntary F/RAND Commitments (June 8, 2022).

[4] *Id.* at 1-2.

[5] Standard Essential Royalties Act (Proposed Legislation), SENATE JUDICIARY COMMITTEE (2022).

unhinged from the uncertain prospective market values that innovators and implementers are best placed to assess and agree in discussion and negotiation.

Standard-essential technologies such as 5G, WiFi and HEVC/H.265 video streaming are developed at great expense by many different companies in anticipation that the fruits of these will be very widely shared by being included in numerous products and services. The UK with its rich history in R&D should aim to be an attractive environment for standard-essential technology development — in company labs and in standard-setting organizations such as 3GPP, IEEE and ITU-T— as well as in the implementation and ultimate use of those technologies by all comers including application developers, manufacturers, systems integrators and end users.

With most of the world's population using mobile phones to call and connect to the Internet and with most connected cars licensed for 4G or 5G there is no evidence of market failure in market-based pricing of SEP royalty rates. To the contrary, established licensing incentivises innovation and has brought success throughout the ecosystem including implementers and to consumers with such widespread adoption.[6] Undermining this would harm licensors with research and development of SEP technologies in the US, the UK and elsewhere in Europe. The result would be a massive transfer of wealth, principally to Asian manufacturers and would be a substantial setback for future innovation including upcoming standards such as 6G in the emerging IoT.

The consultation focuses on SMEs, but these are rarely pursued for SEP royalties. Prospective licensing fees are typically too small to make it worthwhile for patent owners.

This consultation raises numerous issues, including many of which I am familiar with from my 30 years in telecommunications, SEPs and FRAND licensing including the determination of royalty rates in consideration of other terms. However, my Consultation response concentrates mostly on patent counting, essentiality checking and rate determination, which have been an expert focus of mine as a mobile communications industry analyst, consultant and testifying witness in the courts, arbitrations and antitrust investigations around the world over this period.

My Consultation response is largely based on my:

- Empirical research on essentiality checking and patent counting studies with some hitherto unpublished updates;
- Insights on comparable license "unpacking"; and
- Analysis of aggregate royalties and top-down approach rate setting from my 2024 research paper entitled *Discovering or Setting Royalties and FRAND Rates for SEP Portfolios.*[7]

The latter was published in the George Mason University Antonin Scalia Law School Journal of Law, Economics & Policy and cited along with some of my previous research in the

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[6] Keith Mallinson, *Don't Fix What Isn't Broken: The Extraordinary Record of Innovation and Success in the Cellular Industry Under Existing Licensing Practices*, 23 GEORGE MASON L. REV. 967 (July 2016) https://wiseharbor.wpenginepowered.com/wp-content/uploads/2016/12/Mallinson-FINAL.pdf

[7] Keith Mallinson, Discovering or Setting Aggregate Royalties and FRAND Rates for SEP Portfolios? 19 J.L. ECON. & POL'Y 1 (2024), at pages 92 and 127. Available at SSRN: https://ssrn.com/abstract=4667656

UK IPO's report on *Rate-setting for Standard-Essential Patents — International evidence and analysis.*

My response to this Consultation is focused on selected issues

38. Evidence suggests that only about 25-40% of all declared SEPs are truly essential to a given standard.

That most patents, for example, declared to ETSI as potentially essential are not actually essential is unsurprising and should be expected. Several commercial studies estimate overall essentiality rates (i.e. the average including all patent owners) in this range.[8] A meta-study by economic consulting firm Charles River Associates (CRA) shows significant variation in estimates with some studies indicating significantly lower rates.[9] Two studies included in the meta-study estimate that less than 10% of 5G declared patents are truly essential.[10] Other estimates not included in the meta-study are for rates across and above this range, in some cases exceeding 50%. Some studies are not available publicly and can only be obtained for purchase — typically on subscription.

It's a feature not a bug of the declaration system as it was originally conceived that many declared patents are not actually essential. The purpose of a declaration is to ensure the applicable standard is not blocked by patents that are essential and that declared standard-essential patents are pledged for licensing on Fair, Reasonable and Non-Discriminatory (FRAND) terms. Standard specifications can change significantly in the standard-setting process. Claims change in patent prosecution. Whether or not a declared patent ends up being essential depends significantly on those developments. Patent owners reasonably declare copiously to minimise the risk they have not declared patents that end up being essential because this could prevent them from being entitled to FRAND royalties for such patents. There is reportedly also significant "over-declaration" as some patent owners seek to game the system of patent counting that arose as a bi-product of patent declarations with the construction of declared patent databases such as ETSI's IPR database — even though patent counting was never the purpose of such databases.

88. There are growing numbers of commercial services, but these generally operate on a subscription basis. However, there is some evidence that for smaller businesses these services may not be affordable. We would like to understand the cost of services, the methodologies used to assess essentiality, and the accuracy of essentiality determinations.

Commercial essentiality checking and patent counting studies are inaccurate and unreliable. With disparities in results among different studies it is impossible to say with confidence which, if any, can be relied upon. I've shown this in my previous published research on 4G studies. My investigations on 5G studies indicate that major shortcomings persist and in some

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[8] Cyber Creative 5G patent essentiality studies, indicating overall essentiality rates of 33% (2001), 33% (2022), 36% (2023) and 38% (2024); https://www.cybersoken.com/en/topics/.

[9] A Critical Review of 5G SEP Studies, CRA November 2022 also indicating overall 5G essentiality rates of 9% by Unified, 10-15% by IPlytics, 22% by Clarivate and 27% by GreyB https://media.crai.com/wp-content/uploads/2022/11/09132755/Critical-Review-of-5G-SEP-Studies_Nov-2022.pdf

[10] Survey of Mobile Cellular 5G Essentiality Rate, by David Cooper, Johanna Dwyer and Alexander Haimovic, February 2021 https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3771397. 3GPP RAN Landscape Methodologies: A Closer Look at 4G and 5G the Unified Patents team https://support.unifiedpatents.com/hc/en-us/articles/4415793634711-3GPP-RAN-Landscape-Methodologies-A-Closer-Look-at-4G-and-5G

respects have deteriorated, despite some improvements. For example, the exponential increase in numbers of declared patents makes it more difficult and more costly to check sufficient numbers of patents thoroughly and accurately enough to estimate essentiality rates reliably. Improvements in most recent years include better identification and counting of declared patents.

Differing overall essentiality rates indicate bias

That estimates of the overall 5G essentiality rate vary so very widely troublingly indicates major inconsistencies and inaccuracies in essentiality checking. As indicated above, even within 5G, estimates for the overall essentiality rate range from as low as 8% to in excess of 50% among different commercial patent counting and essentiality checking studies.

This more than six-fold wide variation in estimated overall essentiality rates indicates huge and remarkable disagreement. It reveals severe bias — including extreme leniency by some or extreme conservatism by others in their essentiality determinations. Most of these assessments must, therefore, be defective. There is no way of knowing for sure which, if any, studies are getting it right, doing it best or are most accurate. There is no gold standard for the essentiality rate of any standard, which would require the checking of many patents in its determination. Checking essentiality does not have the precision and administrative simplicity of using references such as the Oxford English Dictionary in marking a school pupil's spelling test. Court determinations of essentiality are only for very small numbers of patents that are non-randomly selected from portfolios. Patentees in litigation will typically choose patents to assert from among their strongest. Consequently, these determinations cannot be regarded as representative of a patent owner's entire portfolio or of the entire patent universe and so they are not informative of any company's essentiality rate, let alone of overall essentiality rates.

These wide differences in estimates of a standard's overall essentiality rate cannot be explained away as resulting from random errors due to sampling. In the calculation of overall essentiality rates, sample sizes are relatively large because samples from each patent owner are all combined. For example, with a sample size of 200 patents in total, Cooper, Dwyer and Haimovic (CDH) estimated 8% overall 5G essentiality has an additive random sampling error of ±3.75% (i.e. from 4.2% to 11.8%) at the 95% confidence interval level.[11] There is an infinitesimally small probability that this 8% figure only differs from, say 20%, let alone from, 30%, 40% or 50%, due to random chance in patent sampling. In addition, I have much more to say about the major inaccuracies and differences among studies that can also arise in estimates of essentiality rates for individual patent holders due to sampling and determination errors. I'll come onto that subsequently.

Might overall bias not matter if all patent owners were affected proportionately so that essentiality rankings were consistent? There is no evidence that all patent owners are affected

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[11] Survey of Mobile Cellular 5G Essentiality Rate, by David Cooper, Johanna Dwyer and Alexander Haimovic, February 2021, page 12 https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3771397; Essentiality Rate Inflation and Random Variability in SEP Counts with Sampling and Essentiality Checking for Top-Down FRAND Royalty Rate Setting, By Keith Mallinson, September 2021, https://www.wiseharbor.com/wp-content/uploads/2021/09/Perils-of-sampling-SEPs-Mallinson-30-Sept-2021.pdf at page 15

proportionately, and plenty of it that the bias in estimates of essentiality rate varies from patent owner to patent owner.

Bias is pernicious, arises in several different forms and affects essentiality rankings as well as the overall essentiality rate for each standard. Some study results are affected by prejudice in favour of the firms that pay for the studies. More subtle is bias arising from more diligent attention studies will give to their clients, versus non-clients, in selecting and counting their patents in the first place, as well as in checking their patents for essentiality. Some bias is passive. It simply arises systematically from an assessor's inability to determine essentiality accurately. Where true essentiality rates are below 50%, non-perfect determinations will tend to result in more false positives than false negatives. This biases upwards the essentiality rates found without assessors wilfully favouring one patent owner over another. And, of course, there's the bias that comes from being unduly exacting or unduly soft (e.g. giving the benefit of doubt) in making determinations.

Access is limited by paywalls

Some of these commercial patent counting studies are not generally accessible — even to some large firms, let alone to small firms that could never afford them — because some studies must be purchased and can be expensive. For example, PA Consulting sells multi-client studies. Other studies are available for free, but are typically sponsored by companies with interests in being shown most favourably in the patent counts and essentiality rate rankings. It is notable that one of the very first patent counting studies on 4G found that its sponsor, Nokia, led with more than 50% of the SEPs for that standard.[12] However, even multi-client studies can be prone to favouring their sponsors over non-clients. This can be bias by omission or neglect, as described above. Clients see the results of the studies, have the supplier's ear and better opportunities to correct errors and omissions than non-clients.

Major differences in patent counts before and after essentiality checking

Patent counts and essentiality rates for individual companies are considered in negotiations and other determinations (e.g. by the courts and in arbitrations) where royalty rates and other terms are in dispute.

Declared patent counts for the same company can differ wildly from one study to another, even before any essentiality checking. There are significant differences of opinion on criteria to apply when counting declared patents, and consequently there are inconsistencies in which patents are in fact counted in the landscape of declared patents. Indeed, it can sometimes not be clear which patents have been counted. Discrepancies between patent counts are, for example, in patent family definitions, which patent is selected as representative (e.g. based on language, publication date or other criteria), whether applications are included as well as granted patents, priority date range, how expired patents are dealt with, which standard releases are included, and how patents re-declared to a new standard are counted. There are also methodological differences including how to deal with duplications, and how patents are read from databases. Differences in timing between when the snapshot of declared patents is

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[12] Fairfield Resources International, 2010 ("study was funded by Nokia") https://www.wiseharbor.com/wp-content/uploads/2021/10/WiseHarborvaluingIP7Nov11pdf.pdf

taken can also make a big difference because the rate at which patents are declared is large and increasing.[13]

Wide differences in declaration counts are illustrated by comparing publicly available parts of IPlytics' 2022 and PA Consulting's 2023 studies. IPlytics counts INPADOC families and PA Consulting counts ETSI patent families with selection of a representative patent from among more jurisdictions by PA Consulting than IPlytics.

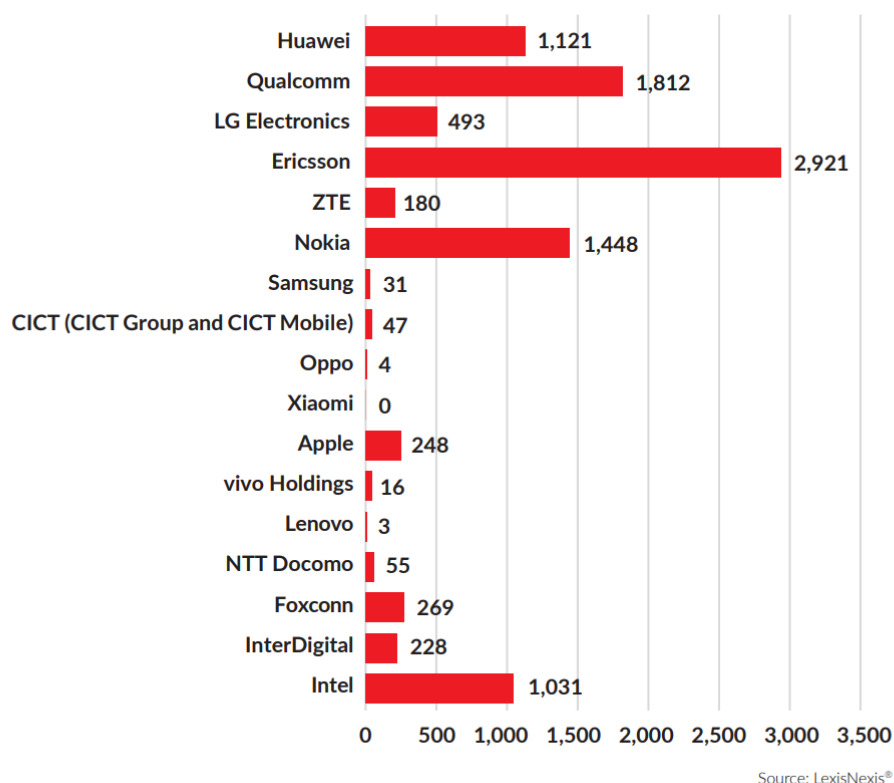## Even declared patent counts vary significantly between studies

Declaring company	IPlytics 2022 Declared 5G patent families (granted in either EPO or USPTO)	PA Consulting 2023 Declared families with a 5G grant in US / EP / CN / KR / JP	Multiple
Qualcomm	3,471	4,552	*1.31*
Huawei	3,886	7,284	*1.87*
BBK Electronics (ViVo, Oppo)	1,183	4,235	*3.58*
Ericsson	1,355	3,028	*2.23*
Samsung	3,228	4,034	*1.25*
Nokia	2,002	3,292	*1.64*
ZTE	801	3,448	*4.30*
LG	2,914	3,800	*1.30*
Intel	104	886	*8.52*
Xiaomi	256	1,289	*5.04*
Sharp	897	1,318	*1.47*
Apple	535	243	*0.45*
CATT / Datang	437	2,119	*4.85*
NTT Docomo	630	1,639	*2.60*
Interdigital	363	681	*1.88*
Lenovo	127	425	*3.35*
Subtotal	22,189	42,273	*1.91*

IPlytics (following its acquisition by LexisNexis) has recognised in its "Cellular Verified" remedial work that it has significantly undercounted declared 5G patent families. It corrects or at least mitigates some huge shortfalls, including 2,921 for Ericsson and 1,812 for Qualcomm in its public 2025 5G patent counting report.[14]

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[13] According to LexisNexis in 2025, the cumulative number of worldwide granted 5G declared patent families by year of first publication increased from 33,936 to 44,578 between 2022 and 2023 (a multiple of 1.31) https://www.lexisnexisip.com/wp-content/uploads/2025/01/2025-LexisNexis-5G-SEP-Report.pdf?hsCtaAttrib=185191375501

[14] Who is Leading the 5G Patent Race https://www.lexisnexisip.com/wp-content/uploads/2025/01/2025-LexisNexis-5G-SEP-Report.pdf?hsCtaAttrib=185191375501

The number of non-matched ETSI-declared patent families (INPADOC) based on unprocessed patent number declarations

Company	Value
Huawei	1,121
Qualcomm	1,812
LG Electronics	493
Ericsson	2,921
ZTE	180
Nokia	1,448
Samsung	31
CICT (CICT Group and CICT Mobile)	47
Oppo	4
Xiaomi	0
Apple	248
vivo Holdings	16
Lenovo	3
NTT Docomo	55
Foxconn	269
InterDigital	228
Intel	1,031

Source: LexisNexis®

Widely different essentiality rate determinations for the same companies

As I discovered in comparing the results of different 4G studies, different 5G studies are also in major disagreement on essentiality rates and counts of patents deemed to be essential. My previous research on 4G essentiality checking shows that studies in which assessors typically spend as little as 30 minutes per patent in determining essentiality are very inconsistent and therefore most of them must be inaccurate. They can't all be right.

Wide variations in shares of found-essential LTE patents among patent-counting studies

	Lowest Estimate	**Highest Estimate**	**Disparity**
Huawei	2.9%	23%	8x
LG	0.6%	17%	17x
Nokia	2.3%	54%	23x

Source: WiseHarbor, 2017[15]

As a testifying expert witness in *TCL v. Ericsson* I showed that different determinations on the same 59 patents were in significant disagreement. Two different experts — engaged on

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[15] Do not Count on Accuracy in Third-Party Patent-Essentiality Determinations, by Keith Mallinson, IP Fiance, May 2017 https://www.wiseharbor.com/wp-content/uploads/2017/05/Patent-Counting-article-for-IP-Finance-12-May-2017.pdf

behalf of TCL and working together — only agreed on 73% of their determinations for some patents among those at issue in that litigation. That's not as good as it might seem. If one of the experts had used only the flip of a coin to determine essentiality for each patent (e.g. heads = essential, tails = not essential) the expected proportion of agreements would be 50%. So, pure chance accounts for most of those determinations agreed by the two allied experts.

Analysis on 109 ETSI/3GPP 3G and 4G LTE declared patents in the 2020 EC Pilot Study and in a subsequent 2022 academic paper considered one set of assessments by patent pools to be the reference point for which patents were regarded truly essential and which were not.[16] An average of around eight hours were spent checking each patent. The studies found 74% accuracy overall and 83% accuracy (i.e. agreement with the reference) where claim charts were also used in a secondary assessment.

More recently, my investigations on patents declared to the 5G standard and checked for essentiality also reveal substantiality different essentiality rate rankings for patent owners from study to study. For example, the aforementioned meta-study by CRA shows that among the top six SEP owners, Qualcomm is ranked top by Cyber Creative (39% essentiality rate) and bottom by Clarivate (19% essentiality rate). Huawei is ranked top by GreyB (32% essentiality rate) and bottom by Cyber Creative (21% essentiality rate).

Essentiality Rates Overall and for Some Major SEP Owners[17]

Study	Ericsson	Huawei	Qualcomm	Samsung	LG	Nokia	*Overall*
CDH	18%	--	--	--	--	--	8%
IPlytics	--	--	--	--	--	--	10-15%
GreyB	24%	32%	29%	23%	20%	27%	27%
Clarivate	24%	27%	19%	22%	21%	21%	22%
CC	31%	21%	39%	37%	32%	29%	33%
Unified	--	--	--	--	--	--	9%

Cyber Creative's highest rankings are also notable. The 2024 study by this Japanese firm finds that three Japanese companies have the highest essentiality rates: NTT DoCoMo, Kyocera, and Fujits [sic].[18] The 2023 study also ranked three Japanese companies most highly: NTT DoCoMo, Sharp, and NEC.[19] Cyber Creative revealed its estimated essentiality

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[16] Pilot Study for Essentiality Assessment of Standard Essential Patents, EC Joint Research Centre, Rudi Bekkers, Joachim Henkel, Elena M. Tur, Tommy van der Vorst, Menno Driesse, Byeongwoo Kang, Arianna Martinelli, Wim Maas, Bram Nijhof, Emilio Raiteri, Lisa Teubner and Nilolaus Thumm (Editor), 2020 https://publications.jrc.ec.europa.eu/repository/handle/JRC119894 ; and Overcoming inefficiencies in patent licensing: A method to assess patent essentiality for technical standards by Rudi Bekkers, Elena M. Tur, Joachim Henkel, Tommy van der Vorst, Menno Driesse, Jorge Contreras, 2022. https://www.sciencedirect.com/science/article/pii/S0048733322001135
[17] https://media.crai.com/wp-content/uploads/2022/11/09132755/Critical-Review-of-5G-SEP-Studies_Nov-2022.pdf
[18] Cyber Creative Institute 2024. https://www.cybersoken.com/en/topics/
[19] Cyber Creative Institute 2023. https://www.cybersoken.com/en/topics/

rate for NTT DoCoMo to be 72% in 2022 — more than double the estimated overall essentiality rate of 33% that year.[20]

Attempting to check essentiality accurately is very time consuming

It's unsurprising that different assessors' essentiality determinations on the same patent so frequently disagree because most assessments are rather cursory — only around 30 minutes per patent in some studies. Much more thorough checking was made in the EC pilot study on 4G patents, and in 5G by CDH in 2021. Around 8 hours per patent was spent checking essentiality in the EU Pilot study. In CDH's 5G study, "each essentiality determination took an average of seven hours of work per patent by three highly experienced experts who are the authors of this paper. The experts doing this work included a university professor at a US institution and industry practitioners with years of experience working for major cellular companies in development and standardization".[21]

Some studies are rather vague about how long they spend checking and how large are their samples. Nevertheless, unbiased sampling error is not the biggest problem, given the huge bias I have already identified.

Even when hundreds of hours per patent are spent as in patent litigation, according to CDH's 5G study, different experts often come up with opposite essentiality, infringement and validity opinions. The difficulties in determining which or how many patents are standard-essential stems from the fact that assessing essentiality for any patent is laborious, full of uncertainties and includes subjective decision making.

The only way for essentiality to be definitively determined for any patent in a particular jurisdiction is through court judgments including appeals. However, as UK and US courts, respectively, have noted:

> "Based on my assessment of both experts, I am sure the disagreement represents cases in which reasonable people can differ".[22]

> "Given the somewhat subjective nature of these determinations, 'disagreements' is probably a more accurate label than 'error'".[23]

Even court decisions are not universally definitive because courts in different jurisdictions can and do come up with different determinations. For example, there was a notable inconsistency between German courts and the Unified Patent Court (UPC) regarding the essentiality and infringement of the same wireless charging patent (EP 2 867 997 B1, or EP997, owned by Philips and declared to the Qi wireless charging standard).

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[20] Cyber Creative Institute 2022. https://www.cybersoken.com/en/topics/

[21] Survey of Mobile Cellular 5G Essentiality Rate, by David Cooper, Johanna Dwyer and Alexander Haimovic, February 2021

[22] *Unwired Planet* Judgment at 335. https://www.judiciary.uk/wp-content/uploads/2017/04/unwired-planet-v-huawei-20170405.pdf

[23] *TCL v. Ericsson* Decision at FN 16 https://images.law.com/contrib/content/uploads/documents/1/TCL-v.-Ericsson.Decision-part-1.pdf

1. German Courts (Düsseldorf Regional Court and Higher Regional Court):

    o   In March 2023, the Düsseldorf Regional Court dismissed Philips' infringement action against Belkin, finding that Belkin's products did not infringe EP997.

    o   In April 2024, the Düsseldorf Higher Regional Court rejected Philips' appeal as inadmissible, making the non-infringement finding final for those parties in Germany.[24]

2. Unified Patent Court (UPC), Munich Local Division:

    o   On 13 September 2024, the UPC's Munich Local Division found in favour of Philips with a valid as granted patent and holding that Belkin's products did infringe EP997. It granted a permanent injunction covering several European countries, including Germany (with a carve-out for the German entities due to the prior national judgment).[25]

    o   The UPC explicitly acknowledged the existence of the contradictory German judgment but chose to diverge from it, applying its own claim construction and infringement analysis.

Too many patents to check

Even if one is content that expert analysis can provide sufficient accuracy on the essentiality of up to hundreds of patents, estimating companies' essentiality rates in 5G is a different and much bigger challenge. Estimating essentiality rates has become more difficult and less reliable as large numbers of declared patents have increased exponentially.

There are far too many declared patents (many thousands of them) and too many patent owners (scores of them) to check more than relatively small samples of these due to the high cost of doing thorough checks, as undertaken on some patents by patent pools and in the EU's Pilot Study. Any use of random sampling is problematic with compounding of both sampling and determination errors in estimated essentiality rates. Relatively small sample sizes and the need to combine initial samples with additional samples to update studies in subsequent years results in significant random error in essentiality rate determinations.

My research including Monte Carlo simulations indicates that sample sizes as large as 1,000 patents per standard per patent owner (or all their patents if they have fewer) are likely to be needed to achieve the levels of accuracy in estimated essentiality rates that are typically expected in academic and market research (e.g. ±15% proportionate margin of error at the 95% confidence level).[26] This would be for a one-off sampling. Updating estimates, for example, every year to reflect additional declarations could require sample top-ups in the hundreds of patents per patent owner to maintain accuracy. For example, 5G declarations increased by 12,848 from a total of 44,678 in 2023 to 57,426 in 2024. Furthermore, the

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[24] [UPC: Phili...P decision], [Philips v....if the ...]

[25] [UPC: Phili...P decision], [Philips v....if the ...], [Philips su...at the UPC]

[26] This estimated margin of error is based on the assumption that overall essentiality rate could be as low as 10%. Keith Mallinson, *Essentiality Rate Inflation and Random Variability in SEP Counts with Sampling and Essentiality Checking for Top-Down FRAND Royalty Rate Setting* (Nov. 24, 2021), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3933944

abovementioned margin of error is purely due to unbiased random errors. Variation in essentiality rate estimates due to biased errors in essentiality determinations is in addition and severe, as I previously illustrated by comparing overall essentiality rates among different studies.

Even if it is concluded that extensive and thorough checking (e.g. with claim charts and a whole day or more of expert effort per patent) can provide accurate enough essentiality rate estimates on relatively small or modest numbers of hundreds of patents,[27] the many times larger and increasing numbers of declarations means that selecting, checking and updating large enough representative samples to potentially enable sufficiently accurate essentiality rate estimates for each patent owner could cost tens of millions of dollars per major standard. This would probably be prohibitively expensive and would still not provide uncontested accuracy.

The Elizabeth Hurley effect and parental overvaluation

In the absence of thorough and accurate studies, the industry uses what is available, which is not very good.

The studies that become most trusted and relied on are those that are already most trusted and relied on (whether or not this is justified). Strategic commitment to publish including updates and vigorous marketing helps with that. This is reminiscent of the so called Elizabeth Hurley effect — shorthand for becoming famous for being famous, as illustrated by the leap to fame of this actress and model in the 1990s.

Companies favour, endorse and support studies that flatter their positions. With all the uncertainties and subjectivity in essentiality checking there also appears to be confirmation bias by study publishers, their sponsors, clients and companies in support of what suits them including study results. Similarly, parents commonly believe their own children are more intelligent, talented, or special than others beyond what is objectively warranted.

Better than the known devils?

It would be very costly for the UK IPO to design, construct and maintain with regular updates another patent counting and essentiality checking system with sufficient accuracy to be accepted as the most authoritative source for patent counts and essentiality rates. However, perhaps its study might benefit by being perceived more neutral than the commercial studies? Scientific principles should be applied, including the need for reproducibility of results. To be useful, the new study would need to be global in scope, rather than focusing purely on UK patents, and be regularly updated (e.g. annually) for each standard.

AI is no silver bullet solution to the essentiality checking challenge. For example, in the absence of an adequately large reference of truly essential patents for any given standard there is no satisfactory data set to train an AI solution with competence.[28] The possibility of creating and maintaining that reference should be investigated.

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[27] For example, essentiality determinations by patent pools typically cost at least $5,000 per patent. At that cost, checking only a total of 500 patents would cost $2.5 million.

[28] Where AI Works Well and Where it Doesn't in Predicting Standard Essentiality for Patents, by Keith Mallinson, IP Watchdog, March 2023.

The need for patent counting studies is unlikely to go away in FRAND rate determinations, but all such studies are so inherently inaccurate and unreliable that it would be unfair to impose another such study. Essential patent counts are used in determining FRAND royalty rates in comparable license unpacking of cross-licenses and in top-down royalty rate allocations. Alternatively, studies counting contributions and approved contributions to Standard Setting Organisations (SSOs) are also used for those purposes. Perhaps the UK IPO might consider pioneering a prospectively better approach by checking and counting only patents that have associated claim charts and disregarding all other declared patents? However, it would be up to the UK IPO to prove to and persuade the industry it has created a better mousetrap with this or any other purported distinctions.

Companies are wary of subjecting their patents to official essentiality checking by national patent offices in case adverse determinations jeopardise their ability to assert those patents. The voluntary Hantei (advisory opinion) patent checking system, administered by the Trial and Appeal Department of the Japan Patent Office, has been shunned.[29]

Even if essentiality could be accurately checked and essentiality rates for entire portfolios could also then be accurately and cost-effectively derived from samples, focusing entirely on essentiality rates and essential patent counts is fundamentally deficient. Those metrics ignore validity, actual infringement and the fact that patent value is not proportionate to the number of patents. Some patents are worth a lot more than others. These counting methods focus on quantity and ignore quality which is also very important.

Rate Determination Track (RDT)

The UK IPO states it is contemplating a new rate determination route....

66. We propose that the scope of the RDT is limited to cases where infringement, validity and essentiality are not in dispute.

The meaning of the above is unclear and could be misinterpreted. I presume the intended meaning is that where a patent owner seeks to enter a FRAND-compliant patent portfolio license, the prospective licensee implementer agrees that at least one of those patents is infringed, valid and essential. As stated at 38., "*only about 25-40% of all declared SEPs are truly essential to a given standard*." Whether or not that range is correct, no implementer is likely to agree that more than a proportion, let alone all, of a licensor's declared patents are truly essential. This is an important distinction. In rate determinations, estimated essentiality rates and numbers of patents deemed essential are used to unpack comparable licenses and to apportion aggregate royalties using the top-down approach.

It should be without dispute that major patent declarers including Ericsson, Nokia, Qualcomm and many others have at least some truly essential patents. Prior litigation and court judgments in many cases indicate that some patents are essential, infringed and have not been found invalid.

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[29] European Commission Joint Research Centre, Rudi Bekkers et al., *Pilot Study for Essentiality Assessment of Standard Essential Patents*, EUR 30111 EN 51-54 (2020), https://publications.jrc.ec.europa.eu/repository/handle/JRC119894

67. The RDT would provide a binding rate determination on request of either the licensor or licensee.

A binding rate determination at the request of either party would unnecessarily and troublingly constitute rate regulation. This would impede the latitude and rights parties usually enjoy to negotiate rates or seek court determinations. National rate regulation (i.e. for the licensing of UK patents for UK implementations) would be of limited use. Global rate setting is appropriate if voluntarily accepted by both parties, but could otherwise clash with rulings in other jurisdictions.

Rate setting would require robust and transparent economic processes. Expert opinions on aggregate FRAND rates vary considerably, as they do about essentiality rates and FRAND rates between individual licensors and licensees.

It is fanciful to believe that sub-contracting to a slew of economic, technical, and other kinds of experts to *make up* aggregate royalty values will produce better, fairer, or truer rates than those derived in market-based rates negotiated in bilateral licenses and offered by patent pools in competition to those. Instead, processes will be susceptible to political or regulatory capture, and rates derived will be significantly affected by interest group lobbying, self-interest, or conflicted interests of external experts.

Possibly even worse, absent adequate governance, leadership, and with some standardisation and transparency in the evaluation methods employed, results produced will be inconsistent and derivations will be opaque. How will the UK IPO ensure adequate quality and consistency in evaluations? What internal expertise will it develop to ensure this?

69. At this stage, we are keen to understand whether a single approach would be appropriate or whether the RDT should be empowered to apply different methodologies.

While comparable license rate discovery methodology is much preferred to top-down approach rate setting, no method should be used without sufficient expertise and rigour.

Unpacking to make licenses comparable

There is industry-wide consensus that comparable licenses provide the best means of determining FRAND royalty rates when these are in negotiation or dispute. But the devil is in the detail. Licenses and the licensing contexts for these vary enormously. Licences must be unpacked and adjustments need to be made so that comparisons can be made and royalty charges (along with other terms) can be determined on an apples-to-apples basis. The myriad of factors to be considered in such calculations include:

- Bilateral versus multilateral (e.g. patent pool) licensing
- Payments in dollar-per-unit or ad valorem running royalties, or one-off up-front lump sums
- Floors and caps to the royalty base against which ad valorem rates are applied
- Assumed sales forecasts and discount rates in deriving equivalent running royalties from lump sums
- Licensing dates and durations
- How back royalties versus future royalties are charged
- How expiring patents are dealt with

- Which standards are included, for example with the prevalence of multi-mode (e.g. 3G, 4G, 5G) and multi-standard (e.g. 5G, WiFi, HEVC/H.265) devices
- Volume discounts, and early-bird discounts in patent pools
- Lower rates for sales in certain geographies
- Cross-licensing with netting off notional licensing charges based on relative patent portfolio strengths and volumes or values of licenced product sales
- Related transactions such as sale of patents, products or entire business divisions
- Patent and licensing context: How similarly are parties "situated" — scale of previous licensing (numbers of licenses, sales volumes and for how long), financial circumstances of parties (e.g. a licensor cash shortage encourages lump sum settlements in face of holdout by major implementers).

However, in many cases, such licenses are confidential and not available for review. With new standards and new applications there are no comparable licenses. Whichever way, substantial economic, financial and industry expertise is required to determine rates and other licensing terms. Doing the job competently entails a lot of expert work and subjective judgment. Experts in litigation spend hundreds of hours poring over many candidate licenses to select, unpack and adjust these so that comparisons can be made and so that rates can be derived on an apples-to-apples basis.

Top-down approach is most commonly applied bottom up

An alternative rate determination method is the top-down approach. With this, a notional aggregate rate is set and then apportioned, typically based on some kind of patent count, or based on an alternative patent portfolio strength metric such as number of approved contributions to the applicable SSO.

The top-down approach formula for rate determinations is generally shunned and rarely used as anything more than a cross-check. The method appeals to some because of its simplicity and transparency in application, but it has major shortcomings. Despite extensive expert work on this in *Interdigital v. Lenovo*, Justice Mellor rejected the top-down approach, even only as a cross-check, at least "as pleaded" in that case.[30]

No UK court has been willing to set any aggregate royalty rate. It is often stated that the top-down approach was used in *Unwired Planet v. Huawei*. As described above, that is incorrect. Instead, as a cross-check, the court used the formula *bottom up* rather than top down using unpacked royalty rates and patent counts to infer — not set — an aggregate rate as a cross-check. This is a crucial difference. Justice Birss was unwilling to set a top-down rate due to problems in doing that and he even distinguished from that term in his approach:[31]

> "the main conceptual difficulty I have with the using a total stack <u>in a top-down approach as opposed to using it as a cross-check</u> is in the selection of the total royalty burden T to start with. In my judgment the statements set out above have little value in arriving at a benchmark rate today for a number of reasons. The claims are obviously self-serving. The statements about aggregate royalties in particular are statements about other people's money on the footing that the person making the

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[30] *Interdigital Technology*, [2023] EWHC 539, at [881].
[31] Unwired Planet Int'l Ltd. v. Huawei Tech. Co. Ltd., [2017] EWHC 2988, at [268]-[269].

statement says at the same time that the cake is quite small but they are entitled to a large piece of it" (emphasis added).

Prospective aggregate rates presented in *Unwired Planet v. Huawei* differed significantly. The court derived an "implied total burden" of 8.8% for multimode 4G from the comparable licenses and the share of Unwired Planet's relevant SEPs.[32] The court also noted that "[o]n Huawei's figures the implied total aggregate [4G] royalty burden T would be 13.3% while for Unwired Planet it would be 10.4%."[33] Aggregate rate benchmarks unreliably proposed include multi-company statements for "a reasonable maximum aggregate royalty level for LTE essential IPR in handsets is a single-digit percentage of the sales price",[34] but that was for single-mode LTE and did not include 2G and 3G SEPs. Some patent owners publicly disagreed with setting aggregate royalty goals at all, as announced by only a handful of other patent owners and technology implementers for 3G and 4G in mobile phones in the 2000s.[35] Even those making the announcements did not regard aggregate figures as caps.

The rates derived from unpacking comparable licenses are based on amounts that would be paid, but for cross-licensing. Consequently, aggregate rates implied from these with use of the top-down formula are theoretical. They are adjusted royalty yields, before cross-licensing reductions and are elevated by including notional royalties (i.e., royalties not paid) for unlicensed SEPs that are counted in the denominator for the derivation of licensor's share of SEPs.

Unfortunately, my characterisation — of using this approach to infer as a cross check rather than set an aggregate rate — as a bottom-up method has not been adopted because that term was already taken to mean an entirely different valuation methodology.

Unwired Planet v. Huawei also illustrates the uncertainty and inaccuracy in selecting the total patent count denominator figure to use in these methods. "The parties are very close on the numerators and far apart on the denominators."[36] Justice Birss expediently split the baby. "I think both values are out by about a factor of two. Half of 1812 is 906 while twice 355 is 710." Splitting the difference takes one to 800. Standing back, about 800 is fair and in my judgment an appropriate figure for the pool of 4G/LTE patents."[37]

Aggregate headline rates sought greatly exceed payment yields

The difficulties, shortcomings and requisites in aggregate rate setting and apportionment are set out in my 2024 research paper entitled *Discovering or Setting Royalties and FRAND Rates for SEP Portfolios,* published in the George Mason University Antonin Scalia Law School Journal of Law, Economics & Policy and cited in the UK IPO's report on *Rate-setting*

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[32] Unwired Planet v. Huawei, [2017] EWHC 711, at [478].

[33] *Id.* at [261].

[34] https://www.sec.gov/Archives/edgar/data/924613/000110465908029241/a08-13064_16k.htm

[35] For example, in 2008, Qualcomm stated "Contrary to recent claims by a small number of manufacturers, FRAND does not, and never has, prescribed formulas for imposing cumulative royalty caps or proportional allocations of such royalty caps. Such formulas would arbitrarily limit the value of standards essential patents, discourage innovation, encourage the filing of marginal patents, complicate and delay the standardization process, and be impossible to implement in practice." LTE/WiMax Patent Licensing Statement, QUALCOMM (Dec. 2008), www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/lte-wimax-patent-licensing-statement_1.pdf.

[36] Unwired Planet Int'l Ltd. v. Huawei Tech. Co. Ltd., [2017] EWHC 2988, at [202].

[37] Unwired Planet Int'l Ltd. v. Huawei Tech. Co. Ltd., [2017] EWHC 2988, at [377].

for Standard-Essential Patents — International evidence and analysis.[38] While my article touches on many different important issues, it is largely about the economics and commercial factors in the methodologies and metrics used to derive aggregate royalty figures and individual FRAND rates using the top-down approach.

The aggregate rates from which bilateral licensing rates are derived using the top-down approach are never fully paid due to notional royalty allocations to patents that are discounted somehow or remain unlicensed. Any aggregate royalty setting must recognize this difference. Simply adding up all licensors' maximum royalty rates inevitably produces a hypothetical maximum aggregate royalty rate figure that is inflated far above what anyone would ever pay.

Total amounts paid end up being much lower than various projected notional aggregate figures. In my seminal research on aggregate royalty charges in 2015 I rebutted (soon followed by concurrence with me from various academics) a common but speculative narrative based on misapplication of mid-19th Century economic theory regarding commodity complements — asserting that royalty charges could "stack" to as much as 30% of smartphone selling price — with my empirical proof that rates paid averaged no more than around 5%.[39] My abovementioned 2024 report illustrates that totalling prospective licensors' wished-for headline rates (e.g. before royalty base caps reduce rates several-fold) and negotiated discounts (e.g. for volume, up-front cash, back royalties), unlicensed use and non-payments resulted in a hypothetical aggregate of up to more than 30% for 4G. The royalty yield of what is actually paid after all those adjustments and some cross-licensing offsets at around 5% is one sixth of that inflated stack figure. Setting aggregate rates for apportionment based on total rates paid would in turn reduce allocations and payments still further.

In the UK's *Optis v. Apple* FRAND trial, expert witness Eric Stasik, with many years' experience in licensing negotiations was asked by Optis' solicitors to give [his] view as to whether it would be reasonable, assessed as of today, for implementers to be expected to bear a theoretical notional aggregate royalty burden for 4G multimode handsets in the range of around 8% to 15% (i.e., a total royalty burden in respect of all relevant (i.e., handset) SEPs in the 2G, 3G and 4G "universe").

In response he testified: "[I]n the (hypothetical) scenario where implementers do all behave as willing licensees and all in fact therefore pay truly "FRAND rates" for the whole stack, a range of 8% to 15% is appropriate ["in respect of all relevant (i.e. handset) SEPs in the 2G, 3G and 4G 'universe'"]".[40]

Stasik also noted that "[i]n practice, implementers do not pay the theoretical total aggregate royalty burden for a 4GMM handset because implementer in my experience are never fully licensed under all SEPs in the 4G, 3G and 2G universe." His description is therefore, seemingly of more than a royalty yield — by pretending unwilling licensees are willing,

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[38] Keith Mallinson, Discovering or Setting Aggregate Royalties and FRAND Rates for SEP Portfolios? 19 J.L. ECON. & POL'Y 1 (2024), at pages 92 and 127. Available at SSRN: https://ssrn.com/abstract=4667656

[39] Keith Mallinson, *Cumulative Mobile-SEP Royalty Payments No More Than Around 5% of Mobile Handset Revenues*, IP Finance. (Aug. 19, 2015), http://www.ip.finance/2015/08/cumulative-mobile-seproyalty-payments.html; Alexander Galetovic, Stephen Haber & Lew Zaretzki, *An Estimate of the Average Cumulative Royalty Yield in the World Mobile Phone Industry:Theory, Measurement and Results*, 42 TELECOMM. POL'Y 263 (Apr. 2018); J. Gregory Sidak, *What Aggregate Royalty Do Manufacturers of Mobile Phones Pay to License Standard-Essential Patents?*, CRITERION J. INNOVATION 701 (2016).

[40] *Optis v. Apple*, [2023] EWHC 1095, at [400].

licensed, and paying royalties. While I presume cross-licensing did not feature much in that particular case because Optis is not an implementer, it is unclear whether the rate at the lower end of that range is supposed to be net of cross-licensing reductions.

Patent value is in how it enhances products and applications in the eyes of the beholders

Any aggregate royalty rates derived in the RDT — as might be sought for new product and application market segments where comparable licensing benchmarks do not yet exist — would be most highly contentious.

Various different techniques are used to establish how much value is derived from patented technology in standardised products and applications, and how that should be apportioned between patent owners and implementers. An expert for Interdigital in *Interdigital v. Lenovo,* seeking to determine SEP value in the established market for smartphone licensing*,* proposed a 50:50 division of value — between licensors and licensees—as derived from his hedonic regression model. Justice Mellor, having evaluated comparable licenses in that matter, rejected the expert's methodology.

Hedonic regressions and conjoint analysis have in some cases been accepted to assist in determining royalties in US patent litigation. I would caution against imposing valuations derived from these methods without the scrutiny of court procedure and evidentiary requirements.

Patent licensing pools and platforms such as Avanci licensing 4G and 5G in cars spent years in discussions with SEP owners and implementers establishing rates, based on value derived and affordability. Similarly, bilateral licensing rates and various associated party-specific terms are fittingly established through negotiation between parties rather than by administrative rate setting.

Some patents are worth much more than others

Top-down apportionment is based on the faulty premise that the relative value of different patent portfolios is directly proportional to the number of declared or checked- essential patents in each of these. On the contrary, there is abundant evidence that the value of patents, including SEPs, varies enormously. Some patented technologies are crucial in creation or improvement of standards; others, such as those reading on parts of the standard that are optional and are rarely or never implemented, are worth very little. Some SEPs relate to devices, and others relate to network equipment. Use of the top-down approach typically ignores the issue of patent validity.

Even top-down approach advocates have differing opinions about which patent strength metric to use.[41] Counting raw declared patents that remain unchecked for essentiality by any third party is widely regarded as inaccurate and unreliable because there is no constraint on patent owners distorting this measure of their patent portfolios' strengths by making

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[41] For example, while Apple advocates simply counting patents declared by their owners, APPLE, *A STATEMENT ON FRAND LICENSING OF SEPS*, https://www.apple.com/uk/legal/intellectual-property/frand/ (last visited Sept. 24, 2025) ("A SEP licensor's *pro rata* share of declared SEPs is an objective reference point in a FRAND negotiation"). Many others believe that independent essentiality checks are required for measurement of portfolio patent strength.

excessive declarations. These bloat the denominator in essentiality rate calculations and inflate the positions of patent owners that are loosest and most voluminous in their declarations. There is a conflict between the patent policies of SSOs that encourage declaration of any patents owners believe may be or may become essential to ensure standards are not blocked, and the separate use of patent counts as metrics of patent strength. The term "over-declaration" has been coined due to the distortions this causes in the latter. Over-declaration comes in two forms: declaring excessive numbers of patents and declaring individual patents excessively to multiple technical specifications within standards.[42]

Fit for purpose essentiality checking and rate setting

It would be better to embellish the UK IPO's SEP resource hub with more information and guidance that can be used voluntarily rather than to intervene with mandatory checks and determinations.

Either way, given all the inaccuracies including bias in essentiality checking and patent counting I have identified above, great care should be taken in choosing which study or studies to use, how to apply their results and in how the UK IPO might design and implement a new study of its own. Nevertheless, while patent counts are most commonly used in the top-down approach apportionments which are generally eschewed, some kind of portfolio strength metric is also required to unpack cross-licenses in more favoured comparable license analysis.

While there are many legal, economic, and commercial reasons why rate setting should be avoided, if aggregate rate setting and apportionment of royalties is to be employed it is essential that governance, organisational processes, and analytical methodologies are fit for purpose and transparent.

If there is going to be essentiality checking, patent counting and an RDT, this requires some standardised definitions and guidance on what expertise is required and on which issues and factors should be considered in evaluations. Even the meaning of *aggregate royalty* is ambiguous: is this total a theoretical maximum that nobody would ever pay, a typical or average figure that would be or is actually paid after royalty-base caps or sales volume discounts and with many patents remaining unlicensed? Or is it something in between that would be the most appropriate figure in top-down approach rate apportionment?

There should be no rigid prescriptions on exactly which methodologies should be used. For example, an understanding of the licensing context for candidate comparable licenses (e.g. as experienced licensing practitioners would have), as well as academic qualifications and experience in economics should be required. For example, unpacking lump sums in licences into equivalent running royalty rates is a challenging task requiring careful consideration of the parties' circumstances (e.g. cash positions) as the licenses were agreed, not simply an abstract discounted cashflow analysis.

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[42] Keith Mallinson, *Gaming the System: A Scatter-Gun Approach to 5G Declarations*, IP Finance. (Dec. 5, 2022, 8:38 PM), http://www.ip.finance/2022/12/gaming-system-scatter-gun-approach-to.html.

About the Consultation submission's author

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