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5G Standard Essential Patents: The Reality Behind the Numbers

How to navigate the 5G SEP landscape by leveraging crucial insights from Concur IP's latest manual essentiality analysis





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Who We Are

Concur IP is a widely recognized and trusted partner for conducting Standard Essential Patent (SEP) essentiality studies. Our team has expertise in working on standards related to cellular communication, audio-video codecs, WiFi, wireless charging, and Passive Optical Networks (PON).

For this study, Concur IP's team of wireless telecom engineers drew on their deep understanding of standard specifications gained from studies to support clients in licensing negotiations, royalty rate disputes, international arbitrations, and litigation. Concur IP's SEP studies have been relied upon by judges for royalty rate calculations in several court cases and international arbitrations. Our team members have testified in international arbitrations and litigations on the basis of our essentiality analysis. Multiple industry experts have endorsed our SEP studies as highly accurate based on their extensive spot checking, ultimately using the findings in FRAND royalty rate calculations using the top-down approach.

Examples of litigation matters which have used Concur IP's studies:

- TCL v Ericsson
- Unwired Planet v Huawei
- ASUS v InterDigital
- Huawei v T-Mobile

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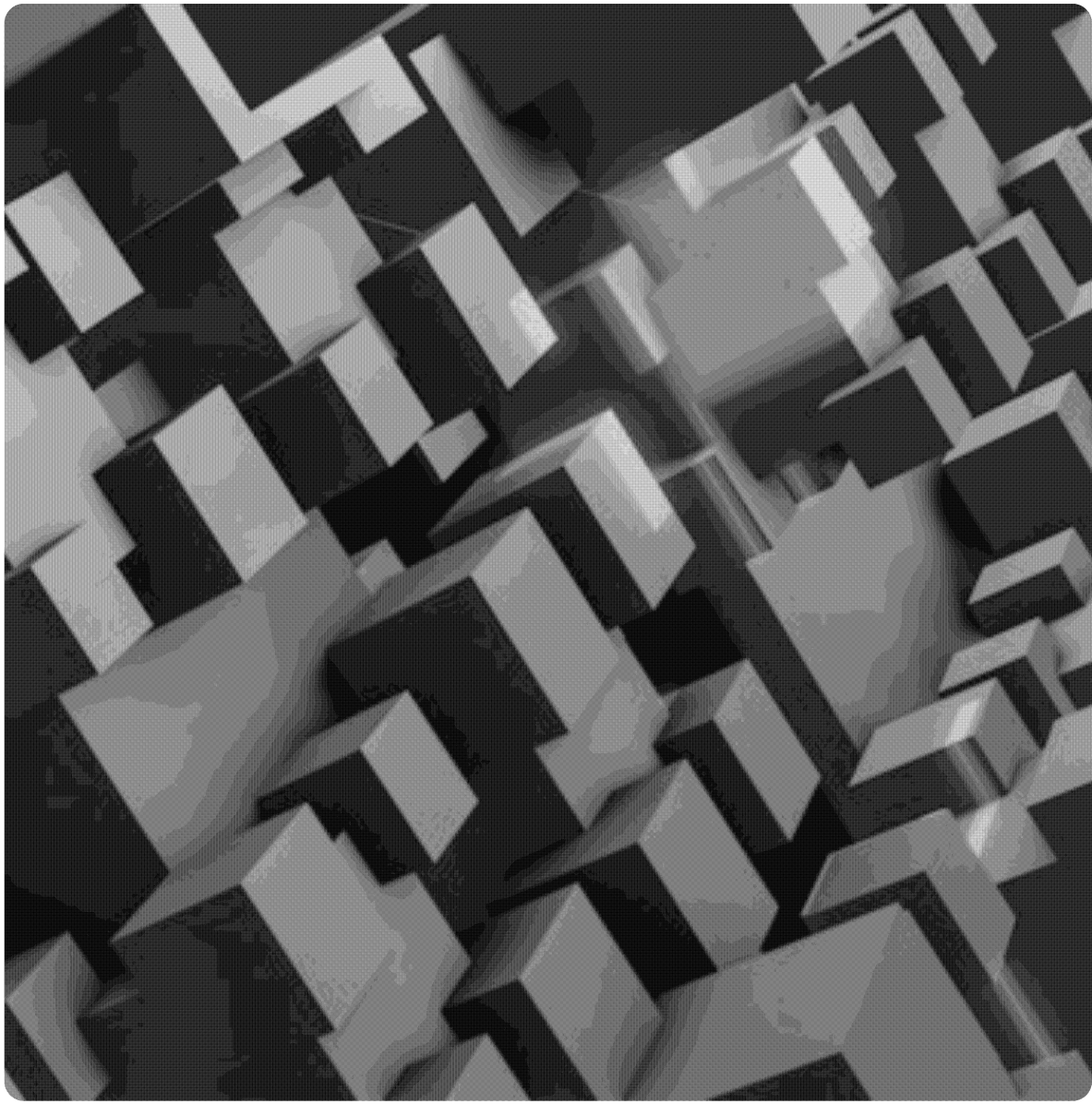
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Executive Summary

Manual essentiality analysis is a MUST to extract transparent and reliable 5G SEP insights and assess relative strengths of 5G portfolios of SEP owners.

5G patent declarations are exploding at unprecedented levels, making it extremely difficult for corporates and law firms to extract critical insights for licensing negotiations and litigations.

As of November 2023, there were more than 75,000 5G families declared to ETSI, out of which more than 65,000 families have at least one patent filing in US, EP, or CN. In this report, we navigate the complex 5G SEP landscape to uncover the declaration trends, major geographies owning the 5G SEPs, and true essentiality statistics of SEP owners using manual essentiality analysis.



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This study included analysis of 5G patents declared to ETSI up to December 31, 2022. A total of around 350,000 patents grouped in more than 67,000 patent families ("declared families") were found relevant to 5G with about 41,000 families active (granted and alive) in US, Europe, or China. A sample of over 20,500 families (i.e., 50% of the total families active in US, Europe, or CN) was assessed using manual analysis of patent claims against the declared standards. Around 4,000 essential families were found, indicating an average essentiality rate of around 20%. Among the SEP owners, there are huge variations in essentiality rates; thus, it is very important to proactively identify true essentiality rate of a SEP holder for effective licensing negotiations.

The report can be used to obtain crucial insights such as Essentiality Rate of each patent owner, Distribution of SEP families into UE (User Equipment) SEP families and Non-UE SEP families, and % share of each patent owner in the total share of SEPs. 5G implementers should be proactive in obtaining essentiality insights of SEP holders and approach licensing negotiations armed with reliable essentiality analysis reports.

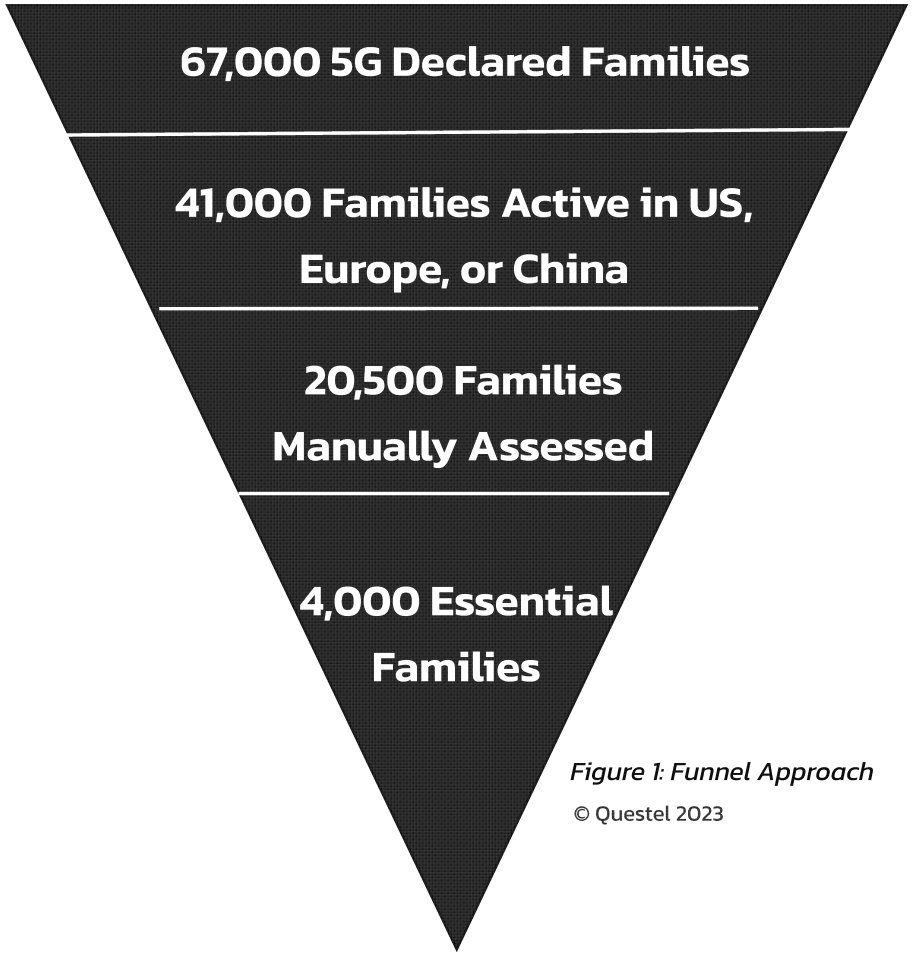


Figure 1: Funnel Approach

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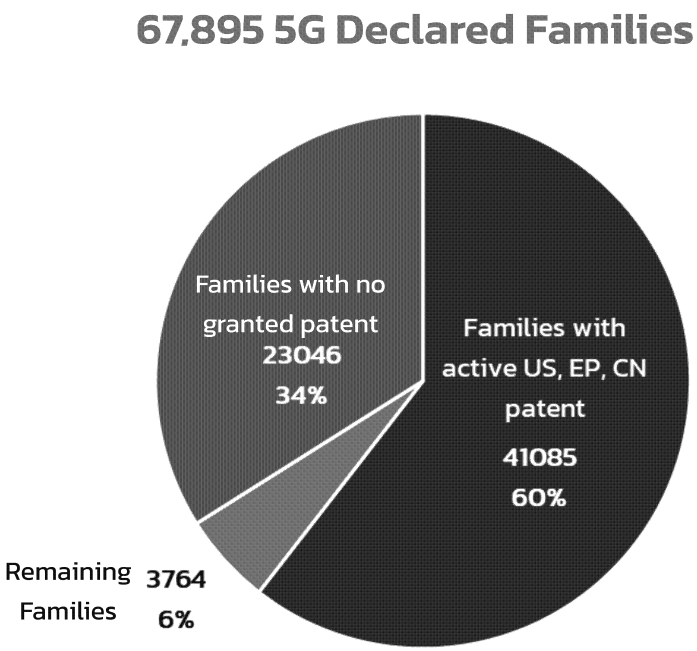


Figure 2: Distribution of 5G Declared Families

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5G: An Already Crowded Area!

Huge number of 5G families along with wide coverage in key geographies show the willingness of the patent owners to occupy as much space as possible.

The cut-off date used for preparing our dataset is December 31, 2022. The dataset included 67,895 5G families declared to ETSI. We further divided the dataset into three categories:

- Families with active (granted and alive) US, EP, or CN patents
  (41,085 families comprising 60% of the total declared families)
- Families having no granted patent
  (23,046 families comprising 34% of the total declared families)
- Remaining families
  (3,764 families comprising 6% of the total declared families)

Out of the 23,046 families without any granted patent, around 72% have at least one US, EP or CN published application, indicating that these families will soon move to the category of families with active US, EP, or CN patents.

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The Race for Ownership

Since the very first 3GPP activities started, there has been a fast and growing race to have the biggest 5G portfolio possible.

3GPP standardization activities for 5G standards started in 2015, resulting in an increasing trend in the priority filings of 5G families from 2015 onwards.

The 2017-2019 period saw the maximum number of priority filings, with over 9,000 patents filed each year.

Note: Patent data for the recent priority years (2021 and 2022) may not be complete, as there is usually a time lag between application filing and publication.

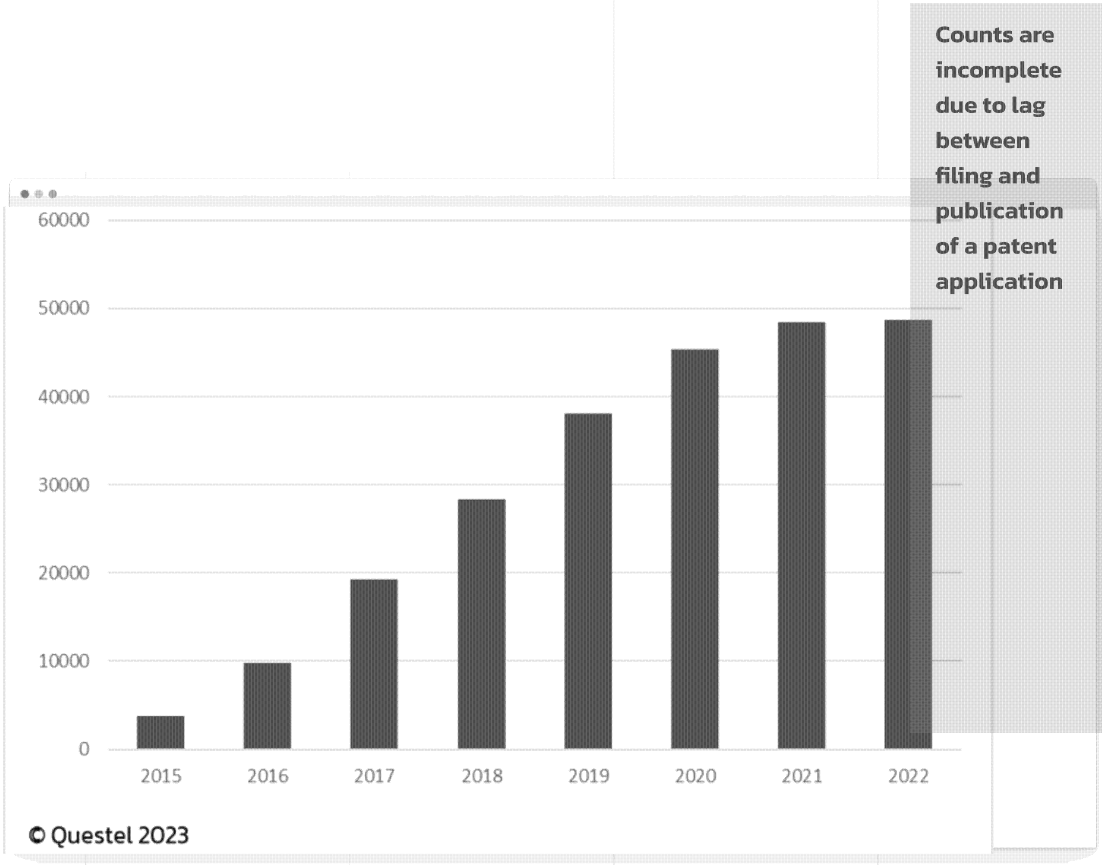


Figure 3: Cumulative Number of declared families by priority year

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The Top 5G Industry Players

A few telecom players own most of the 5G technology. They are investing dozens of millions per year resulting in huge revenue expectations from SEP licensing. 5G users, be ready for those large expectations!

- The top 10 declaring companies hold a majority (75%) of 5G patent families.
- Chinese companies have a stronghold on 5G patents with four out of the top 10 players being Chinese companies.
- The relative positions of the patent owners shown in Figure 4 (right) is based on the count of declared families, without any filter of essentiality analysis. The relative position may change significantly after the filter of essentiality analysis is applied.

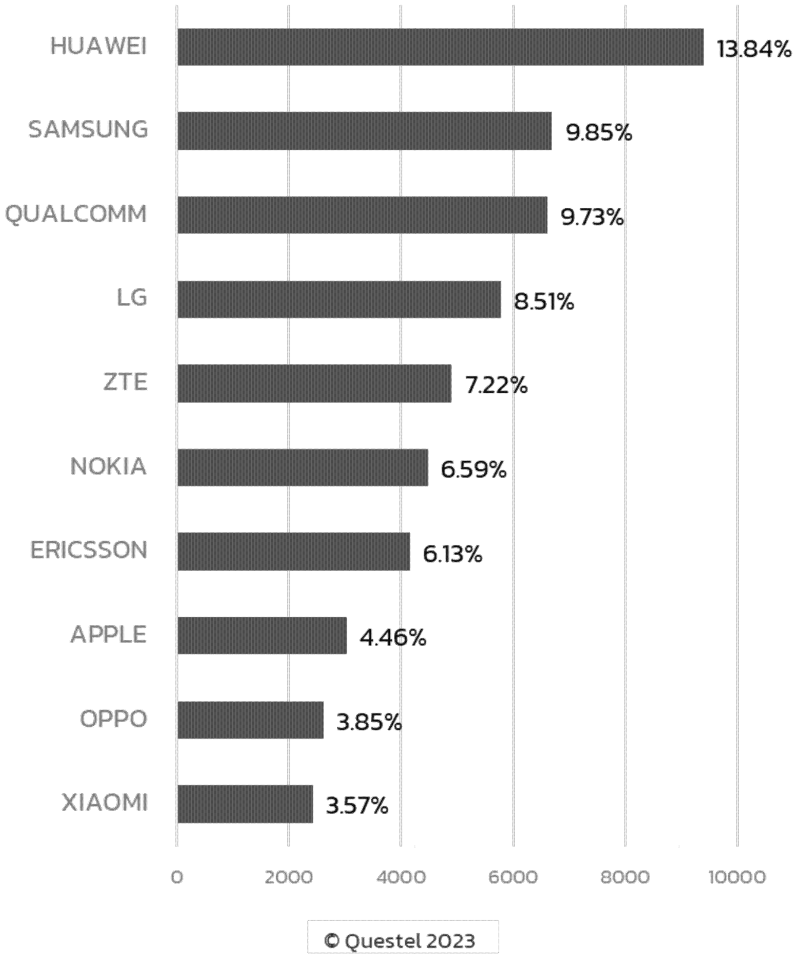


Figure 4: Distribution of declared families by patent owner

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Geographical Distribution of 5G Declared Families

5G patents are everywhere!

- Patent owners seek wider geographical protection to cover local players of various geographies within the licensing net and to increase the chance of getting at least one granted member within a family.
- China and the US are very close to each other, both having over 45,000 5G declared families.
- The US is ahead of China and other countries when comparing families with aa granted patent.
- Only 25% of the total declared families have a Japanese granted patent/patent application.

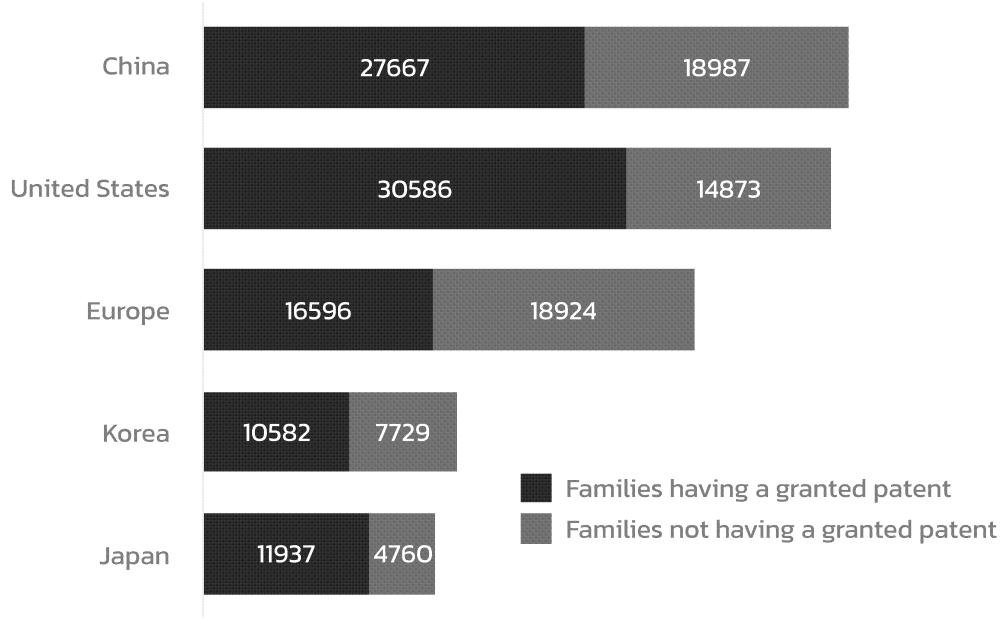


Figure 5: Geographic Distribution of declared families

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5G Top Player Dynamics

In addition to the number of patent families, top players have searched for maximum impact with large protection and high and fast granting rates.

- Out of the 67,895 declared 5G families, 41,085 families have at least one granted and alive patent in US, EP, CN.
- Figure 6 shows the distribution of families with active US, EP, or CN patent by patent owners. Huawei is well ahead of others, not just in terms of the declared families but even for the families with at least one granted and alive patent in US, EP, CN.
- Figure 7 shows the distribution after combining the families with at least one active patent in US, EP, CN and the families having only published applications in US, EP, CN (which are likely to be granted in the upcoming years). The ranking of the top 10 companies does not differ much, except Samsung <-> LG and ZTE <-> Nokia switching their positions, indicating a strong hold by top 10 patent owners of their respective positions in the coming years.
- In addition to high filings, top patent owners have managed to accelerate examination procedures and rapidly develop granted portfolios to assist in licensing/litigations initiatives.

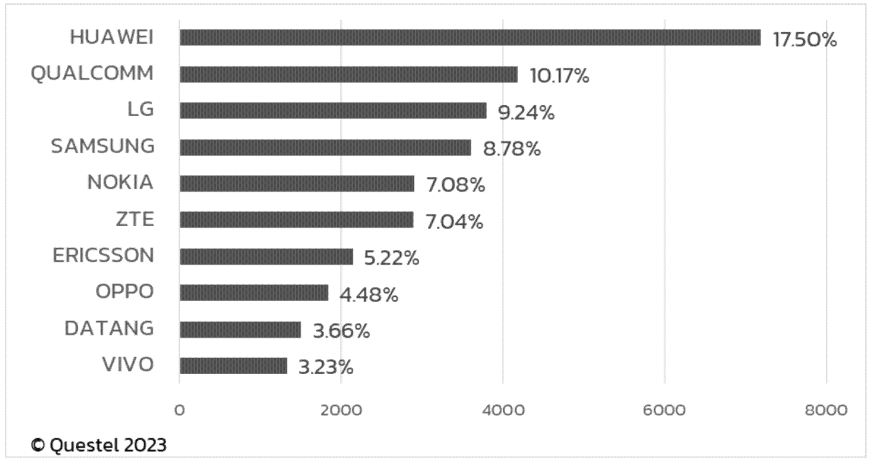


Figure 6: Distribution of families with active US, EP, CN patents by patent owner

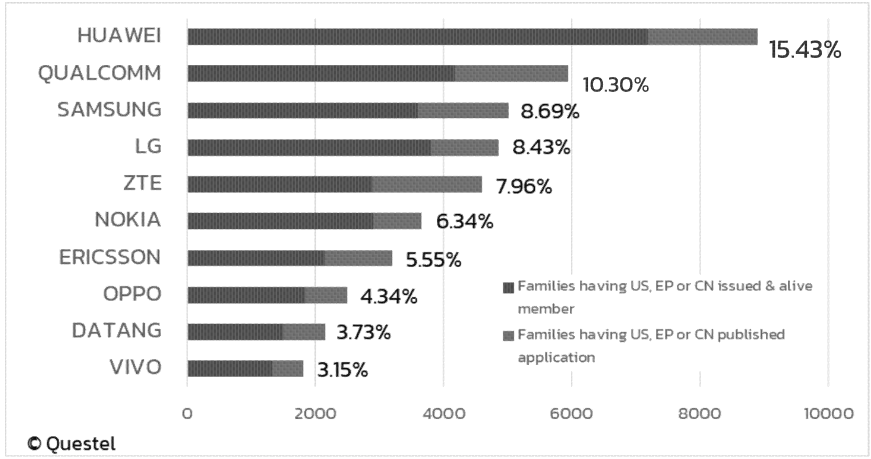


Figure 7: Distribution of families with US, EP, CN patent/application by patent owner

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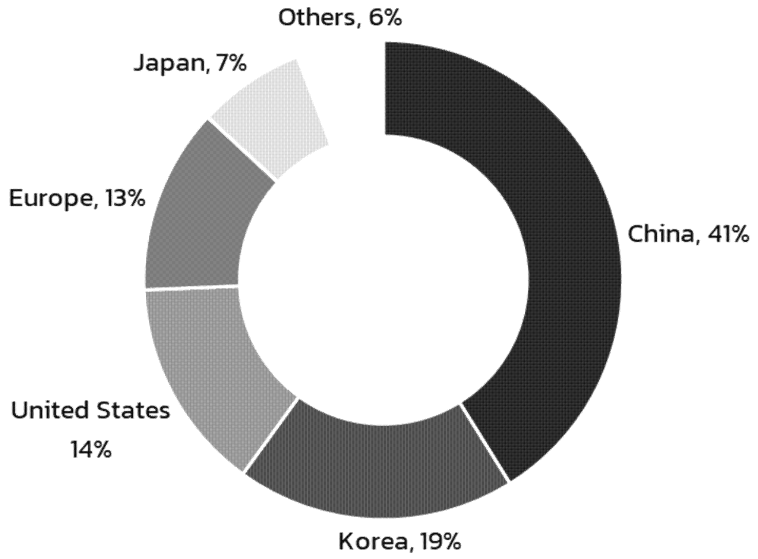
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Ownership of the 5G Declared Families

The battle for 5G declarations has been won by Chinese players. In the absence of essentiality checks, this could lead to unexpected leverage forces and huge shift in flow of licensing revenues from US/Europe to China.

- With 41% of the families having at least at least one granted and alive patent in US, EP, CN owned by Chinese companies, China certainly dominates the 5G market, with Chinese companies filing 5G-related patents worldwide.
- Interestingly, the share of the 5G patent families owned by US companies is substantially less at 14%. This is even lower than the share owned by Korean companies, which hold 19% of the 5G families with an active US, EP, CN patent.

More than 40% of 5G families having an active US, EP, CN patent are owned by Chinese companies



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Figure 8: Ownership of 5G families with active US, EP, or CN patent

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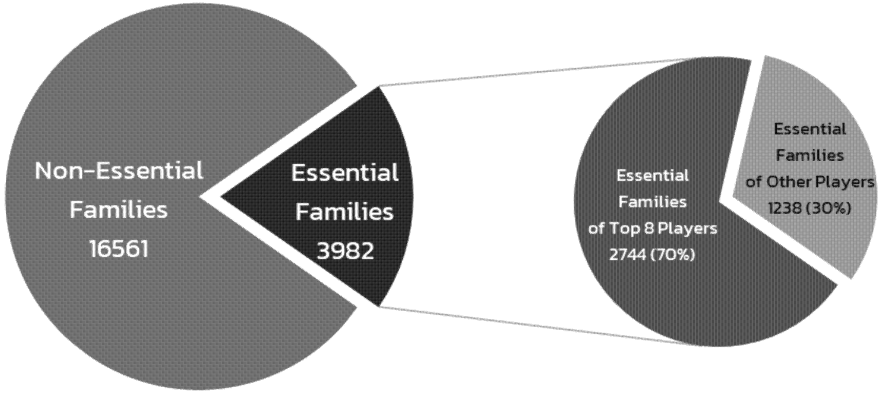
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5G Essentiality Statistics

5G users, don't believe in declarations only! You need more accurate data to finely understand the real picture.

We sampled 20,543 (50%) families out of 41,085 families with at least one active patent in US, EP, CN:

- For each of the top SEP owners, the sample included more than 40% of their declared families to include a fair representation of each SEP owner.
- Around 20% families were found to be truly essential to the 5G standards. The essentiality rate varies a lot among the patent owners.
- Around 70% of the total essential families are owned by the top 8 players.



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Figure 9: Distribution of Truly Essential Families

How to identify strong and weak patents

Essentiality analysis can be used to separate strong patents from weak patents within a portfolio and design separate strategies for them.

For Strong patents:

- Prepare detailed claim charts
- Conduct validity searches

For Weak patents:

- Out-license or sell
- Manage costs (reduce filings in certain tech areas, abandon/lapse)

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Sample Essentiality Statistics

Examples of key findings covered in our 5G SEP report

Some of the findings from manual essentiality analysis include:

- Essentiality Rate of each patent owner = % of Essential families out of total analyzed families of the patent owner
- Distribution of SEP Families into UE SEP Families and Non-UE SEP Families.
- % share of each patent owner in the total share of SEPs: This is computed by extrapolating the findings from the analysis of the sampled families to obtain the numerator and the denominator for calculating the patent owner's share.

Top 10 Players (In Alphabetical Order)	Essential Families	Analyzed Families	Essentiality Rate
DATANG	[illegible]	[illegible]	[illegible]
ERICSSON	[illegible]	[illegible]	[illegible]
HUAWEI	[illegible]	[illegible]	[illegible]
LG	[illegible]	[illegible]	[illegible]
NOKIA	[illegible]	[illegible]	[illegible]
OPPO	[illegible]	[illegible]	[illegible]
QUALCOMM	[illegible]	[illegible]	[illegible]
SAMSUNG	[illegible]	[illegible]	[illegible]
VIVO	[illegible]	[illegible]	[illegible]
ZTE	[illegible]	[illegible]	[illegible]

Top 10 Players (In Alphabetical Order)	UE Essential Families	Non-UE Essential Families
DATANG	[illegible]	[illegible]
ERICSSON	[illegible]	[illegible]
HUAWEI	[illegible]	[illegible]
LG	[illegible]	[illegible]
NOKIA	[illegible]	[illegible]
OPPO	[illegible]	[illegible]
QUALCOMM	[illegible]	[illegible]
SAMSUNG	[illegible]	[illegible]
VIVO	[illegible]	[illegible]
ZTE	[illegible]	[illegible]

Top 10 Players (In Alphabetical Order)	Total Essential Families	% Share in SEP
DATANG	[illegible]	[illegible]
ERICSSON	[illegible]	[illegible]
HUAWEI	[illegible]	[illegible]
LG	[illegible]	[illegible]
NOKIA	[illegible]	[illegible]
OPPO	[illegible]	[illegible]
QUALCOMM	[illegible]	[illegible]
SAMSUNG	[illegible]	[illegible]
VIVO	[illegible]	[illegible]
ZTE	[illegible]	[illegible]

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5 Key Takeaways From Our Analysis

Our research has revealed the following key points of note:

1

Ownership

The ownership of true SEPs is very different from the ownership of the declared families.

2

Over declarations

Each player over-declares the patent families, resulting in overestimation of their true SEPs, and this overestimation varies greatly from one player to another.

3

Essentiality knowledge is vital

The information about true essentiality is crucial before engaging in any licensing discussions.

4

Benefits of manual analysis

The manual essentiality analysis can provide numerator and denominator to identify a patent owner's market share and corresponding FRAND royalty rate using a top-down approach.

5

Identifying strong patents

Essentiality analysis should be used to identify strong patents within a portfolio. Be ready with detailed claim charts, along with a thorough validity search for strong patents

Contact us

To find out more or to prepare for your upcoming licensing negotiations, get in touch for a copy of our manual essentiality analysis reports.

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Questel is an end-to-end IP solutions provider to more than 20,000 clients and 1.5 million users across 30 countries. Alongside our comprehensive software suite for searching, analyzing, and managing inventions, patents, designs, trademarks, and domain names, Questel also provides services supporting the IP lifecycle, including prior art searches, SEP analysis, patent drafting, brand protection, international filing, translation, and patent and trademark renewals.. These solutions, when combined with our IP cost management platform, deliver clients an average savings of 30-60% across the entire prosecution budget.

Contact our experts to find out more about any of the topics covered in this eBook, including manual essentiality analysis, standard essential patents, and 56 SEPs.

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About the Authors



Sanjay Nama is co-founder of Concur IP (a Questel company) with over 15 years of experience in the IP industry. He supports clients in crucial patent licensing studies on patent declarations, technical contributions, and manual essentiality analysis. He has drafted several reports providing critical insights for licensing negotiations and litigations.



Raj Makwana is a Senior Manager at Concur IP (a Questel company) with over 10 years of experience in the IP industry. He is a subject matter expert in telecom domain and has in-depth knowledge of cellular standard specifications.



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