IPLYTICS | Intellectual Property Analytics

How to Navigate Risk Webinar Part 1:

The Role of SEPs & Standards in the Auto Industry

Tim Pohlmann, CEO IPlytics GmbH

Recording: https://youtu.be/A2743XKvLxg

IPlytics Navigate Risk Webinar Series 2021

I. Navigate Risk Part 1: "The Role of SEPs in the **Auto Industry**"
October 12th, 2021
Recording: https://youtu.be/A2743XKvLxg

II. Navigate Risk Part 2: "The Role of SEPs for **Smart Factory** applications"
November 23rd, 2021
Registration: https://www.iplytics.com/webinars/upcoming/

III. Navigate Risk Part 3: "The Role of SEPs for **Smart Energy** applications"
December 7th, 2021
Registration: https://www.iplytics.com/webinars/upcoming/

Today's Speaker

- PhD and Post Doc. from CERNA, **MINES ParisTech** and **TU Berlin**.
- CEO and founder of IPlytics.
- 2021 IAM Strategist 300. Panel speaker and thought leader.
- Appointed faculty lecturer at:
  - **Technical University of Berlin -** Strategic Standardization
  - **CEIPI Université de Strasbourg -** SEPs and FRAND licensing
  - **EPFL Lausanne -** Big Data Driven Patent Intelligence
  - **PATON Ilmenau** – The Interplay of Patents and Standards
  - **European Patent Office** – SEP / FRAND and standards development

Today's Agenda

I. The Rise of SEPs and Standards

II. SEPs and Standards in the Auto Industry

III. Standard Development Initiatives in the Auto Industry

IV. SEP Patent Pool Programs for the Auto Industry

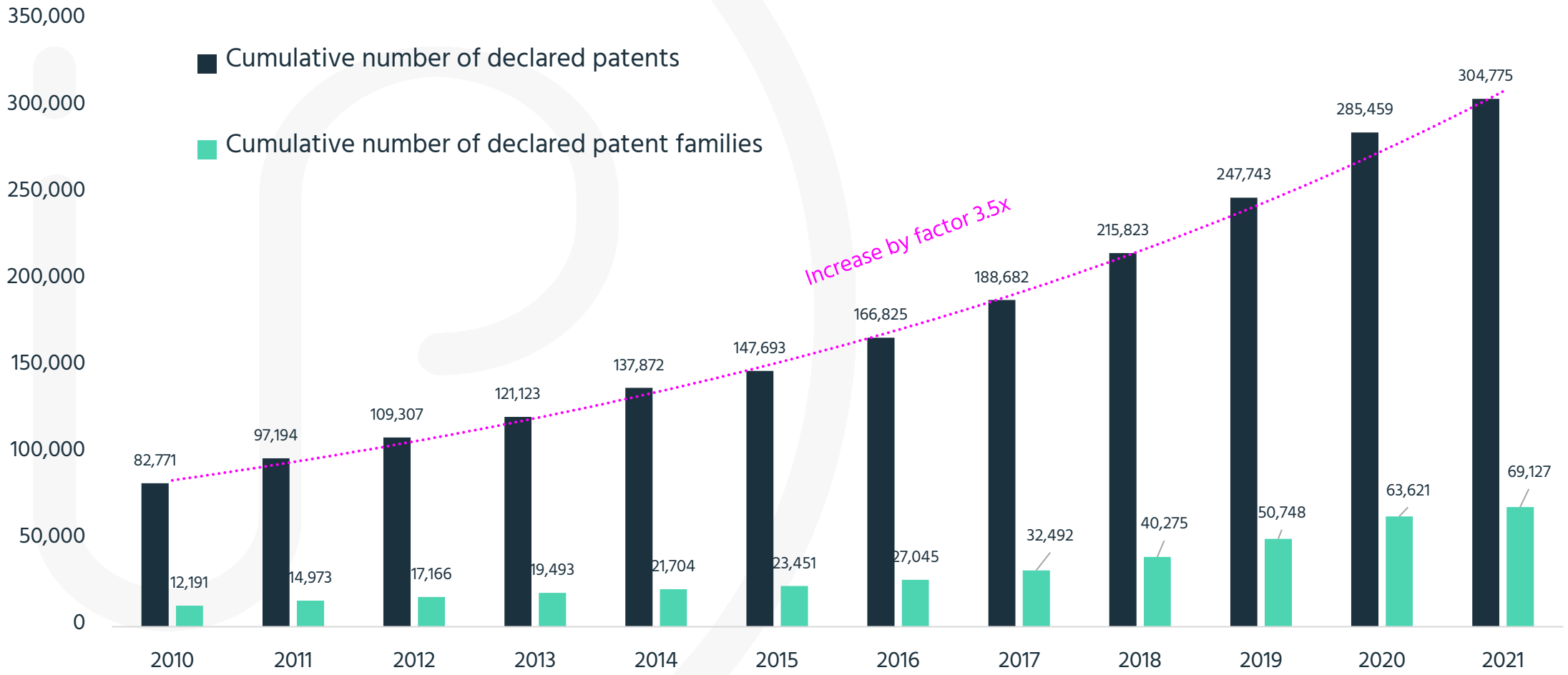
V. SEP Litigation Trends in The Auto Industry

VI. Patents and Standards Data to Navigate Risk

VII. Takeaways

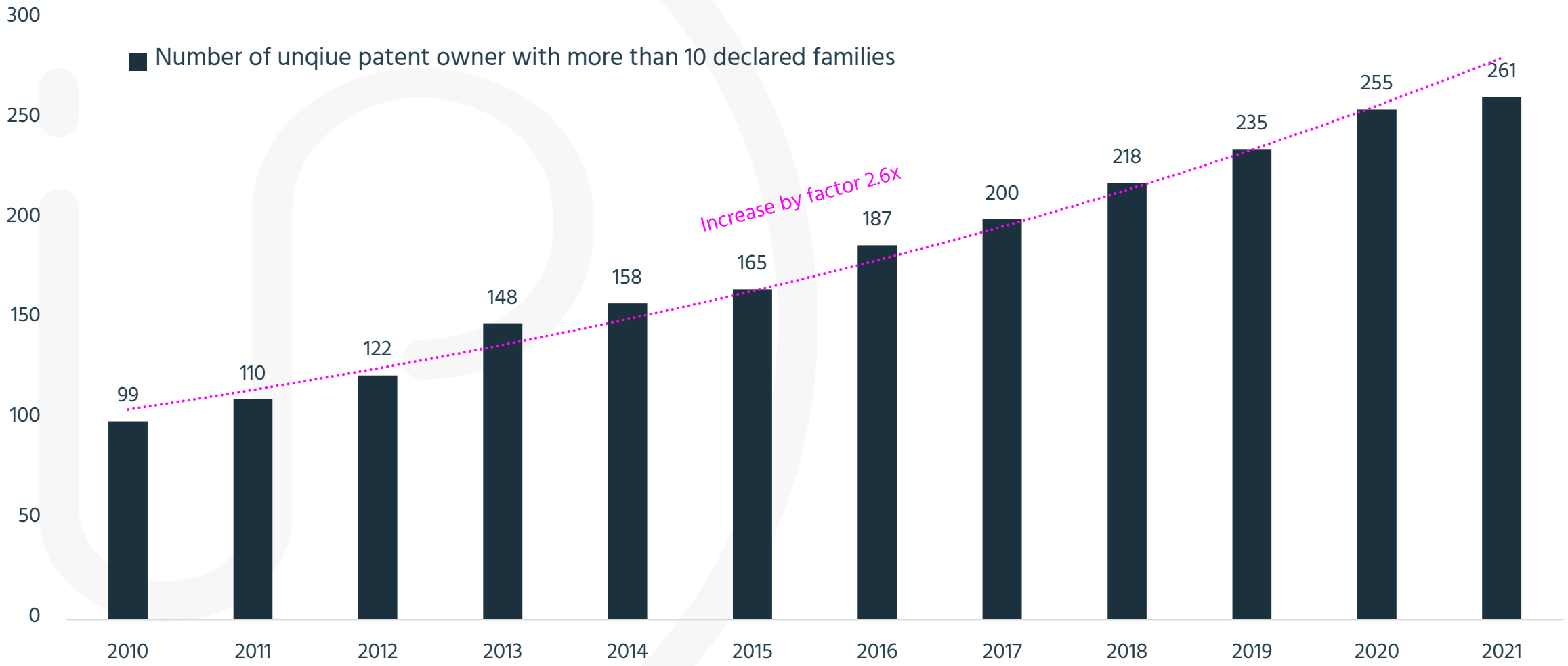
I. The Rise of SEPs and Standards

Number of declared patents over time (IPlytics 2021)



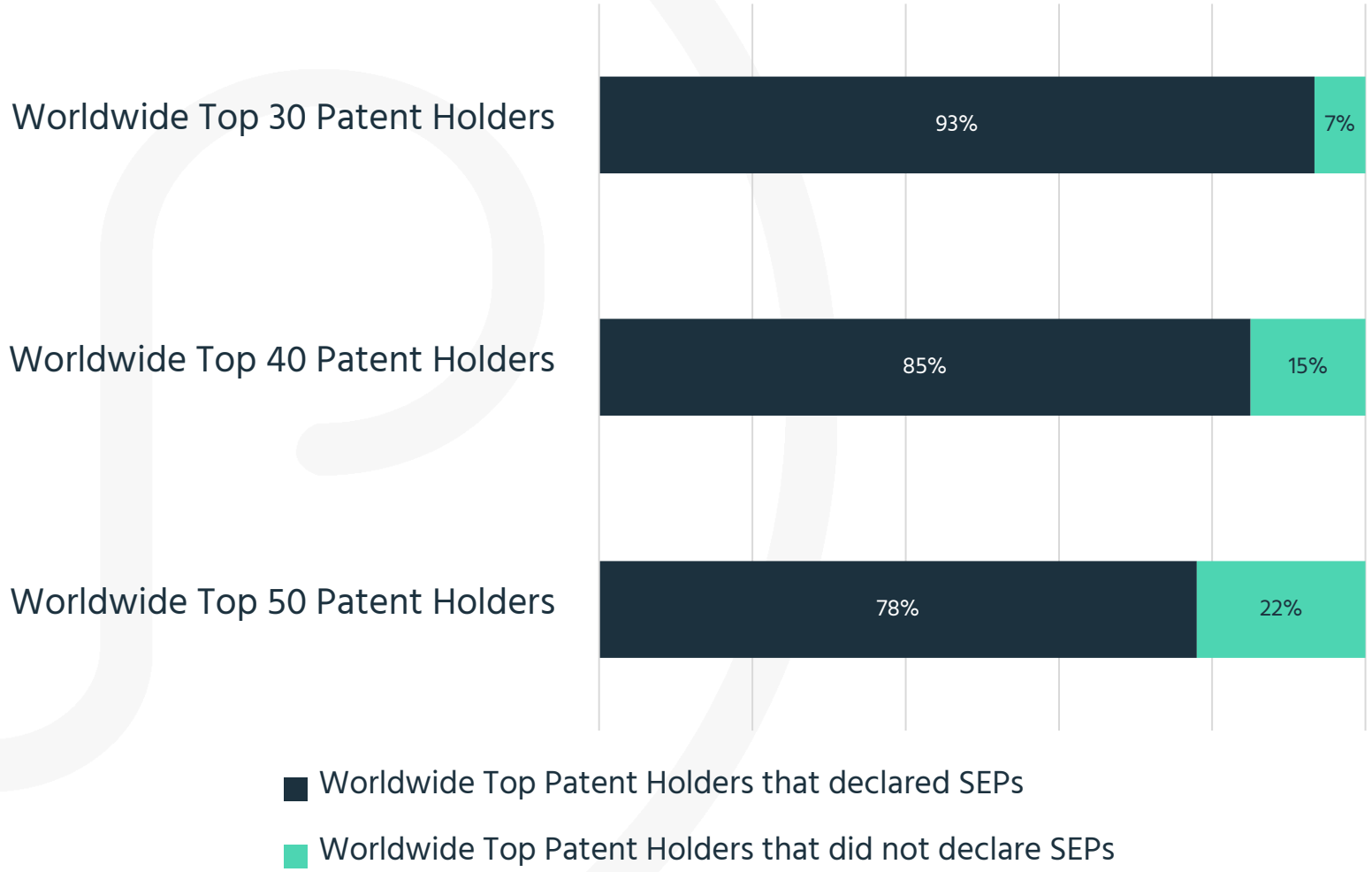
Source: https://www.iplytics.com/report/rise-standard-essential-patents/

Number of unique SEP holders over time (IPlytics, 2021)



Source: https://www.iplytics.com/report/rise-standard-essential-patents/

Share of SEP holders in top 50 (IPlytics, 2021)



Source: https://www.iplytics.com/report/rise-standard-essential-patents/

Number of unique SEP holders over time (IPlytics, 2021)

- The number of declared patents has more than **tripled** in 10 years (by factor **3.5x**)
- The number of **SEP holders** has more than **doubled** in 10 years (by factor **2.6x**).
- SEPs today are crucial to almost any large company actively pursuing R&D:
  - **78% of the top patent owners declare SEPs**.
- Many **automotive OEMs** and **supplier** among the SEP declaring companies including Continental (Germany), Volkswagen (Germany), Daimler (Germany), Nissan (Japan), Toyota (Japan), Denso (Japan) and PSA (France) and others.

➢ Companies do not own SEPs by chance. Patents describing an invention that is essential for technology standards are the outcome of **many years of R&D investments** and contributions to **standards developments.**

Source: https://www.iplytics.com/de/report/rise-standard-essential-patents/

II. SEPs and Standards in the Automotive Industry

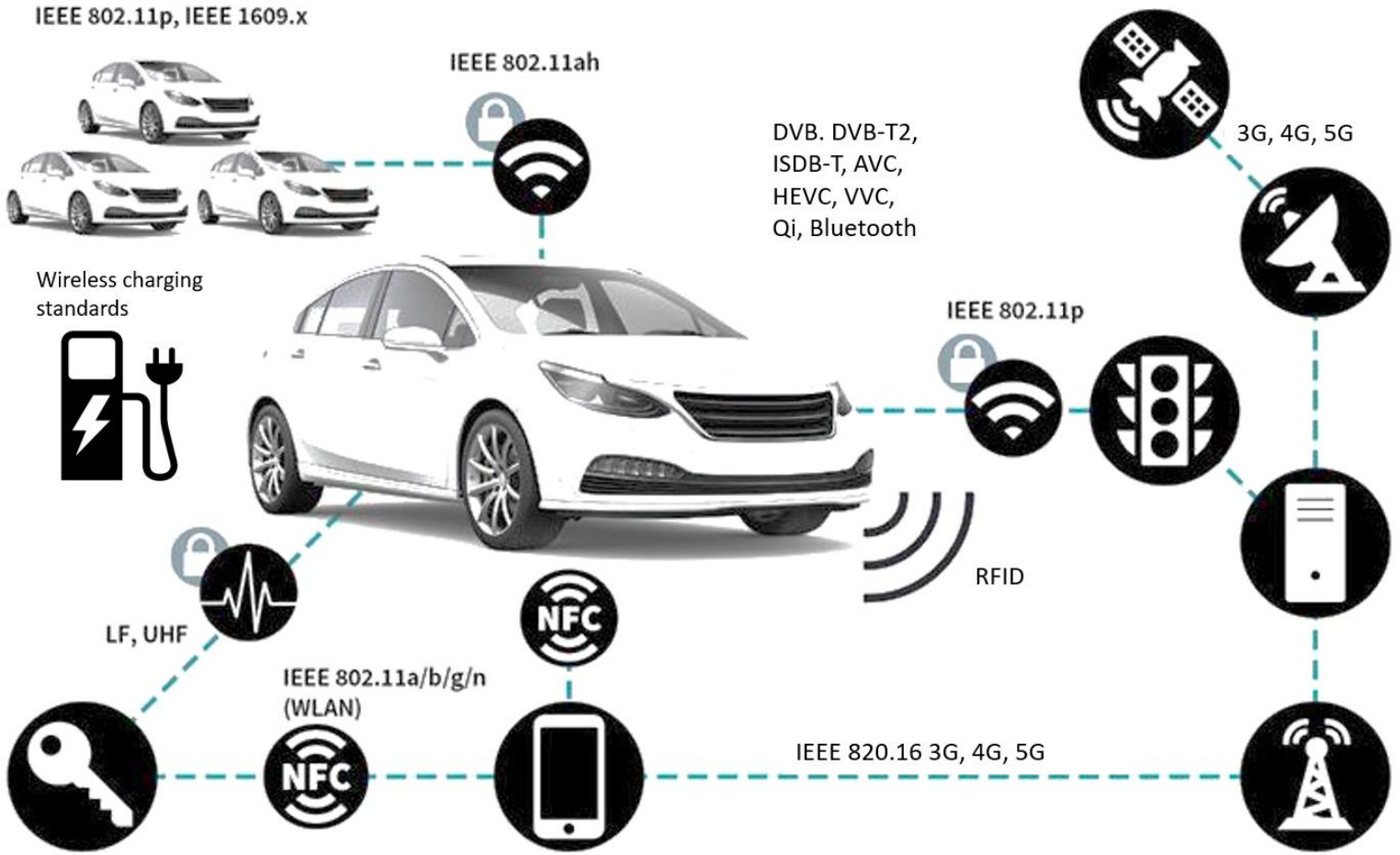
Auto industry looks set to change

Disruptive technology trends in the auto industry:

- **Electrification**
  - **Battery electric vehicles (BEVs) sold in 2020 share:** Norway (57.3%), Sweden (12.6%), Germany (10.7%), Austria (11.4%), the Netherlands (10.7%) and Switzerland (9.9%), the UK (8.1%) and France (7.9%), USA (2.5%), China (9.8%, largest BEV market in absolute terms)
- **Car sharing**
  - Projected market volume for Car-Sharing of **$15 billion** by 2025, CAGR 2021-2025 of **12.94%.** Expected to amount to **58.9 M users by 2025**.
- **Advanced Driver-Assistance Systems (ADAS)**
  - **85%** of vehicles produced globally in 2025 will have some level of **driving automation** (L1 and above). E.g. advanced cruise control (hands free), lane keep assist, automatic lane change, automatic emergency steering and braking, and fully automatic parking assist.

Source: https://www.marketresearchfuture.com/reports/in-car-wireless-charging-market-5746

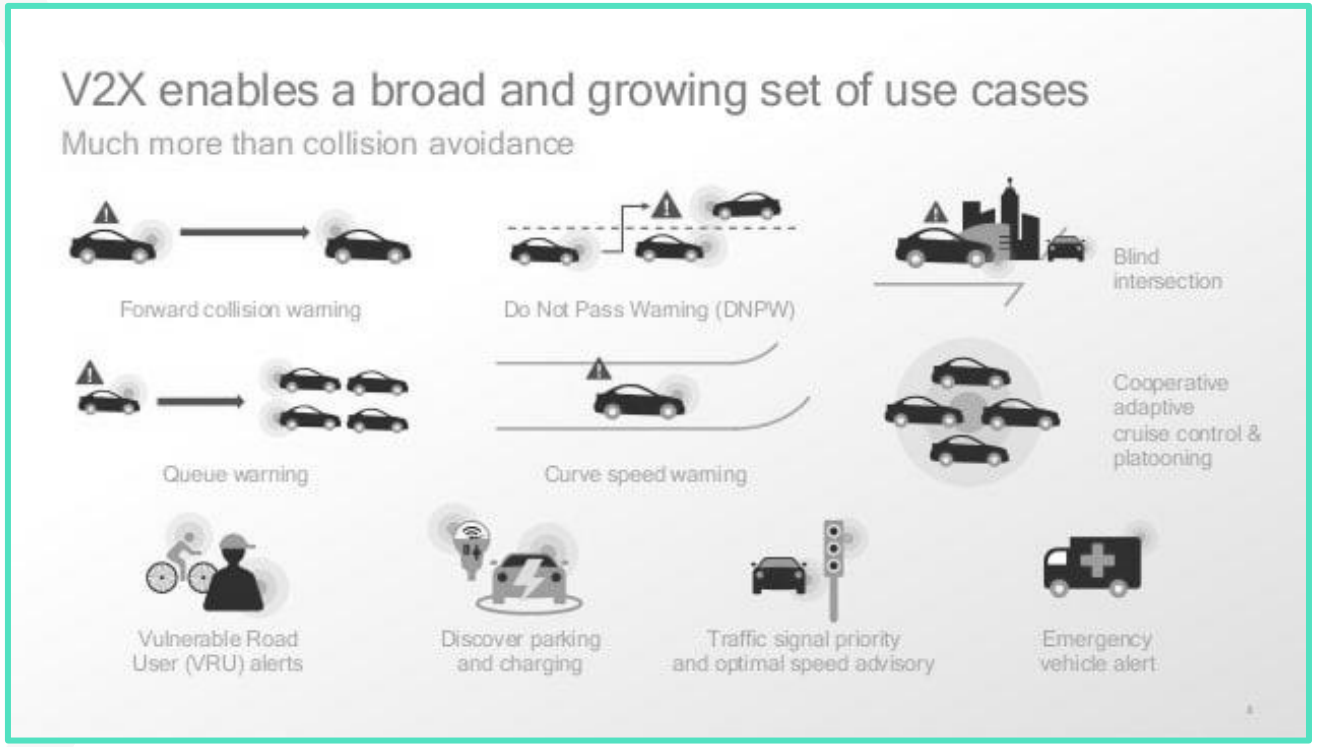
The connected vehicle



Source: https://www.iplytics.com/report/standard-essential-patents-auto-industry/

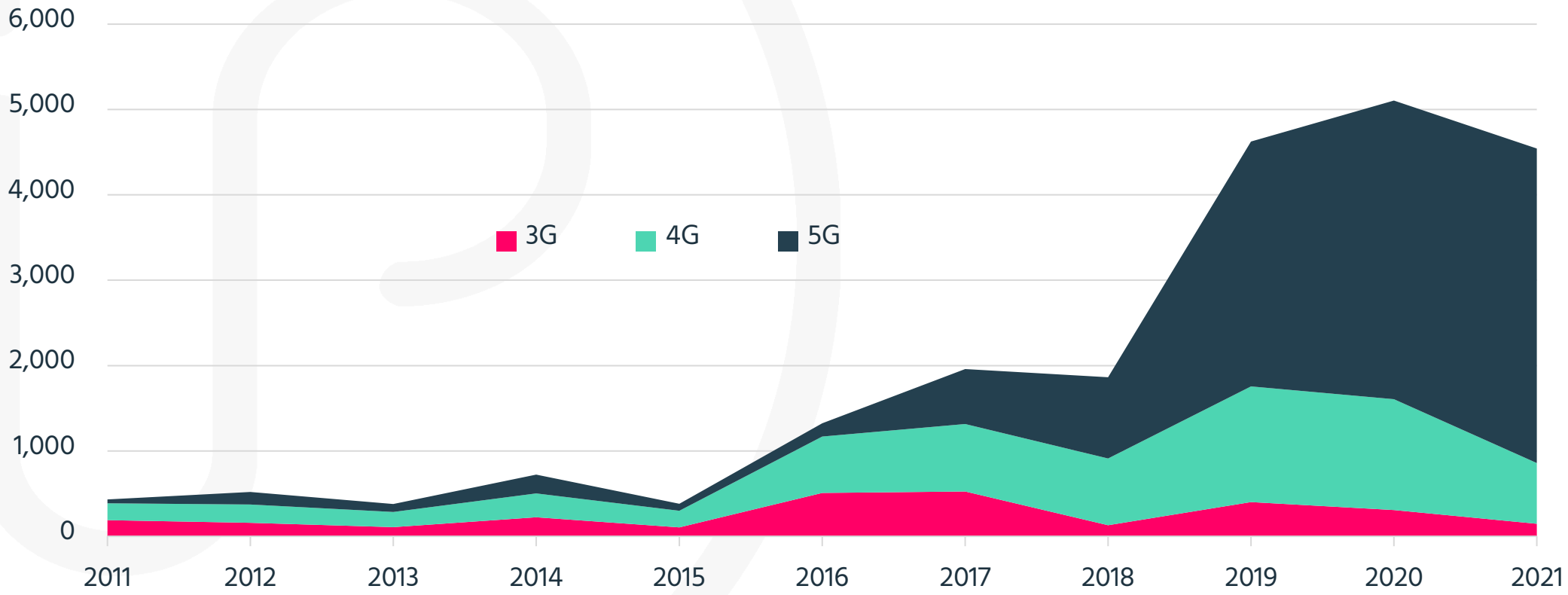
5G and Connectivity – **Smart Cars**

- **5G** enables larger bandwidth to allow cars to exchange real time information with, charging stations, parking lots, roadsides, traffic lights or other cars.
- **5G** will ensure a much more stable network to e.g. enable ADAS driving features to always connect to the Internet.
- **5G** will have a reduced latency to enable high quality streaming for e.g. conference video calls, on demand video streaming or gaming.



5G and Connectivity – **Smart Cars**

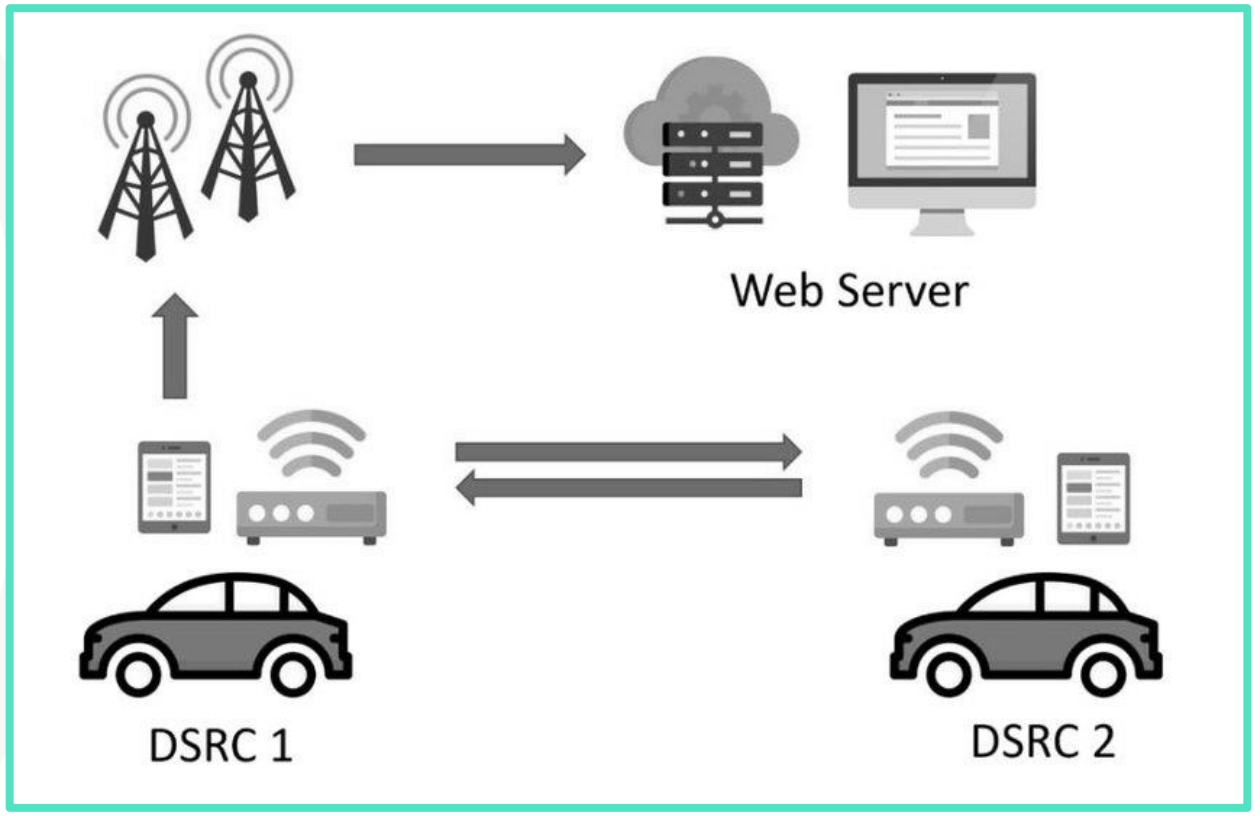
Number of declared patents that mention a vehicular application as to declared standards (IPlytics, 2021)



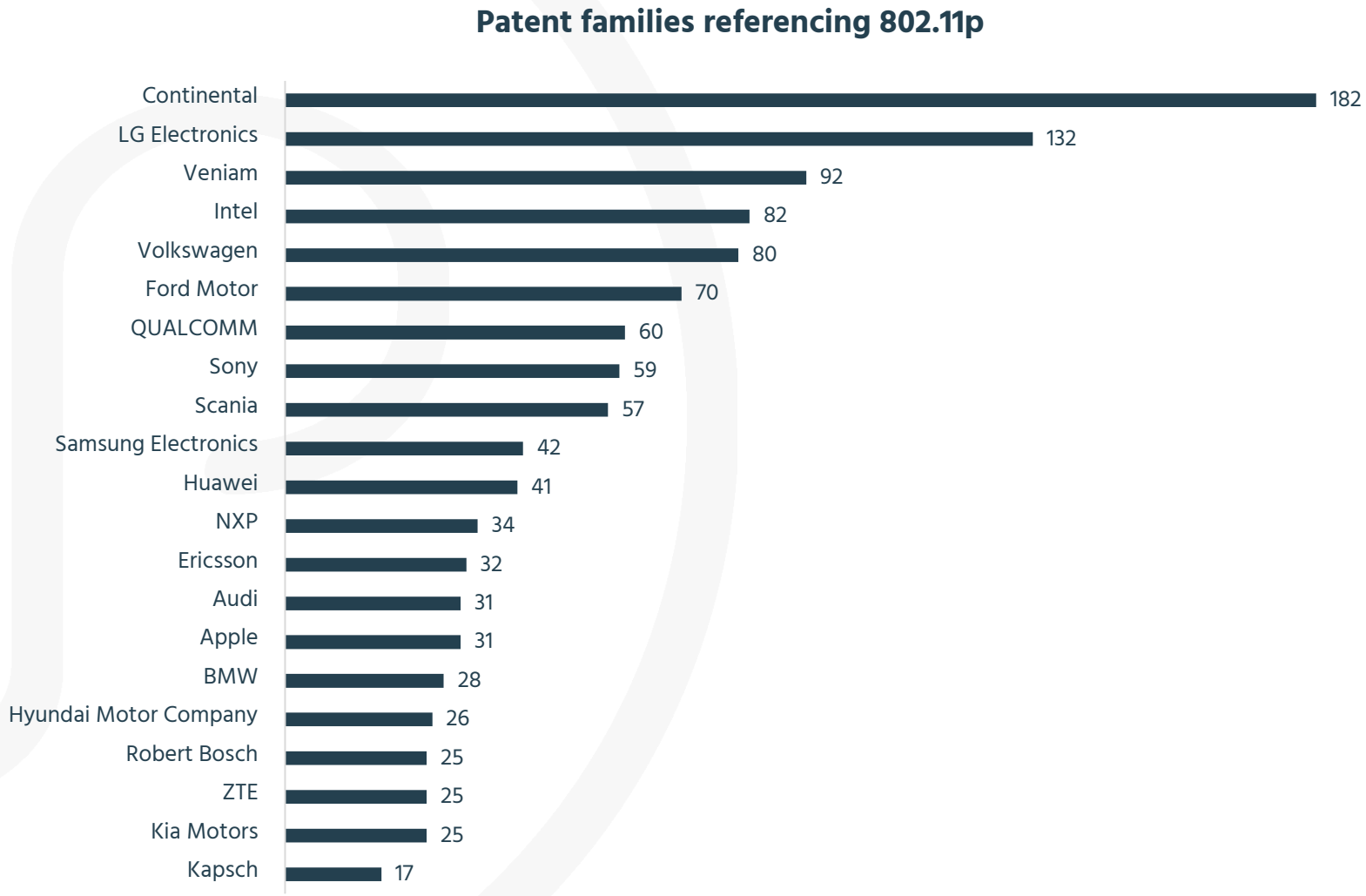
Source: https://www.iplytics.com/report/standard-essential-patents-auto-industry/

802.11p and Connectivity – **Smart Cars**

- **802.11p (DSRC)** enables larger bandwidth to allow cars to exchange real-time information among cars.
- **802.11p (DSRC)** has a Target Wait Time (TWT) feature for lower battery consumption enabling to integrate Wi-Fi sensors in traffic lights or buildings to only “wake up” when needed.
- **802.11p (DSRC)** will have a reduced latency to ensure exchange between high-speed vehicles and between the vehicles and the roadside infrastructure.
- It is estimated that **Wi-Fi (802.11)** is subject to **ten thousands of SEPs**

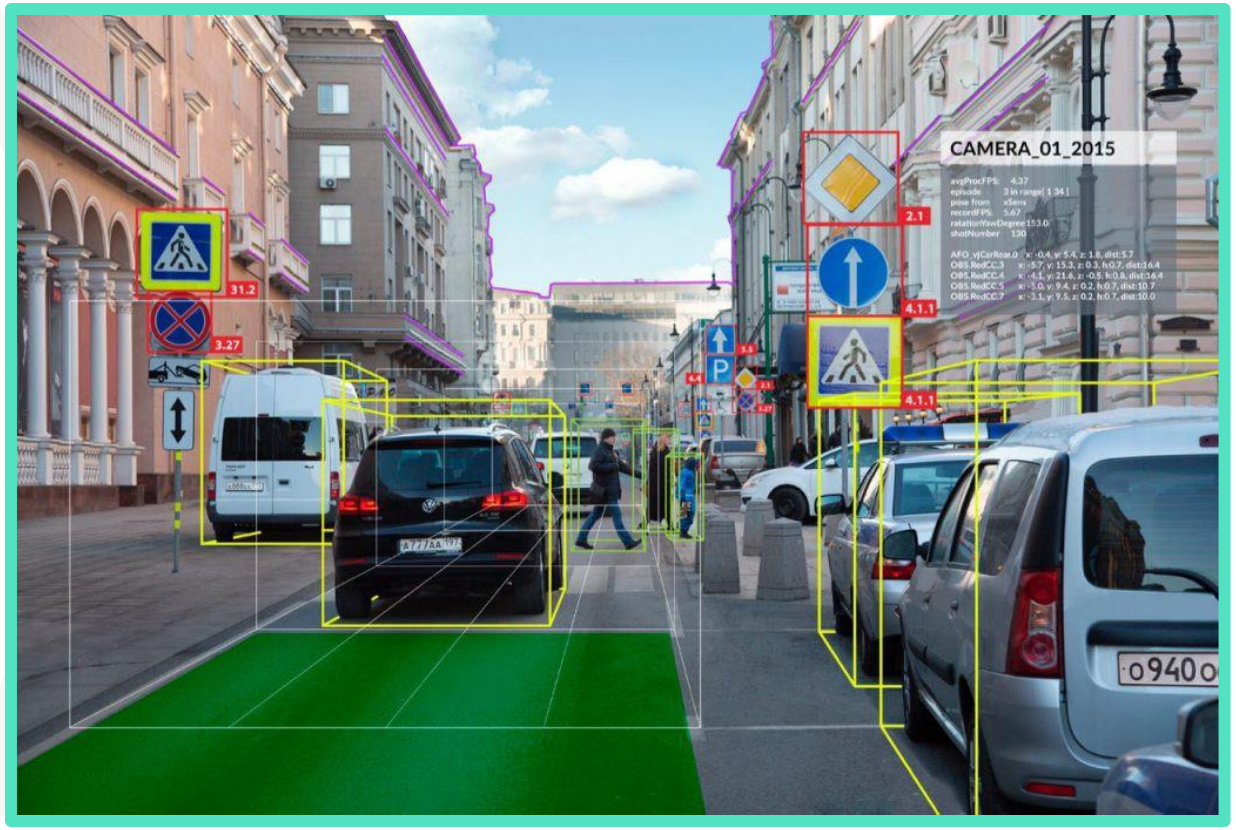


802.11p and Connectivity – **Smart Cars**



VVC and autonomous driving

- An autonomous vehicle uses input devices like cameras to allow the **car to perceive the world around it**, creating a digital map.
- **Image classification** is determining what the objects in the image are, like a car or a person.
- Such application set **high demands on video compression** efficiency and functionality that **VVC** will meet.
- It is estimated that VVC will be subject to thousands maybe even **ten thousands of SEPs**



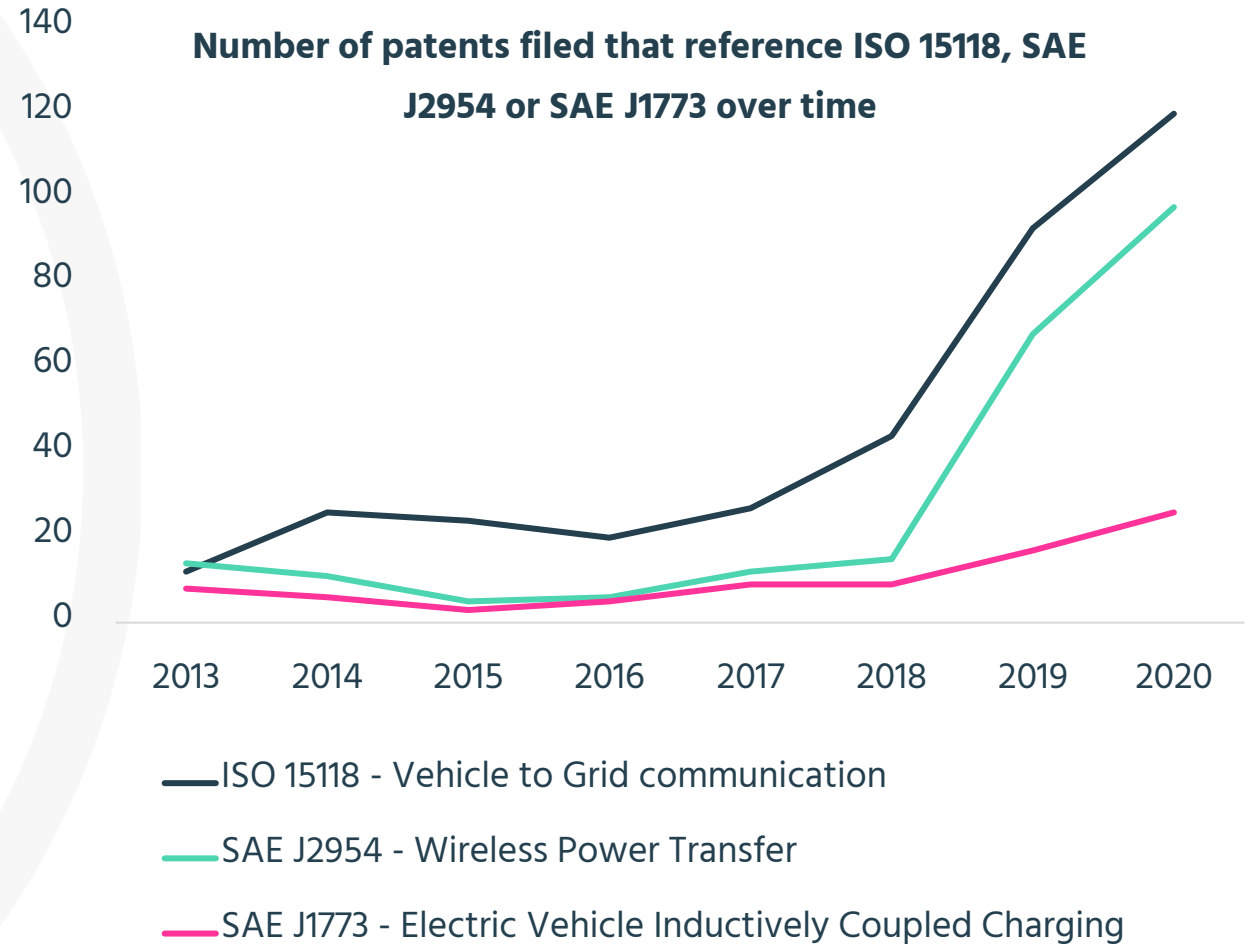
Wireless Charing – Qi standards

- The wireless charging market is expected to achieve an astonishingly positive CAGR of 40.8% to **$13.74 billion** by the end of 2023.
- Qi standard implemented in over **8,274 products including automobiles.**
- As of October 2021, more than **1,000 declared patents** at Wireless Power Consortium or **pooled** at MPEG LA Qi standard patent program.

Source: https://www.iplytics.com/report/patent-sep-trends-wireless-charging//

Wireless Charing – Vehicle Charging standards

- **ISO 15118** – a vehicle-to-grid communication standard for wireless high-level communication between electric vehicles and the electric vehicle supply equipment.
- **SAE J2954** – a Wireless Power Transfer standard for light-duty plug-in/electric vehicles, which defines acceptable criteria for interoperability, electromagnetic compatibility, electromagnetic field EMF, minimum performance, safety, and testing for wireless power transfer.
- **SAE J1773** – electric vehicle inductively coupled charging standard for inductive charging systems to charge electric battery vehicles.

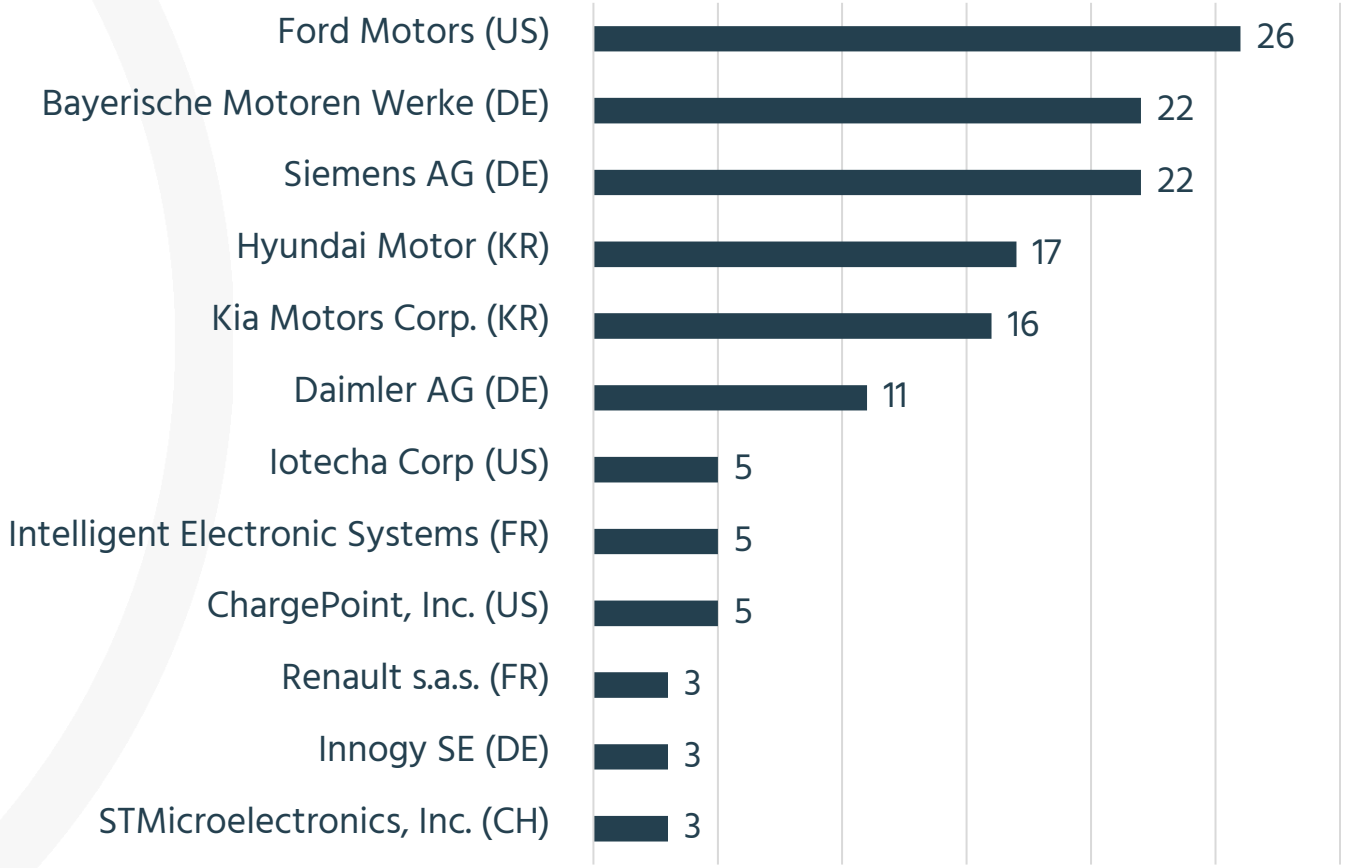


Source: https://www.iplytics.com/report/patent-sep-trends-wireless-charging//

Wireless Charing – Vehicle Charging standards

- The list of companies is dominated by **car manufactures** with top patent owner, such as Ford, BMW and Hyundai.
- Beyond the auto industry, the analysis identified companies from the industrial **manufacturing** sector, **energy** sector and **semiconductor** sector, including Siemens, Innogy and STMicroelectronics.

Number of patent families filed that reference ISO 15118 as to patent owner

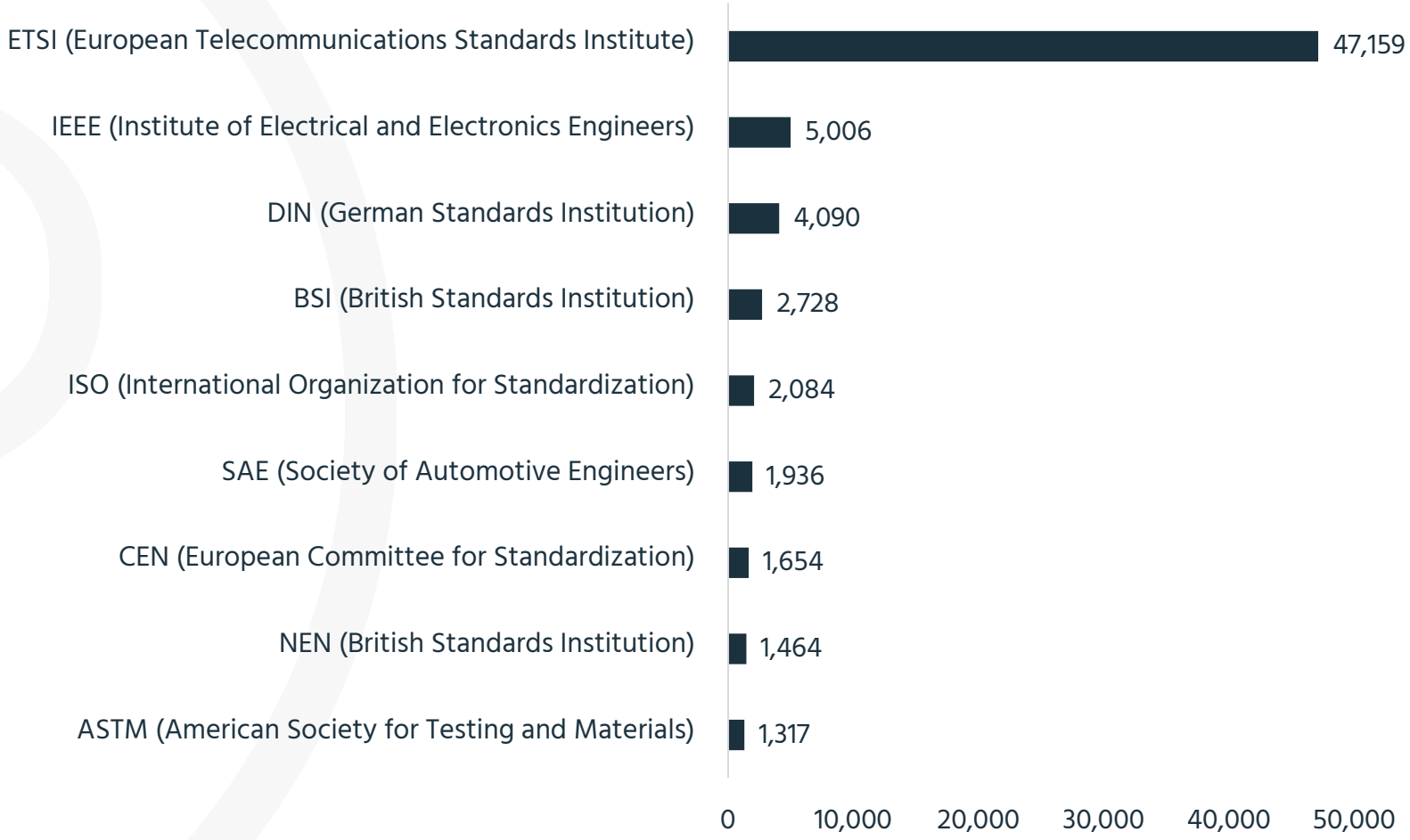


Source: https://www.iplytics.com/report/patent-sep-trends-wireless-charging//

III. Standard Developing Initiatives in the Automotive Industry

Standard Organizations

- Number of standard specifications and contributions that **describe a connected vehicle application** as to standards organization (IPlytics, 2021)

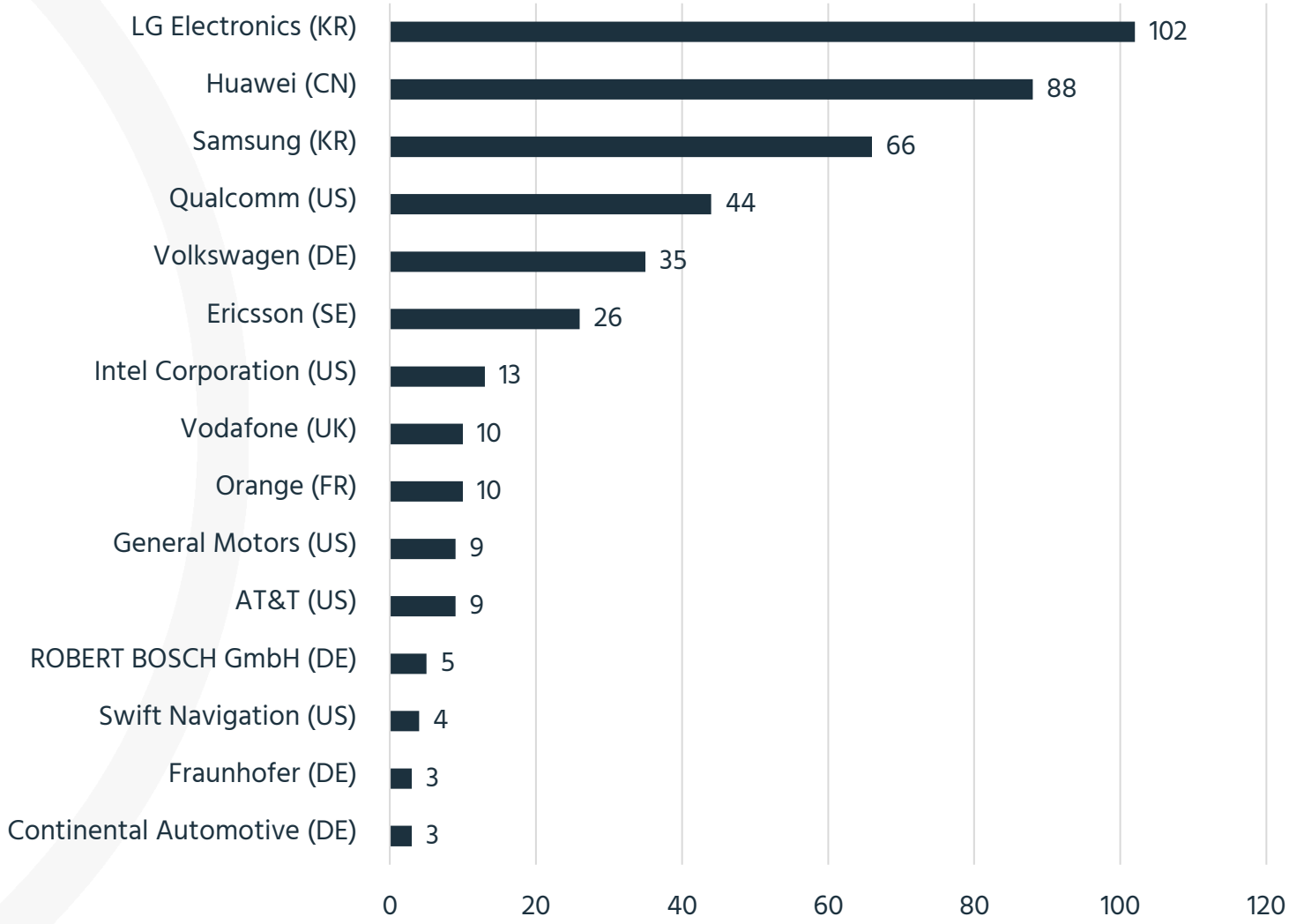


Source: https://www.iplytics.com/report/standard-essential-patents-auto-industry/

5GAA

- **5GAA** specifies the implementation of connectivity standards (e.g. 4G/5G) making sure that the full potential of the standardized technologies is **utilized for the automotive application**.

- Number of approved 3GPP contributions at the 5GAA working groups (IPlytics, 2021)



Source: https://www.iplytics.com/report/standard-essential-patents-auto-industry/

SAE patent declarations

- Patents declared standard essential for the **SAE specifications**

  - ✓ **SAE J2601:** Fueling Protocols for Light Duty Gaseous Hydrogen Fueling
  - ✓ **SAE J2799:** Hydrogen Surface Vehicle to Station Communications
  - ✓ **SAE J2931:** Digital communication between Plug-In Vehicles (PEV), the Electric Vehicle Supply Equipment (EVSE)

Source: https://www.iplytics.com/report/standard-essential-patents-auto-industry/

IV. SEP Patent Pools for the Automotive Industry

SEP Licensing – Patent Pools

Patent pools:

- A patent pools aggregate patent ownership and offer a license program under a single license contract – “one-stop shop”.
- Many **economist claim positive** effects from pooling patents:
  - Pools may reduce **transaction costs** (reduce number of licensees)
  - Reduce multiple **marginalization** problem
  - **Clear** blocking positions (blocking patents)
  - **Facilitates** a technology to the public
- Pools are often created for standardized technologies due to the **nature of SEPs** that must be licensed in any implementation (no bundling).

SEP Licensing – Patent Pools

Potential Patent Pool Costs:

- Pools have substantial **set-up costs** (usually worn by the SEP owners that consider to join the pool, the pool initiator and/or the pool administrator).
- It is **difficult** for pools to **agree on revenue-sharing rules** if there are significant (perceived) differences in the value of essential patents or differences in the fees that the patent owners wish to receive.
- Pools may introduce **complexity** when pool members negotiate license or litigate individually.
- Broad pools may create **attractive positions for single firms to stay out**
- Some patent pools are set up to **set royalty rate** for a certain standard

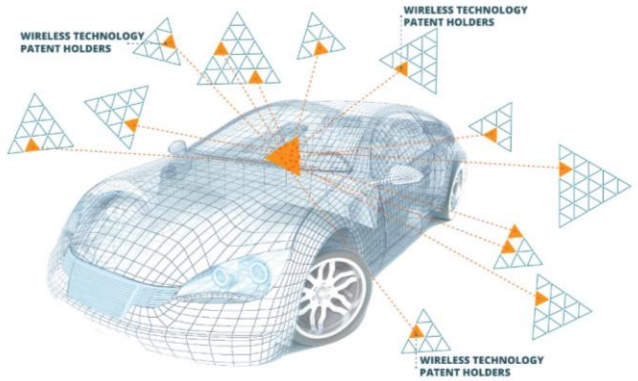
4G/5G Patent Pools –AVANCI Example

MARKETPLACE TECHNOLOGY POSSIBILITIES PRICING FAQ

Why Avanci?

Hundreds of companies are entering the connected world each day, with creative products finding new uses for wireless connectivity. For developers of those products, it can be difficult to know what technology rights are needed and how to get them.

From automakers to meter manufacturers – developers of IoT products have asked for an open and efficient way to access the licenses needed for the latest wireless technology.



VEHICLE PRICING

eCall only	$3/vehicle
3G (includes 2G and eCall)	$9/vehicle
4G (includes 2G/3G and eCall)	$15/vehicle

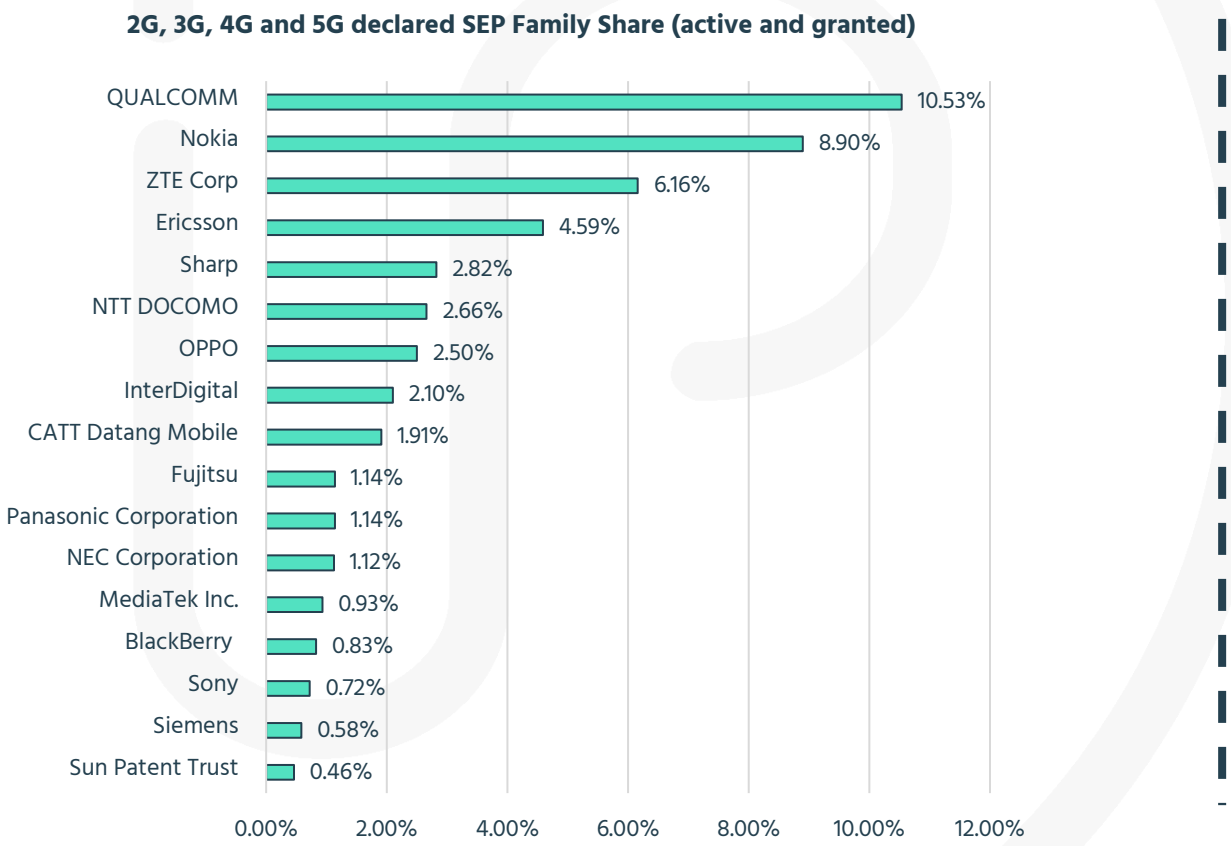
AVANCI Pool Member and Outsider

3G, 4G and 5G SEP owner AVANCI **Member**

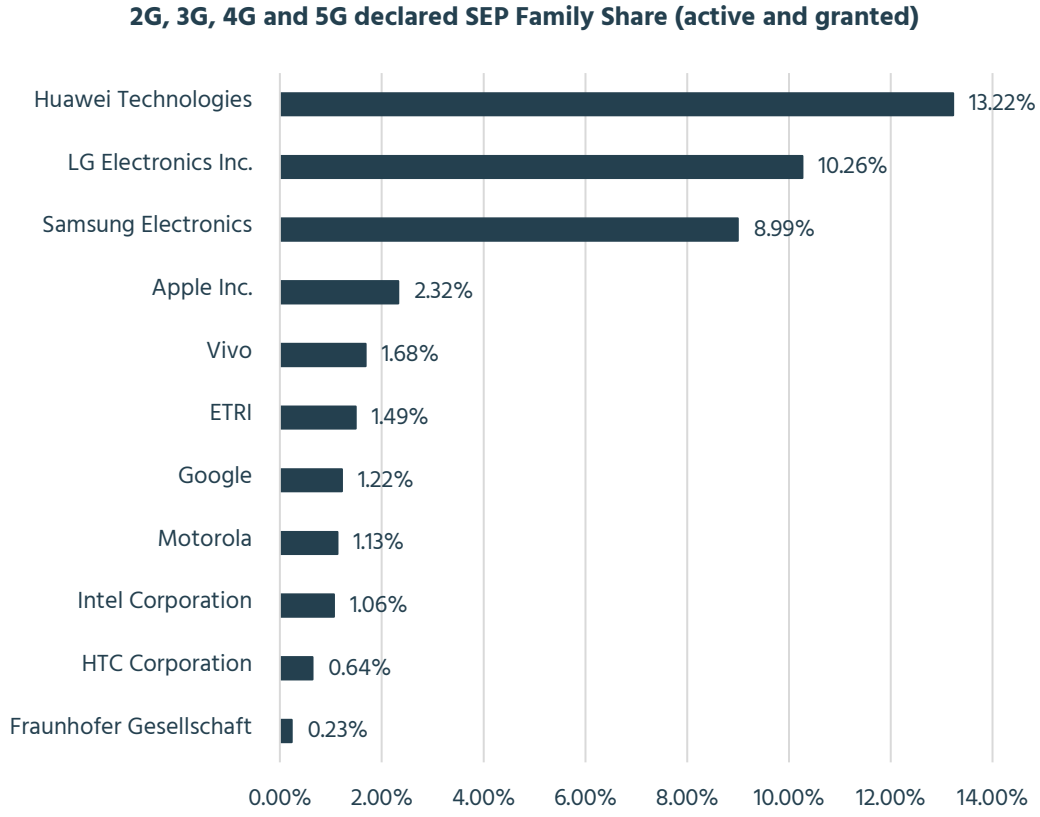
3G, 4G and 5G SEP owner AVANCI **Outsider**

2G, 3G, 4G 5G declared patens as to owner top 30

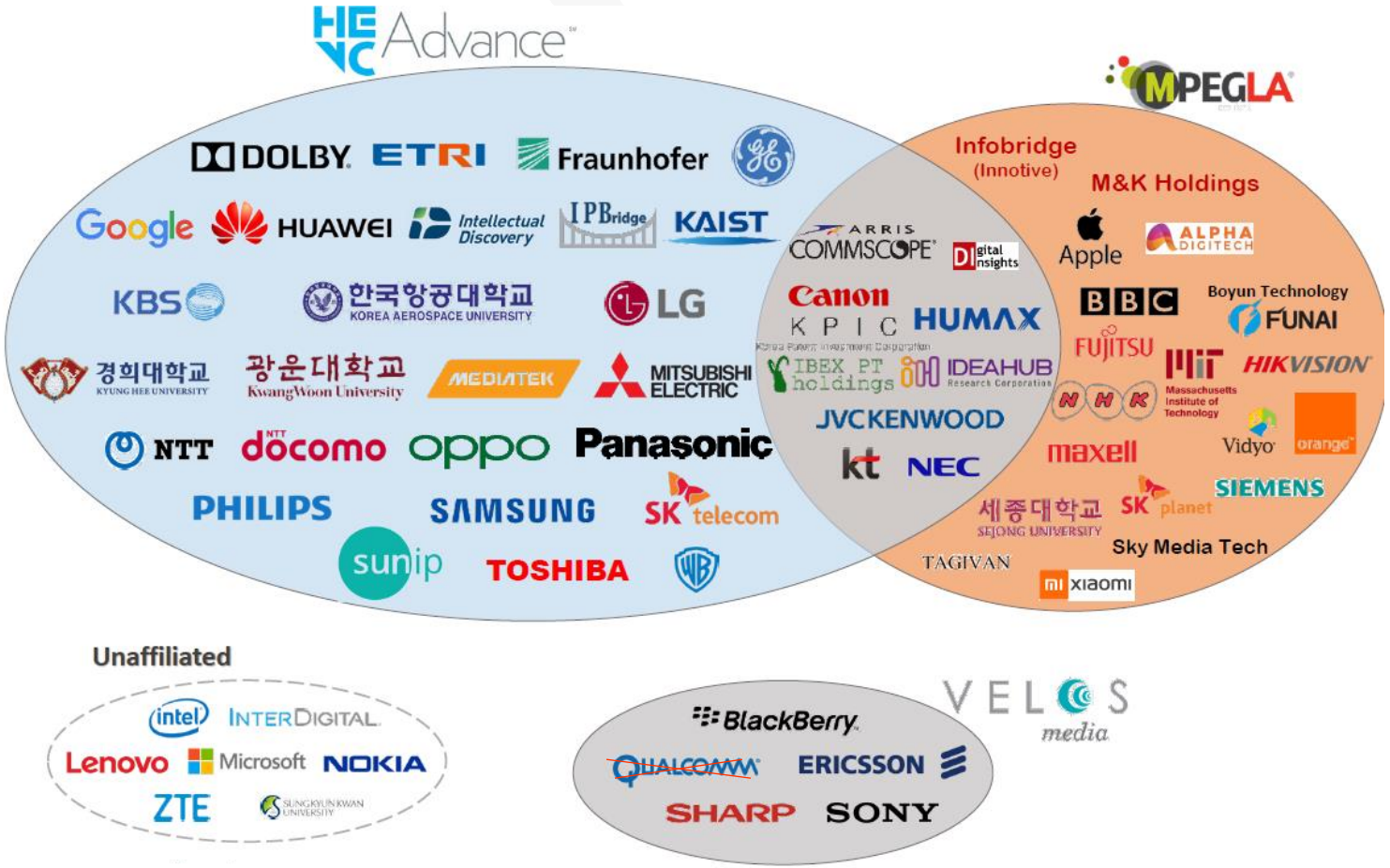
3G, 4G and 5G SEP owner AVANCI **Member**



3G, 4G and 5G SEP owner AVANCI **Outsider**



HEVC pool situation



VVC pool situation

MPEG LA Announces Development of VVC (Versatile Video Coding) Pool License

VVC expected to improve video compression efficiency and functionality

January 27, 2021 07:13 PM Eastern Standard Time

DENVER--(BUSINESS WIRE)--MPEG LA, LLC, the world leader in digital video patent pool licensing for nearly 25 years, announced today the development of a pool license for the next generation video coding standard known as VVC (Versatile Video Coding, also known as H.266 and MPEG-I Part 3) in order to offer the market a convenient one-stop alternative enabling VVC's wide adoption.

"MPEG LA applauds the work of leading technology innovators from around the world whose research and development investments have made VVC possible, and welcomes them to join MPEG LA's license development effort"

VVC has the potential to achieve the same level of perceptual quality as prior video codecs with up to a 50% improvement in video coding efficiency, thereby supporting 4K and 8K Ultra High Definition (UHD) and High Dynamic Range (HDR) video, telemedicine, online gaming, virtual 360° video and adaptive streaming applications.

"MPEG LA congratulates the Media Coding Industry Forum (MC-IF) and its participants for their pool fostering initiative preparing the market for a VVC pool license. MC-IF's work has been of immeasurable benefit, and MPEG LA was pleased to cooperate in that process. Building on MC-IF's work, MPEG LA is moving ahead with the next step listening to, working with and leading MC-IF participants and others to make yet another breakthrough generation of digital video compression technology widely accessible to the market under reasonable, trusted, transparent and non-discriminatory licensing conditions," said Larry Horn, President and CEO of MPEG LA.

"MPEG LA applauds the work of leading technology innovators from around the world whose research and development investments have made VVC possible, and welcomes them to join MPEG LA's license development effort," said Bill Geary, MPEG LA's Vice President of Business Development.

To participate in the initial VVC license development meeting, parties that believe they have patents essential to the VVC standard are invited to submit them to MPEG LA in accordance with the submission procedures at https://www.mpegla.com/vvc/.

Although only issued patents will be included in the license, patent applications with claims that owners believe are essential to the VVC standard and likely to issue in a patent also may be submitted in order to participate in the license development process.

MPEG LA, LLC

Access Advance Launches VVC/H.266 Video Patent Pool

JULY 1, 2021

SHARE

Includes innovative Multi-Codec Bridging Agreement that Provides Substantial Royalty Savings to Licensees in both the VVC and HEVC Advance Pools

BOSTON – (July 1, 2021) – Building on the success of its HEVC Advance Patent Pool, Access Advance today announced the launch of the VVC Advance Patent Pool *and* the Multi-Codec Bridging Agreement ("MCBA"). VVC is the next generation video codec standard finalized less than one year ago, which provides significant improvements in video compression of up to 50% over HEVC, enabling a new generation of products, ever more beautiful video, faster downloads, and improved savings on storage.

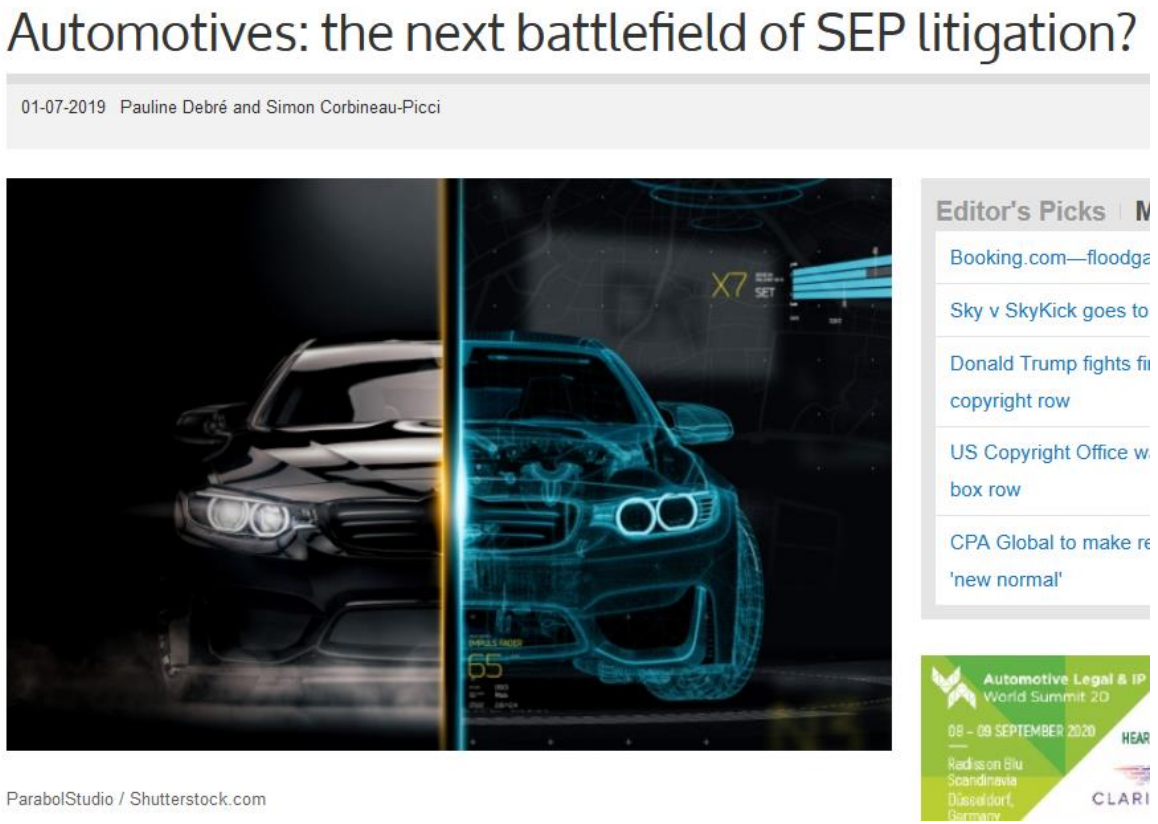
The license structure of the new VVC Advance Pool mirrors that of the HEVC Advance Platform Pool License recently announced, with royalty rates and caps set at a ***modest 25% increase*** over the equivalent HEVC Advance License structure. Please see https://www.accessadvance.com/vvc-advance-patent-pool-royalty-rates-summary

V. SEP Litigation Trends in the Automotive Industry

SEP litigation cases

Recent SEP auto industry litigation 2G, 3G, 4G:

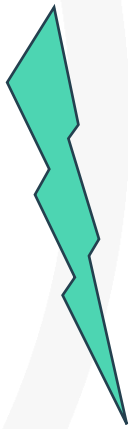
- Nokia vs. Daimler (Germany, 2019)
- Nokia vs. Continental (Germany, 2019)
- Conversant vs. Daimler (Germany, 2020)
- Sharp vs. Daimler (Germany, 2020)
- Conversant vs. Tesla (Germany, 2020)
- Sharp vs. Tesla (Japan, 2020)
- Sisvel vs. Tesla (USA, 2021)
- L2 Mobile vs. Ford (USA, 2021)



The clash of cultures

Communication Industry

- SEPs are licensed on the **User Equipment level**
- Consequence: licensing negotiations always target the device manufacturer (**OEM**)
- Horizontal license negotiations
- **Result:** Potentially high licensing costs for OEMs without own SEP portfolios



Automotive Industry

- Patents are usually (cross --) licensed on **vertical levels**
- **Suppliers** typically incorporate IP rights into its component supply contracts
- License based on a component selling price
- **Result:** Minimum increase of car sales price

SEP licensing in the auto industry

What is the basis of the license?

- The product/vehicle vs. the component (SSPPU)

What is the mechanism?

- Percentage of the product/component vs. lump sum price per product/component

Who can take a license in the value chain?

- OEM vs. Supplier

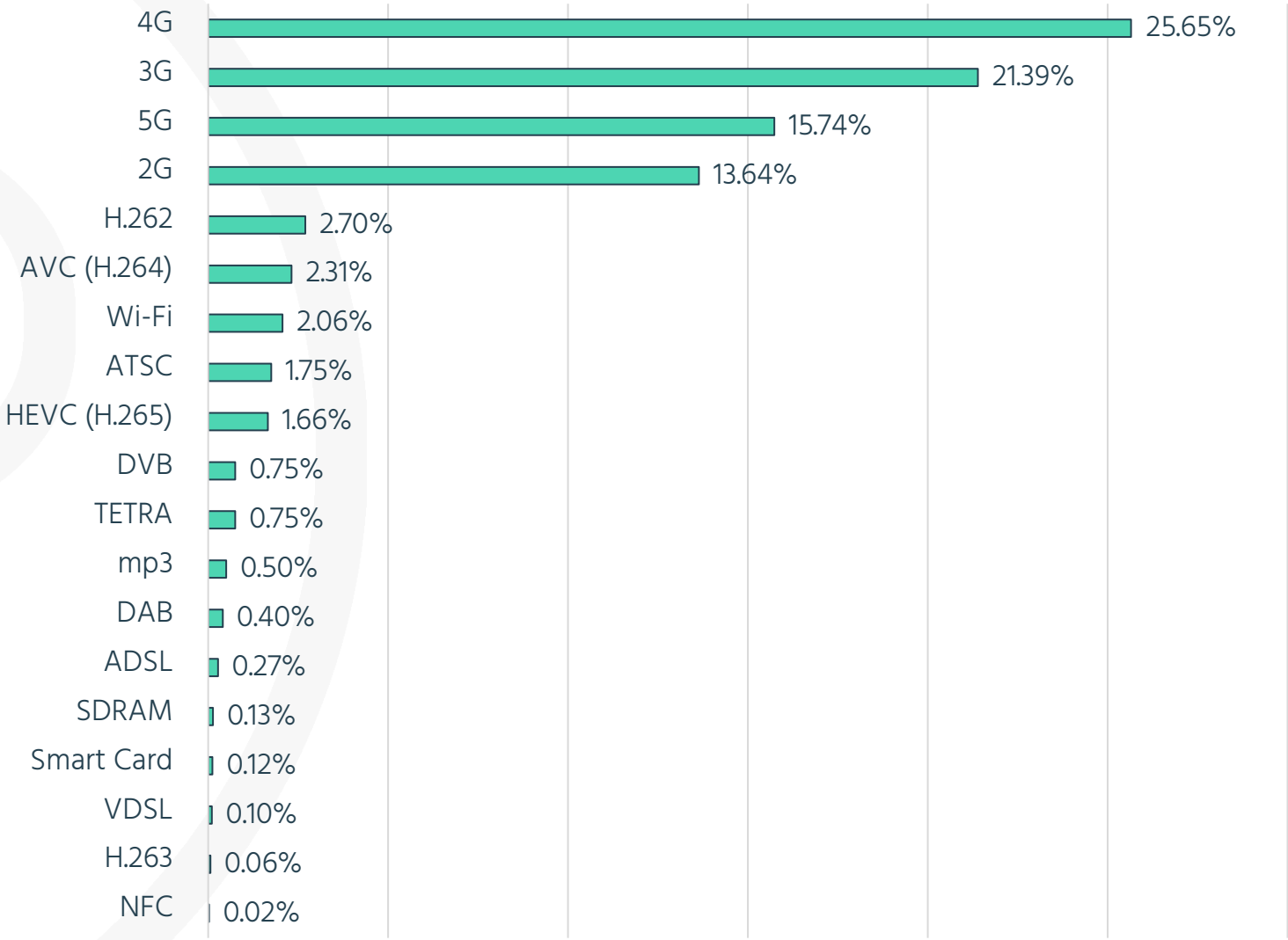
What is the model?

- Patent pools vs. Bilateral license

What is a reasonable royalty as to FRAND?

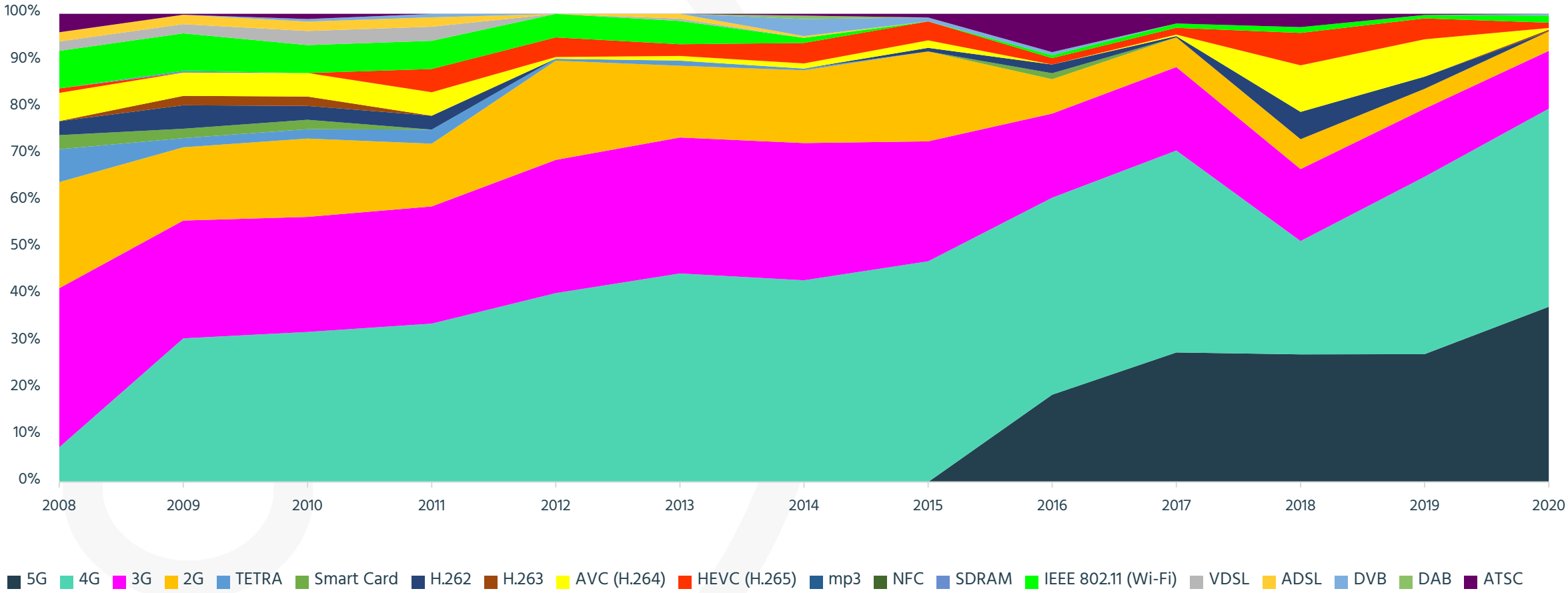
Litigated SEPs in the past 10 years

- Share of standards subject to litigated patents (IPlytics Platform 2021)



Source: https://www.iplytics.com/report/sep-litigation-trends-what-data-say/

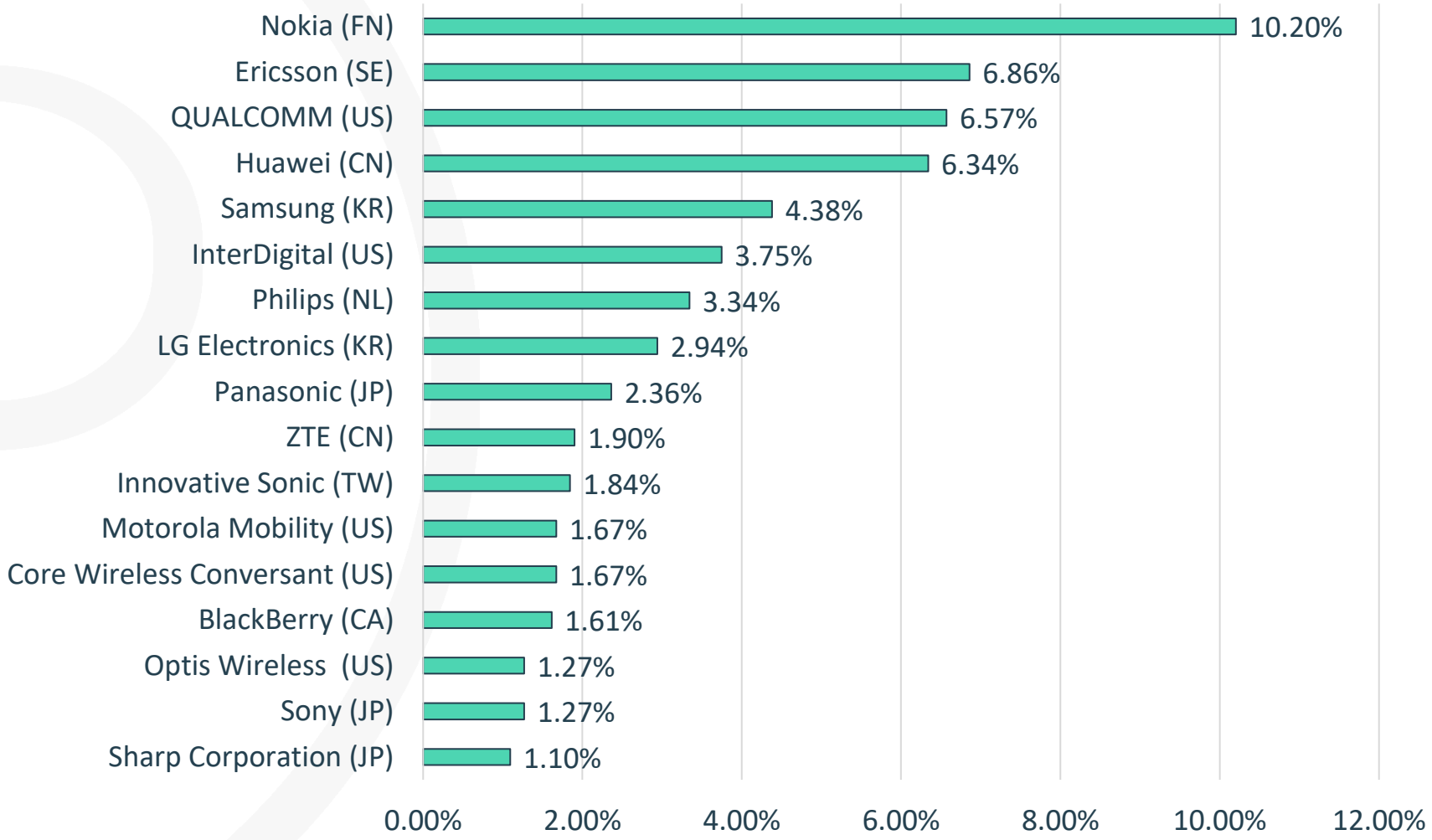
SEP Litigated Over Time



Source: https://www.iplytics.com/report/sep-litigation-trends-what-data-say/

Litigated SEPs

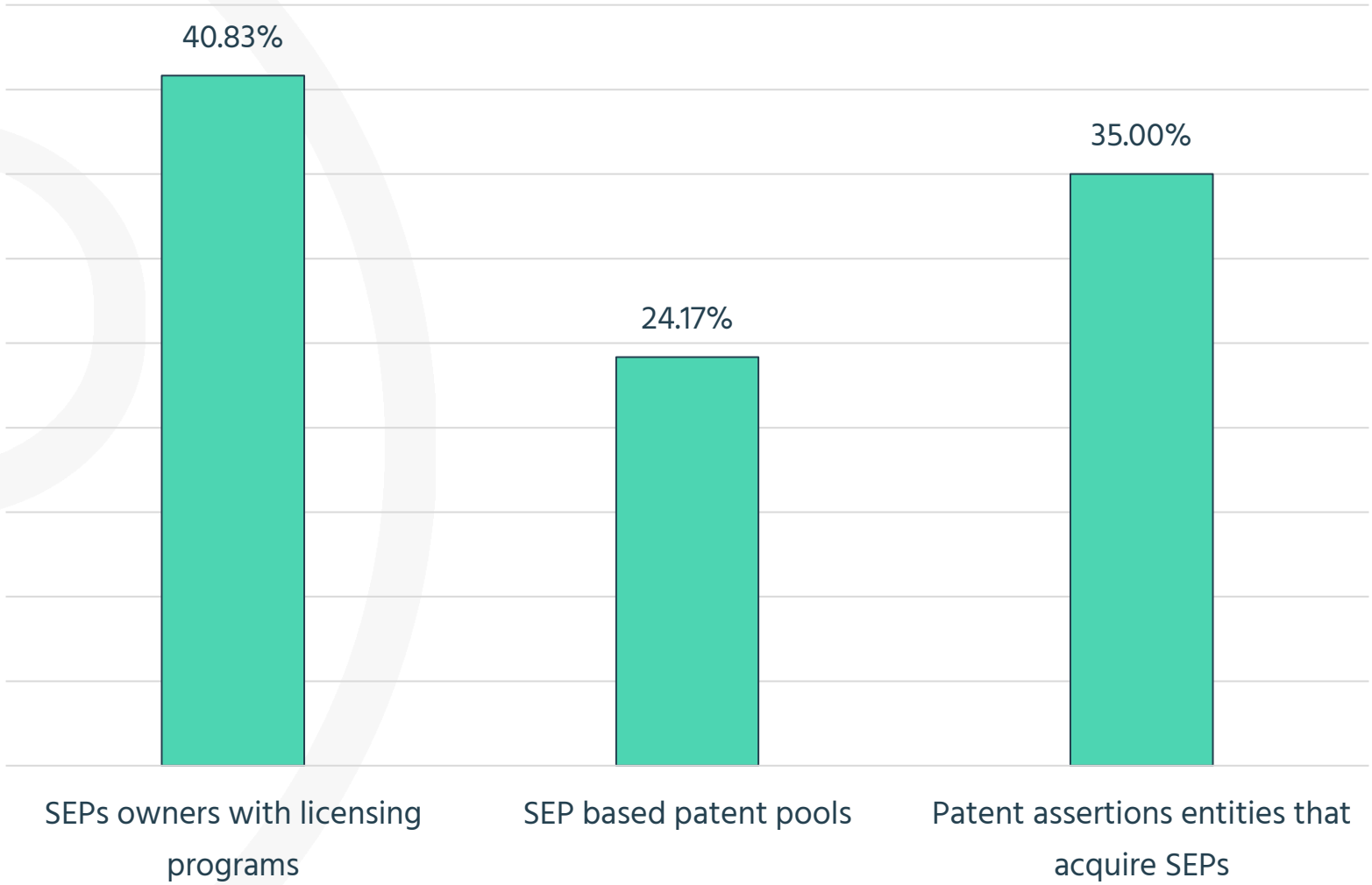
- Plaintiff share as to litigated declared SEPs (IPlytics Platform, 2001-2021)



Source: https://www.iplytics.com/report/sep-litigation-trends-what-data-say/

Litigated SEPs

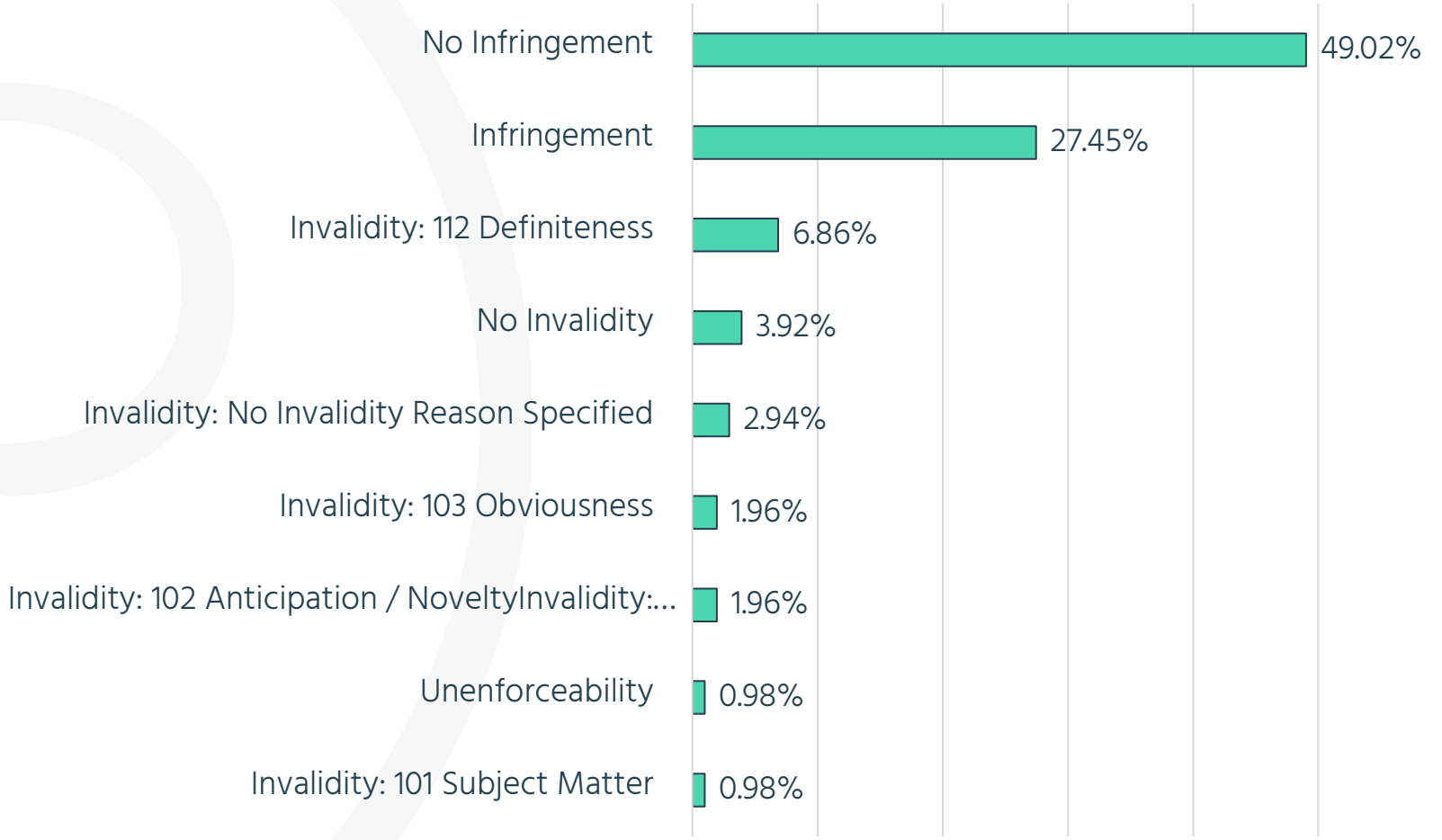
- Who will drive SEP litigation in the upcoming years on the plaintiff side? (IPWatchdog Webinar Polls, March 2021, N=294)



Source: https://www.iplytics.com/report/sep-litigation-trends-what-data-say/

Litigated SEPs

- Litigated declared patents as to decision outcome (US courts only)



Source: https://www.iplytics.com/report/sep-litigation-trends-what-data-say/

VI. Patents and Standards Data to Navigate Risk and Identify Opportunities

Increasing complexity

- **Connectivity is everywhere**, and it heavily relies on standards that are subject to SEPs.
- Fully connected cars that implement 3G and 4G (soon 5G), Bluetooth, NFC, RFID, Qi, HEVC/VVC and DVB, among many others, have been on the market for more **than a decade now**.
- The **number and variety of use case of standardized connectivity** technology has increased over the past 5 years with an growing number of newly implemented standard subject to SEPs (e.g. SAE standards, Qi standard)
- It is challenging to keep up with technology trends, new standards projects as well as SEPs or new pool license programs.
- **Multidimension access** to patents and standards data is crucial to be part of the discussion and have a seat at the table where standards are developed, patents are licensed and pools are formed.

Source: https://www.marketresearchfuture.com/reports/in-car-wireless-charging-market-5746

Standard Essential Patent Data (1978-2021)

SSO	Example Standards	Declared SEPs
ETSI	2G, 3G, 4G, 5G, NB IoT, LTE-E, ITS, C-V2X, DVB, DMR, DECT, TERA	280,000
ITUT	AVC H.264, HEVC H.265, VVC H.266	15,000
ATSC	ATSC -1.0- 3.0, Over the Air Internet TV Broadcasting	9,900
ISO	RFID, MPEG 1-4, mp3	4,800
ATIS	2G, 3G, 4G, 5G	4,700
IETF	Internet Protocol Standards	1,700
IEEE	Wi-Fi 1-7, DSRC, WAVE, LAN/MAN, Bluetooth, ZigBee, FireWire, WiMAX, Ethernet	1,500
ARIB	2G, 3G, 4G, 5G	1,500
Wireless Power Con.	Wireless Charging Qi Standard	1,150
ISO/IEC	MPEG Visual	1,100
SMPTE	Motion Picture and Television	800
OMA	GSM, UMTS or CDMA2000	700
IEEE / IEC	Wi-Fi 1-7, DSRC, WAVE, LAN/MAN, Bluetooth, ZigBee, FireWire, WiMAX, Ethernet	260

Standard Essential Patent Data (1978-2021)

SSO	Example Standards	Declared SEPs
ANSI	Wi-Fi 1-7, LAN/MAN, Bluetooth, ZigBee, FireWire, WiMAX, Ethernet	210
IEC	Electric vehicle conductive charging, Industrial Networks, CQN series RF, RFID	113
ATSC	Advanced Television Systems, Digital Television Transmission over Terrestrial	81
ITUR	Radio Transmission	44
VESA	DisplayPort	40
OASIS	XrML WSRP UOML | UOML UDDI	35
Broadband Forum	Ethernet, ADSL, DSL, Optical Fiber	21
TIA	TDMA, CDMA, WCDMA	19
CEN	IST, Electronic Identification, Authentication and Trusted Services	12
SAE	Broadband PLC Communication for Plug-in Electric Vehicles, Mobile Fueling Station	7
ECMA	NFC	1

Standards Contribution Data (1990-2021)

Detailed contribution data including information on:

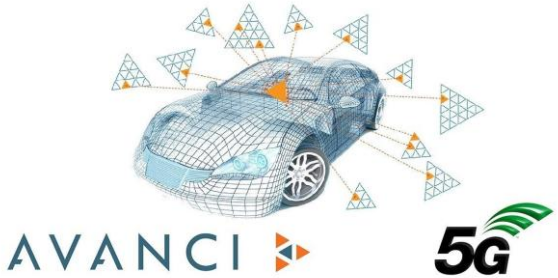
- **Full text specification**
- **Company / Author**
- **Agreed / Approved Status**
- **Group / Subgroup**
- **Standard Generation**
- **References**
- **Category (Tech Input v Correction)**

SSO	Information available	Contribution Count
ETSI - 3GPP	full text	1,209,993
IEEE	full text	118,987
JCT-VC (ITU HEVC)	full text	9,742
IETF	full text	8,774
JVET (ITU VVC)	full text	8,473
JVT (ITU AVC)	full text	3,051

Patent Pool Data (1990-2021)

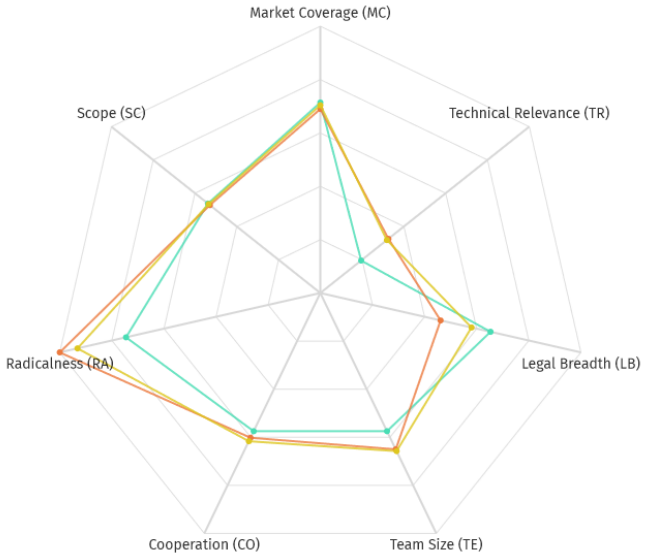
Patent pools listing verified standard essential patents. Among others:

- **MPEG LA**
- **Via Licensing**
- **SISVEL**
- **AVANCI**
- **Access Advance**
- **ULDAGE**
- **France Brevets NFC**



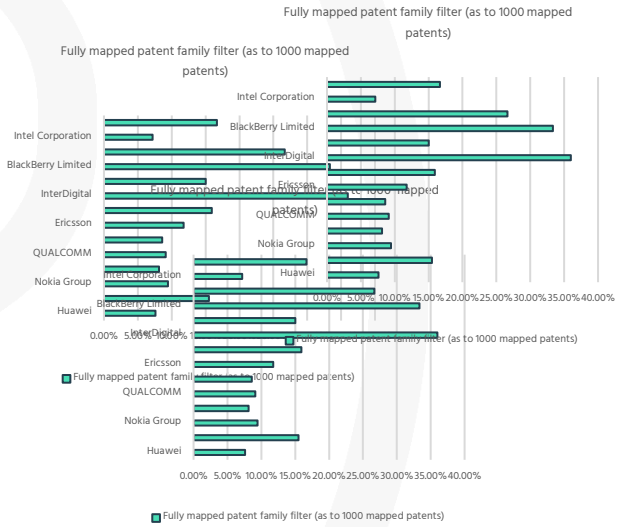
"The question about which patents are essential and which are not, is one of the most debated when negotiating SEP portfolio value, royalties or infringement claims."

1 VALUATION



Objective data correlation

2 RANDOM SAMPLE



SEP essentiality sample share

3 AI SEP DETERMINATION

Predict SEP essentiality

Data Correlation

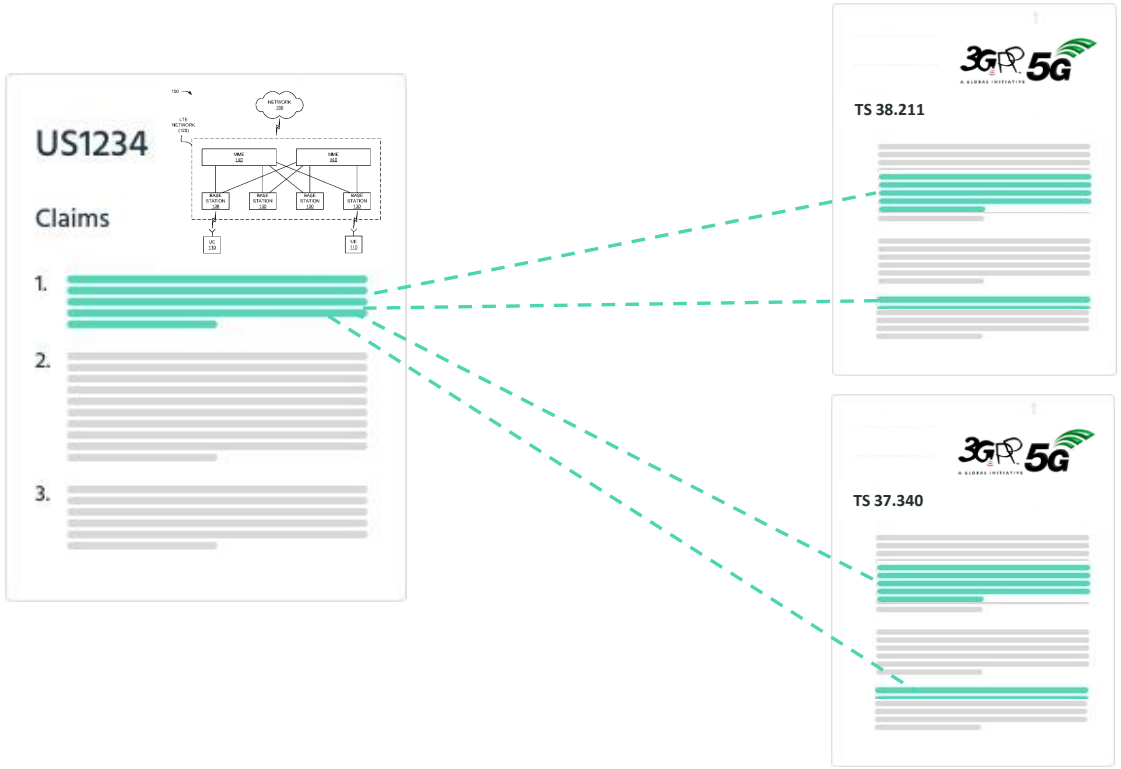
Correlating patents and standards – 7 relevant features:

1. Patent's claims are **semantically similar** to corresponding standard document (TS)
2. Patent's listed **inventors** (name, surname, affiliation) **participated** at corresponding standards meeting
3. Patent's **applicant/assignee** submits accepted and **approved contributions** at to corresponding standard in working group
4. Patent's **prio. date** overlaps with **core date range** of standards development
5. Patent has been **cited by declared SEPs** (excluding self-citations)
6. Patent cites of **predecessor standard** or Tdocs as prior art in the non-patent literature
7. Patent's **IPC/CPC** overlaps with verified SEP's IPC/CPCs

Manually mapped/charted patents across standards

IPlytics SEP sampling

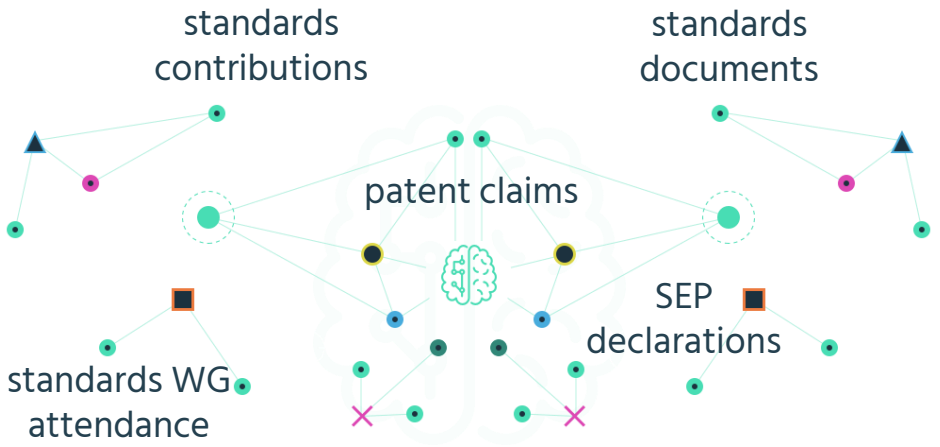
- 2,000 **5G** mapped patents (randomly selected and representative across top 30 SEP portfolios)
- 1,000 **3G/4G** mapped patents (randomly selected and representative across top 30 SEP portfolios)
- 200 **Wi-Fi 6** mapped patents (randomly selected and representative)
- 400 **VVC** mapped patents (randomly selected and representative)



AI to predict essentiality rates of portfolios

IPlytics – **PES (Patent Essentiality Score)**

- **IPlytics prediction model** scores patents as to their likelihood of being standard essential.
- **A semantic LSI model is trained** to compare independent claims and standard sections.
- **7 correlation features** are incorporated.
- The model uses **firm fixed effects** to consider company specific differences.
- The **model is trained** making use of verified SEP training data from **expert claim charts**.



VII. Takeaways

Takeaways

Technology revolution:

- Connectivity in cars has the potential to fundamentally change the automotive value chain.
- To cope with these challenges, vehicle manufacturers need to face the complex licensing world of the telecommunications industry:
  - ensure that they not only have the **right IP strategy** in place but also a **seat at the table** when technology standards are developed.
  - This includes a more **comprehensive monitoring** of patent filings, SEP declarations, as well as patent pooling initiatives
  - in order to **manage risk** and **identify opportunities** to shape the future of connected technology.

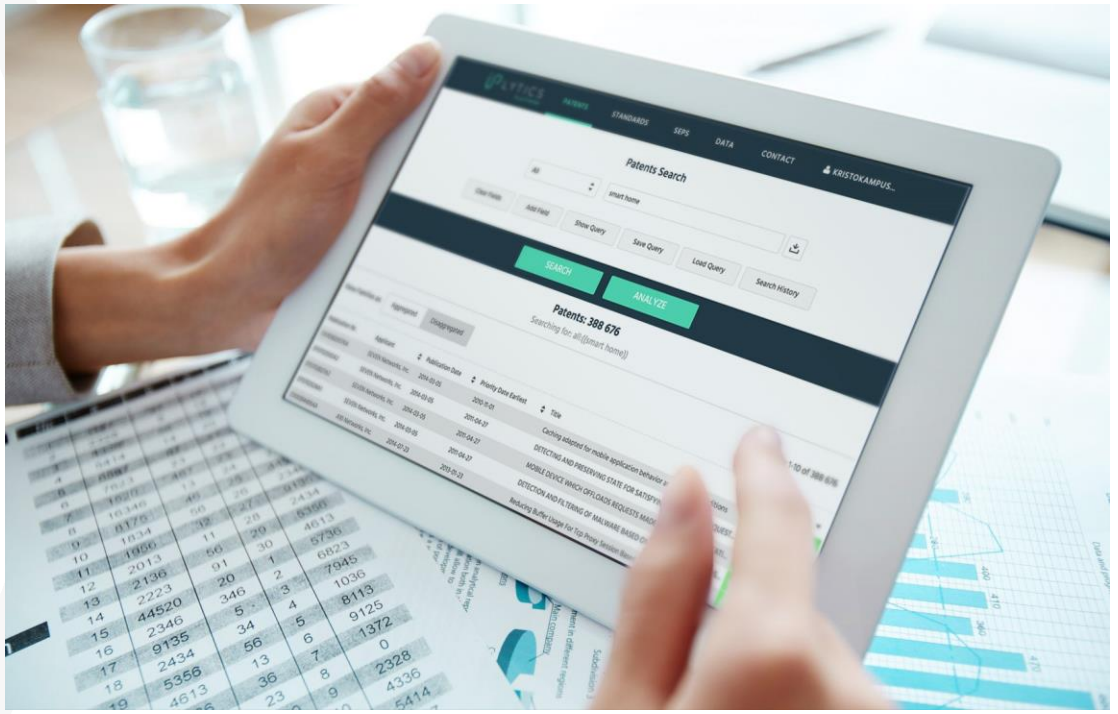
IPlytics Europe and US

For more information on IPlytics Products and Services, please contact us on:

https://www.iplytics.com/request-a-demo/

Or call us at:

Europe +49 30 555 74282 or
USA +1 512 947 1152



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