

# Cellular SEP Aggregate Royalty Rate for Carrier Network Equipment

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## 1. Background Introduction

In the field of cellular communications, the creation of related Standard Essential Patents (SEPs) had been primarily dominated by a few traditional carrier equipment vendors and chipset manufacturers up until the 4G era, such as Qualcomm, Ericsson, and Nokia, with Qualcomm having the largest share according to analysis by Tech+ IP Capital. Although its specific SEP share was not disclosed, its influence in this space was significantly ahead of other competitors.<sup>1</sup>

However, upon entering the 5G era, the cellular SEP landscape has greatly changed, and changed rapidly: as of early 2025, the concentration of global 5G SEPs remains high, with over 70% belonging to the top ten right holders. More importantly, several mobile phone manufacturers have emerged to be strong SEP contributors.

According to the “Research Report on Global 5G Standard Essential Patent and Standard Proposals (2024)” released by the China Academy of Information and Communications Technology (CAICT) in September 2024, there were over 114,000 declared 5G SEPs globally as of March 31, 2024.<sup>2</sup> This study also reveals that as the 5G standard-setting process advances, more and more companies are participating in 5G SEP declarations, with a significant portion of it coming from mobile phone manufacturers.

Here is the breakdown of the top ten effective global cellular SEP right holders according to the aforementioned study.<sup>3</sup> Huawei holds a share of 12.42%, followed by Qualcomm at 9.43%, and LG at 8.25%. The rest of the list includes, in the declining order, Samsung, ZTE, Ericsson, Nokia, Xiaomi, OPPO, and Datang.<sup>4</sup> Noticeably, Xiaomi and OPPO are mobile phone manufacturers, while Huawei and Samsung are also major mobile phone manufacturers, aside from being major players in the carrier equipment market. ZTE, a major carrier equipment vendor, also has a sizeable mobile phone manufacturing business, albeit not as sizeable as it used to be.

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1 IAM, New 4G/5G landscape shows which SEP owners have strongest global coverage, June 02, 2022, <https://www.iam-media.com/article/4g-5g-sep-landscape-shows-which-patent-owners-have-best-global-coverage>.

2 "LTE Standard Essential Patents Now and in the Future", February 20, 2012: <https://silo.tips/download/lte-standard-essential-patents-now-and-in-the-future>.

3 China Academy of Information and Communications Technology, Intellectual Property and Innovation Development Center, "Research Report on Global 5G Standard Essential Patents and Standard Proposals (2024)," September 2024, page 16.

4 China Academy of Information and Communications Technology, Intellectual Property and Innovation Development Center, "Research Report on Global 5G Standard Essential Patents and Standard Proposals (2024)," September 2024, page 15.

## **Figure 1 , Percentage of effective global patent families among the top ten companies**

The fact that the top ten list of 5G SEP right holders now having more than half of it as phone manufacturers or partially phone manufacturers appears to have ushered in a profound structural change in the intellectual property right (IPR) landscape of the cellular communications industry. The creation of SEPs is no longer solely confined to traditional carrier equipment vendors and chipset manufacturers. Phone manufacturers are also directly participating in the standard development and standard setting processes. This new phenomenon begs the important issue of “rebalancing” of the global SEP licensing and payment system under the 5G framework.

In the traditional cellular mobile phone industry, the business model consisted of two primary components: First, mobile terminal manufacturers’ products gained network connectivity via network equipment supplied to carriers. Second, communication chip manufacturers and equipment vendors licensed communication technology to mobile phone manufacturers via SEP licenses. Consequently, licensing fees for network access were predominantly realized from the phone manufacturers. However, with the advent of the 5G era and the significant changes in the industry SEP ownership structure, mobile phone manufacturers themselves start to hold an increasing share of communication patents; they are no longer just passive licensees but have gradually become important contributors to the standard-setting processes as licensors as well.

Against the backdrop of this structural change, the traditional SEP licensing channel is clearly obsolete and will have to be gradually replaced with a new model. In the future, it may be necessary to establish new SEP licensing arrangements moving in the “mobile phone manufacturer → base station equipment or operator” direction. It may initially start with what we call the “base station SEP licensing” model, as base stations account for a lion share of carrier network equipment carriers’ purchase from equipment vendors in supporting cellular services: When carriers deploy network equipment, they must not only obtain SEP licenses from traditional equipment vendors but also for the relevant SEPs held by mobile phone manufacturers (such as Xiaomi, OPPO, etc.) This new model is needed, in order to reflect a fairer and more balanced royalty revenue distribution objective for SEP right holders.

Therefore, we believe it is about time that mobile phone manufacturers start to take a more proactive stance to monetize their standard related R&D investments with carrier equipment vendors. In fact, to our knowledge, some licensing agreements in recent years have already reflected this trend. Licensing agreements between base station equipment suppliers and mobile phone manufacturers are no longer simply unidirectional, but rather bidirectional cross-licensing agreements. This adjustment helps enhance the fairness of the SEP system and also better reflects the contributions made by various stakeholders in the current telecommunications industry. The rest of this short note discusses the issue of aggregate royalty rate pertaining to applying to carrier

equipment vendors from three perspectives.

## 2. Diversity of the Standard-Essential Patent (SEP) Royalty Rates

The value contribution and importance of relevant SEPs vary across different products, leading to significant diversity in royalty rates. In such cases, the applicable royalty rate is typically determined through a comprehensive assessment of the value contribution and importance of relevant patents.

Major SEP holders such as Huawei, Ericsson, Qualcomm, and Nokia have publicly announced licensing rates that are generally calculated as a certain percentage of the net selling price (NSP) of licensed products. The licensing targets are no longer limited to smartphones, but now also include smart home devices, connected vehicles, and industrial IoT equipment — all of which are key areas within the Internet of Things (IoT) ecosystem.

For example, regarding SEPs for smartphones, Ericsson publicly stated in 2017 that the 5G licensing rate was set at USD 5 per device for high-end handsets and a minimum of USD 2.5 per device for low-end handsets.<sup>5</sup> Nokia's 2018 announcement set the maximum 5G licensing rate at EUR 3 per device. Qualcomm, in its 2017 disclosure, announced that the royalty rate for single-mode 5G phones would be 2.275% of the wholesale price, while for multi-mode (3G/4G/5G) devices it would be 3.25%.<sup>6</sup>

Huawei, in July 2023, announced that its 5G multi-mode smartphone royalty cap would be USD 2.5 per device, and USD 1.5 per device for 4G multi-mode phones. For Wi-Fi related consumer electronic devices, Huawei set a flat rate of USD 0.5 per device. For IoT devices using core IoT technologies, Huawei declared a royalty rate of 1% of the net selling price, capped at USD 0.75 per device, while for IoT-enhanced connected devices, the rate ranges from USD 0.3 – 1 per device.<sup>7</sup>

These examples demonstrate that, even for the same patent portfolio, SEP royalty rates can differ substantially across licensees and product categories — in some cases by several multiples.

In 2022, Sisvel launched its Wi-Fi 6 Patent Pool and Cellular IoT (C-IoT) Patent Pool programs. The Wi-Fi 6 licensors include Huawei, MediaTek, Philips, SK Telecom, Panasonic, and others. The royalty rate for enterprise access points (industrial applications) is USD 1 or 1.2 per device, while for consumer electronics and smart home products, the rate is USD 0.5 or 0.6 per device. The C-IoT patent pool differentiates between NB-IoT and LTE-M standards: NB-IoT products are uniformly charged USD 0.08 – 0.66 per device, while LTE-M (eMTC) smart sensors, depending on device price (up to USD 130), are charged up to USD 1.33 per device.<sup>8</sup>

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5 Mobile World Live, Ericsson sets out stall on 5G patent rates, March 20, 2017, <https://www.mobileworldlive.com/ericsson/ericsson-sets-out-stall-on-5g-patent-rates/>.

6 Qualcomm, Qualcomm 5G NR Royalty Terms Statement, November 19, 2017, <https://www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/qualcomm-5g-nr-royalty-terms-statement.pdf>.

7 Huawei: <https://www.huawei.com/en/ipr/license/cellular-iot>, accessed on August 15, 2025.

8 Sisvel: <https://www.sisvel.com/licensing-programmes/>, accessed on August 15, 2025.

Beyond cellular communication standards, the HEVC (High Efficiency Video Coding) SEPs exhibit similar diversity in licensing. The HEVC Advance patent pool offers licenses for decoders and encoders used in mobile devices (smartphones, tablets, laptops), connected home devices, and 4K UHD televisions. Licensors include Samsung, Huawei, MediaTek, and others. The HEVC Advance royalty schedule varies across regions, device categories, and configuration levels, and also includes several discount options. For mobile devices (phones, tablets, computers, etc.), the per-unit fee is USD 0.4 / 0.2 depending on region (Tier 1/Tier 2), while for 4K televisions, the per-unit fee is USD 1.2 / 0.6.<sup>9</sup>

These industry practices clearly indicate that, for the same technical standard and its associated SEPs, the applicable royalty rates differ significantly across different products. Our research finds a generally positive correlation between the value contribution of SEPs to a given product and the royalty rate applied: the more single-purpose a product is, the higher the relative contribution of the SEPs, and thus the higher the likely royalty rate.

For instance, in the Sisvel Wi-Fi 6 and HEVC SEP examples above — ignoring overall device price differences — the Wi-Fi 6 SEP royalties for enterprise access points (industrial equipment) are several times higher than those for consumer devices. Similarly, HEVC SEP royalties for 4K televisions are roughly three times those for smartphones. The relatively lower rate for smartphones reflects that, beyond video playback, they also perform functions such as telephony, network communication, Bluetooth, and NFC. In contrast, 4K televisions are far more function-specific, focusing primarily on video playback. Therefore, where SEPs contribute more substantially to one product than another, it is normal and reasonable for the corresponding royalty rate to be significantly higher—sometimes by several multiples. Moreover, when firms sell similar products to industrial users and end consumers, prices are typically higher for the industrial segment, reflecting standard market dynamics.

### **3. Three Considerations in Determining Base Station Royalty Rates**

#### **(1) Comparative Value Contribution of Cellular Communication Functions in Mobile Phones and Base Stations**

In the telecommunications industry, royalties for standard essential patents (SEPs) have traditionally been calculated based on the selling price, or sometimes called the entire market value, of the whole device. However, as the relative value contribution of cellular communication functions in such a device has declined, using the entire market value as the royalty base may overestimate the contribution of cellular technologies.

For example, a modern smartphone contains nearly 2,000 components, including traditional cellular communication modules (2G/3G/4G/5G baseband chips and integrated system-on-chips such as CPUs, GPUs, and DSPs), Wi-Fi, Bluetooth, NFC, and video decoders, among others.

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<sup>9</sup> HEVC advance program overview: <https://accessadvance.com/wp-content/uploads/2025/07/HEVC-Advance-Program-Overview-Jul-2025.pdf>, accessed on August 15, 2025.

Beyond communication components, smartphones derive increasing value from features such as high-resolution cameras and advanced display technologies. These extensive component systems collectively enable a wide range of functionalities that cater to diverse consumer needs. Consequently, cellular communication represents only one portion of a smartphone's total value.

Compared with traditional mobile phones, whose primary value lay in voice communication, modern smartphones have far transcended this original concept. Users today primarily value internet connectivity, multimedia, and entertainment functions. The smartphone has evolved into an integrated platform encompassing telephony, online communication, gaming, entertainment, and productivity tools. As a result, the diversification and differentiation of smartphone functions have gradually diminished the relative importance of cellular communication capabilities.

Table 1 below, drawn from a previously published paper by the author, analyzes the value contribution of cellular communication functions across different types of mobile phones. The study shows that the proportion of cellular communication technology value to total device value peaked at 30% for 3G phones, declined to 18.3% for 4G phones, and fell further to 15.0% for 5G phones. This trend indicates that as mobile communication technologies evolved from 3G to 5G, the share of value attributable to cellular communication functions has steadily decreased. The overall value of smartphones has become increasingly concentrated in components such as displays and memory. In other words, the relative value contribution of cellular communication functionality has been diminishing over time.

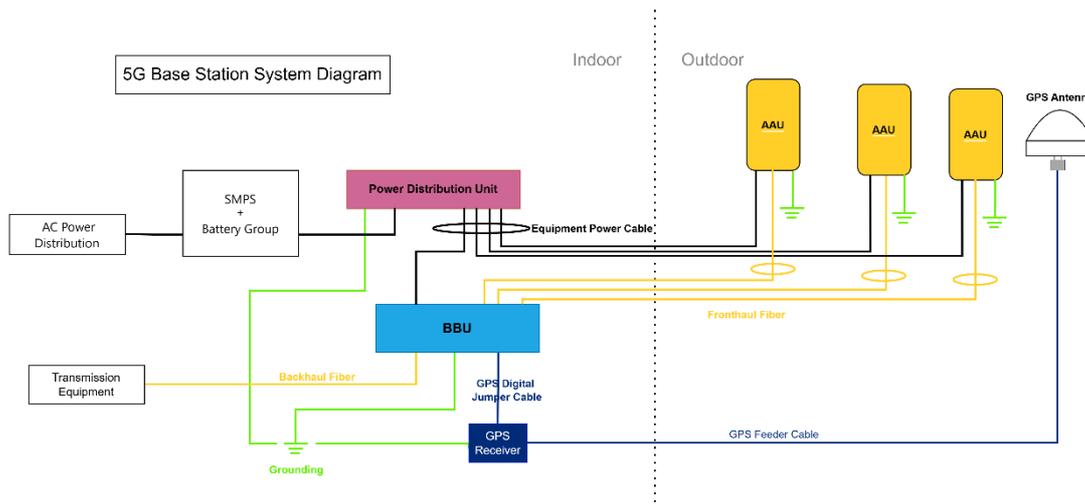
**Table 1. Proportion of Communication Function Value in Different Types of Mobile Phones<sup>10</sup>**

3G/4G/5G Phone	Mobile phone model	SoC cost as a percentage of the total cost of a mobile phone	Average proportion
3G	iPhone 4	30.0%	30.0%
4G	Samsung A80	18.7%	18.3%
4G	Honor 9X	18.4%	
4G	Huawei 10s	14.6%	
4G	OnePlus 7pro	21.6%	
5G	Huawei nova6	18.6%	15.0%
5G	Vivo X30	18.5%	
5G	OPPO Reno3	16.1%	

<sup>10</sup> Gong Jiong, Xiong Kaijun. Research on the impact of the functional value of mobile phone cellular communication on the fee base of standard essential patent licensing fees [J]. Price Theory and Practice, 2021, (06): 39-43.

5G	iQOO pro	10.7%	
5G	Axon 10pro	10.9%	

Compared with smartphones, base stations have a more singular function — providing network coverage to enable cellular communication. A complete 5G base station system consists of main equipment, supporting power facilities, towers, and equipment rooms (see Figure 2). The main equipment includes the BBU (Baseband Processing Unit) and the AAU (Active Antenna Unit), while the supporting facilities include transmission systems, power supplies, air conditioning, towers, antennas and feeders, and grounding systems. Therefore, determining the royalty base based on the total equipment price of the base station is more reasonable than using the total device price of smartphones. When both base stations and smartphones adopt the total device price as the royalty base, the patent licensing rate for base stations should be appropriately higher than the commonly used smartphone licensing rate.



**Figure 2. 5G Base Station Connection Diagram**<sup>11</sup>

In summary, based on licensing practices for standard-essential patents (SEPs) and our previous research findings, the value of smartphones also derives from components such as the screen and memory, while the share of value attributable to cellular communication functions has been gradually declining. In contrast, base station network facilities serve a single purpose—providing network coverage to enable cellular communication. Therefore, we argue that the cumulative industry royalty rate for base station network facilities should differ from that for mobile terminals, with the former being significantly higher.

The specific rate difference between the two can be estimated by calculating the proportion of cellular communication function value within a smartphone, yielding a preliminary ratio. As discussed earlier, this proportion has shown a declining trend across generations, but for both 4G and 5G smartphones, it typically remains below 20%. Taking 20% as an example, the current

<sup>11</sup> Zhihu, "Equipment and Installation Process Involved in 5G Base Stations", July 19, 2022: <https://zhuanlan.zhihu.com/p/543564546>.

industry cumulative royalty rate for 5G smartphones is about 5%. If royalties were levied solely on the cellular communication function—i.e., assuming the royalty base is only 20% of the smartphone’s total value—the effective industry aggregate royalty rate would reach 25% ( $5\% \div 20\%$ ), five times higher than the commonly used 5% smartphone rate. This example indicates that for pure cellular communication network equipment, the industry aggregate royalty rate could be several times, potentially up to five times, higher than that of the smartphone industry.

**(2) Considering the Royalty Burden from the Perspective of Licensees’ Profitability**

Under the FRAND principle, royalty rates should not only reflect the patented technology’s contribution to the product—ensuring that the patent holder’s interests are fairly represented—but also take into account the licensee’s financial capacity, thereby maintaining a balance between both parties’ interests.

According to the operational and financial conditions of major licensors in the network equipment market—such as Nokia, Samsung Electronics, Ericsson, Huawei, and ZTE—these five companies together accounted for approximately 93.7% of the global market share in 2024.<sup>12</sup> Table 2 shows the gross profit margins of these companies between 2018 and 2024. Nokia’s margin remained relatively stable with minimal fluctuations; Samsung Electronics experienced a decline in 2019 followed by a rebound and subsequent drop; Ericsson’s margin demonstrated consistent and steady growth; Huawei’s margin surged in 2021 to 48.30% before slightly declining; and ZTE maintained a gross profit margin above 30%.

These data suggest that equipment suppliers’ profitability levels has remained strong and stable, with gross margins consistently exceeding 30%, indicating substantial profits from network equipment and base station sales. Therefore, the industry aggregate royalty rate applied on network equipment makers should be set higher than that for smartphone manufacturers.

**Table 2. Gross Profit Margins of Major Base Station Licensors**

Year	Nokia	Samsung	Ericsson	Huawei	ZTE
2018	37.43%	45.69%	32.35%	38.60%	32.91%
2019	35.71%	36.09%	37.33%	37.60%	37.17%
2020	37.49%	38.98%	40.33%	36.70%	31.61%
2021	39.79%	40.48%	43.37%	48.30%	35.24%
2022	41.03%	37.10%	41.72%	43.90%	37.19%
2023	39.03%	30.30%	38.58%	46.20%	41.49%
2024	46.12%	36.99%	44.12%	44.40%	37.91%

Note: Gross profit margin = gross profit  $\div$  operating revenue (on a consolidated basis), unit: %;

<sup>12</sup> The WeChat public account "6G Standards and Technology Exploration" published an article titled "Omdia Releases 2025 RAN Market Landscape Report: Ericsson Wins Double Championship, Huawei Closely Follows, Five Major Vendors Control 93.6% of the Market," on October 13, 2025: [https://mp.weixin.qq.com/s/fAO6\\_Mgtv16TkISR0nQIEg](https://mp.weixin.qq.com/s/fAO6_Mgtv16TkISR0nQIEg).

data are derived from company annual reports or authoritative financial databases. Minor rounding differences may exist for certain years.

To compare the profit margins between network equipment vendors and smartphone manufacturers, we collected financial data and other relevant disclosures from several publicly listed smartphone manufacturers. Lenovo's Intelligent Devices Group (including PCs, tablets, smartphones, and smart devices) reported a gross profit margin of 16.1% for FY2024/25.<sup>13</sup> Xiaomi's smartphone segment posted an average gross profit margin of 12.6% in 2024.<sup>14</sup> Apple's overall hardware business (product segment) recorded an approximate gross profit margin of 37.2% in 2024.<sup>15</sup> According to media summaries, Samsung's hardware/mobile product gross profit margin ranged between 15% and 20% (this paper adopts the midpoint value of 17.5% for calculation).<sup>16</sup> OPPO and vivo's gross profit margins were around 17%,<sup>17</sup> while Transsion's smartphone business reported 20.62%.<sup>18</sup> Huawei and Honor did not publicly disclose the gross profit margins of their smartphone segments in available financial reports or media coverage.

In summary, the overall profitability of licensees in the network infrastructure market is relatively strong, allowing them to bear and accommodate higher royalty rates compared to smartphone manufacturers. Based on our calculations, the weighted average gross profit margin of Nokia, Samsung Electronics, Ericsson, Huawei, and ZTE in 2024—weighted by market share<sup>19</sup>—was 43.74%. On the user equipment (UE) side, the weighted average gross profit margin of manufacturers in 2024—also weighted by market share<sup>20</sup>—was 21.24%. This implies that network infrastructure vendors have about 2.1 times the financial capacity to absorb cellular SEP licensing fees compared to smartphone manufacturers.

Moreover, Apple's unique business model and significant brand premium make its profit margin incomparable to those of Android manufacturers. Including Apple would substantially inflate the overall average profitability level and obscure the true profitability of other smartphone manufacturers who are under intense competition. Therefore, after excluding Apple and

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13 Lenovo Q4 and FY24/25 Earnings Announcement, May 22, 2025:

[https://investor.lenovo.com/en/financial/results/presentation\\_2425\\_q4.pdf](https://investor.lenovo.com/en/financial/results/presentation_2425_q4.pdf).

14 Xiaomi: [https://ir.mi.com/system/files-encrypted/nasdaq\\_kms/assets/2025/03/18/5-38-56/%E8%8B%B1%E6%96%87%E5%85%AC%E5%91%8A.pdf](https://ir.mi.com/system/files-encrypted/nasdaq_kms/assets/2025/03/18/5-38-56/%E8%8B%B1%E6%96%87%E5%85%AC%E5%91%8A.pdf).

15 Visual capitalist, Charted: How Apple Makes its \$391B in Revenue, March 20, 2025, <https://www.visualcapitalist.com/charted-how-apple-makes-its-391b-in-revenue/>.

16 Cliff Snotes, Apple Vs Samsung, Dec 5, 2024, <https://www.cliffsnotes.com/study-notes/22809299>.

17 The Economic Times, Dial M for margins: Chinese phone companies offer higher share to retailers, Jan 10, 2024, <https://economictimes.indiatimes.com/industry/cons-products/electronics/dial-m-for-margins-chinese-phone-companies-offer-higher-share-to-retailers/articleshow/106676869.cms>. While the data cited in the press release primarily targets the Indian market, given that India is one of OPPO and vivo's core shipping regions, data from that market can also reflect the overall gross profit margins of both companies to a considerable extent.

18 The data is from Transsion Holdings' 2024 annual report.

19 The WeChat public account "6G Standards and Technology Exploration" published an article titled "Omdia Releases 2025 RAN Market Landscape Report: Ericsson Wins Double Championship, Huawei Closely Follows, Five Major Vendors Control 93.6% of the Market," on October 13, 2025: [https://mp.weixin.qq.com/s/fAO6\\_Mgtv16TkISR0nQIEg](https://mp.weixin.qq.com/s/fAO6_Mgtv16TkISR0nQIEg).

20 Omdia, Global smartphone shipments rebound with 7.1% growth in 2024, amid industry recovery, Feb 4, 2025, <https://omdia.tech.informa.com/pr/2025/feb/omdia-global-smartphone-shipments-rebound-with-7point1-percent-growth-in-2024-amid-industry-recovery>.

recalculating the weighted average by market share, the adjusted gross profit margin is only 16.61%. This suggests that network infrastructure vendors' capacity to bear cellular SEP royalties is approximately 2.6 times that of smartphone manufacturers. In conclusion, from the gross profit margin perspective, base station vendors' capacity to bear cellular SEP royalties is roughly 2.1–2.6 times that of UE manufacturers.

### **(3) Comparison Between the Base Station Side and the UE Side**

In theory, the responsibility of delivering returns to SEP right holders should be shared equally between the base station equipment side and the smartphone manufacturer side, or sometimes dubbed as the mobile terminal (UEs) side. However, statistical data reveal that — if measured by the amount of standard proposals — the smartphone manufacturer side accounts for roughly 30% of standard proposals, yet nearly all royalties are currently collected from the smartphone manufacturers. Furthermore, smartphone manufacturers currently do not receive significant licensing revenues from the base station equipment side proportional to their contribution in the standard-setting process.

One major reason for this discrepancy is that although many core inventions originate from technical requirements of network infrastructure (e.g., base stations), licensing fees are often targeted at the smartphone side. When designing patent portfolios, even when certain patents clearly belong to the base station domain, patent holders often emphasize their implementation paths in terminal devices to justify extending their licensing coverage to the smartphone market.

According to Counterpoint Research and Business Standard, global smartphone industry revenue in 2022 was approximately USD 409 billion,<sup>21</sup> and the aggregate 5G SEP industry royalty rate was about 5%. Hence, total SEP licensing income for the smartphone industry can be estimated as:

Smartphone industry revenue  $\times$  5G aggregate royalty rate = 409  $\times$  5% = USD 20.45 billion.

Furthermore, studies estimate that SEP annual licensing income for 2G, 3G, and 4G mobile communication technologies did not exceed USD 20 billion, representing roughly 5% of total global smartphone sales, with Qualcomm, Alcatel-Lucent, Ericsson, InterDigital, and Nokia being the main beneficiaries.<sup>22</sup>

Similarly, according to Charles River Associates (CRA), total licensing revenue for the world's top 17 SEP licensors reached EUR 11.3 billion (approximately USD 13.167 billion) in 2022. However, since many SEP holders do not disclose their licensing revenues, this figure likely underestimates the true total. CRA estimated that due to opacity and other factors, the reported figure might represent only 59% of actual global SEP licensing income—implying that the true amount could reach EUR 19.1 billion (approximately RMB 152 billion or USD 22.397 billion). This finding is in line with our previous estimates.

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21 Business Standard, Global smartphone revenue fall by 9% to \$409 billion in 2022: Report, Feb 05, 2023, [https://www.business-standard.com/article/technology/global-smartphone-revenue-fall-by-9-to-409-billion-in-2022-report-123020500518\\_1.html](https://www.business-standard.com/article/technology/global-smartphone-revenue-fall-by-9-to-409-billion-in-2022-report-123020500518_1.html).

22 Paperzz, Cumulative mobile-SEP royalty payments no more than, <https://paperzz.com/doc/7711619/cumulative-mobile-sep-royalty-payments-no-more-than>.

Globally, the market for integrated network infrastructure equipment used by telecom operators is enormous. In the submarket focused on mobile network equipment, multiple research and industry reports estimated that the global market size in 2024 would reach approximately USD 113.8 billion.<sup>23</sup> Dividing the estimated smartphone industry SEP licensing income by the mobile network equipment market size—assuming all royalties are shared equally between network and UE sides—yields a network-side licensing rate of:  $20.45 / 113.8 = 17.97\%$ . Comparing the base station side and the UE side, the ratio of the two aggregate royalty rates is thus:  $17.97\% \div 5\% = 3.59$ .

#### **4. Conclusion**

This report investigates the issue of determining SEP royalty rates for base stations. Section 1 outlines the evolution of SEP right holders in the cellular communication industry, emphasizing the necessity of addressing base station royalty rates. Section 2 examines the diversity of SEP licensing rates. Section 3 discusses—through the lens of (1) the relative value contribution of cellular communication functions in smartphones and base stations, (2) licensees' profitability and their capacity to bear royalty burdens, and (3) the comparison between the base station and UE sides—that base station SEP licensing should differ from smartphone licensing.

In conclusion, considering practical implementation and reasonable licensing perspectives, we believe that the aggregate royalty rate for the base station side should be approximately 2.5 to 3 times that of the UE side, with a multiple close to 3 being the more reasonable range in our view.

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<sup>23</sup> Wiseguy, Global Mobile Network Telecom Equipment Market Research Report, Jun 24, 2024, <https://www.wiseguyreports.com/reports/mobile-network-telecom-equipment-market>.  
Market Research Future, Network Equipment Market, Sep 2025, <https://www.marketresearchfuture.com/reports/network-equipment-market-33523>.  
Delloro, Worldwide Telecom Equipment Down 11 Percent in 2024, March 19, 2025, <https://www.delloro.com/worldwide-telecom-equipment-down-11-percent-in-2024/>.