IP LYTICS | Intellectual Property Analytics

Answering SEP market questions-Webinar Series Part 1:

How to gain the competitive edge for V2X technology

Tim Pohlmann CEO @ IPlytics GmbH

Webinar recording: https://youtu.be/OKZYqLs_lyI

2023

IPlytics Webinar Series 2023

I. Part 1: "How to gain the competitive edge for V2X technology"
   January 24th, 2023
   Register: https://www.iplytics.com/events/upcoming/

II. Part 2: "How to gain the competitive edge for NB-IoT and LTE-M"
   February 28th, 2023
   Register: https://www.iplytics.com/events/upcoming/

III. Part 3: "How to gain the competitive edge for Wi-Fi and Video Codec"
   March 28th, 2023
   Register: https://www.iplytics.com/events/upcoming/

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Today's Speaker

- **PhD & Post Doc.** TU Berlin, CERNA, MINES ParisTech.

- CEO and **founder of IPlytics**.

- **2022 IAM Strategist 300**. Panel speaker thought leader.

- **Economic expert** and author of studies for the EU Commission, WIPO and German government.

- Appointed **faculty lecturer** (TU Berlin, EPF Lausanne, CEIPI Strasbourg, Cleveland-Marshall College of Law)

- **Author** of over 50 industry articles published at IAM Magazine, IPWatchdog and Managing IP.

Today's Agenda

I. SEPs and Standards in the Auto Industry

II. The market potential for V2X technology

III. Standards development for V2X technology

IV. How to identify V2X technology standards, contributions and SEPs

V. SEP licensing in the automotive industry

VI. How to get the right insights from your V2X technology SEP analysis

VII. Takeaways.

I. SEPs and Standards in the Automotive Industry

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.**

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.

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The connected vehicle

IEEE 802.11p, IEEE 1609.x

IEEE 802.11ah

DVB. DVB-T2, ISDB-T, AVC, HEVC, VVC, Qi, Bluetooth

3G, 4G, 5G

Wireless charging standards

IEEE 802.11p

RFID

LF, UHF

IEEE 802.11a/b/g/n (WLAN)

NFC

NFC

IEEE 820.16 3G, 4G, 5G
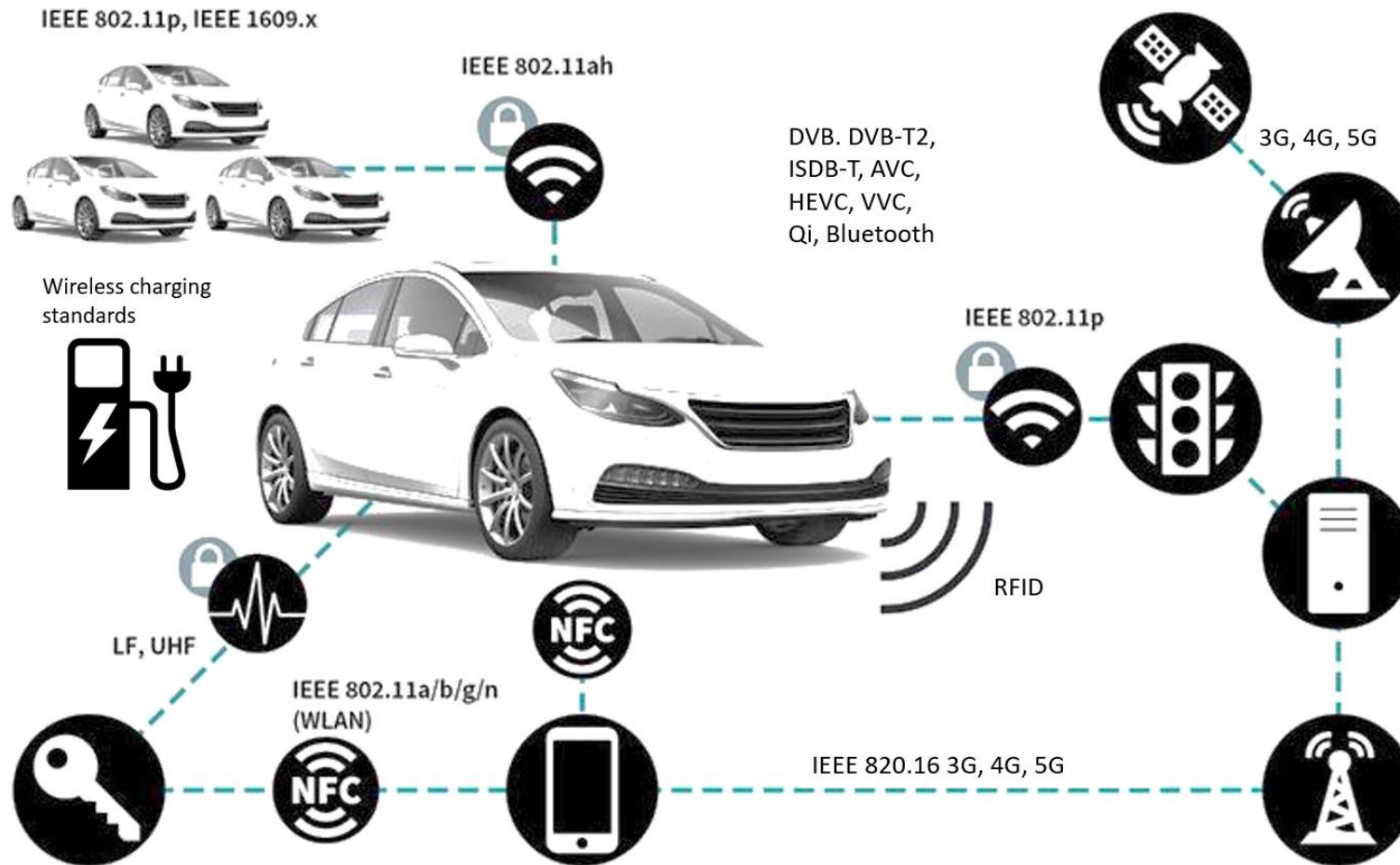
Mobile data traffic outlook

➢ **Smartphone** data report results:

  - In **2028**, all **growth** in mobile data traffic will come from **5G**, as 4G traffic is set to decline.

  - The global monthly average usage per smartphone is anticipated to be **19 GB in 2023** and is forecast to reach **46 GB** by the end of 2028.

  - In **2028**, 5G's share of mobile data traffic is forecast to grow to **69 percent**.

- **Smart vehicle** data report results:

  - One autonomous vehicle will generate around **4,000 GB** (around 4 terabytes) of data every day.

  - And that's just assuming one hour of driving! For more heavily used vehicles, it's expected that autonomous vehicles will generate and consume around **40,000 GB** (around 40 terabytes) of data for every eight hours of driving time.

Source: https://www.ericsson.com/en/reports-and-papers/mobility-report/dataforecasts/mobile-traffic-forecast
Source: https://www.mewburn.com/news-insights/5g-and-autonomous-vehicles-accelerating-data-communication-speed

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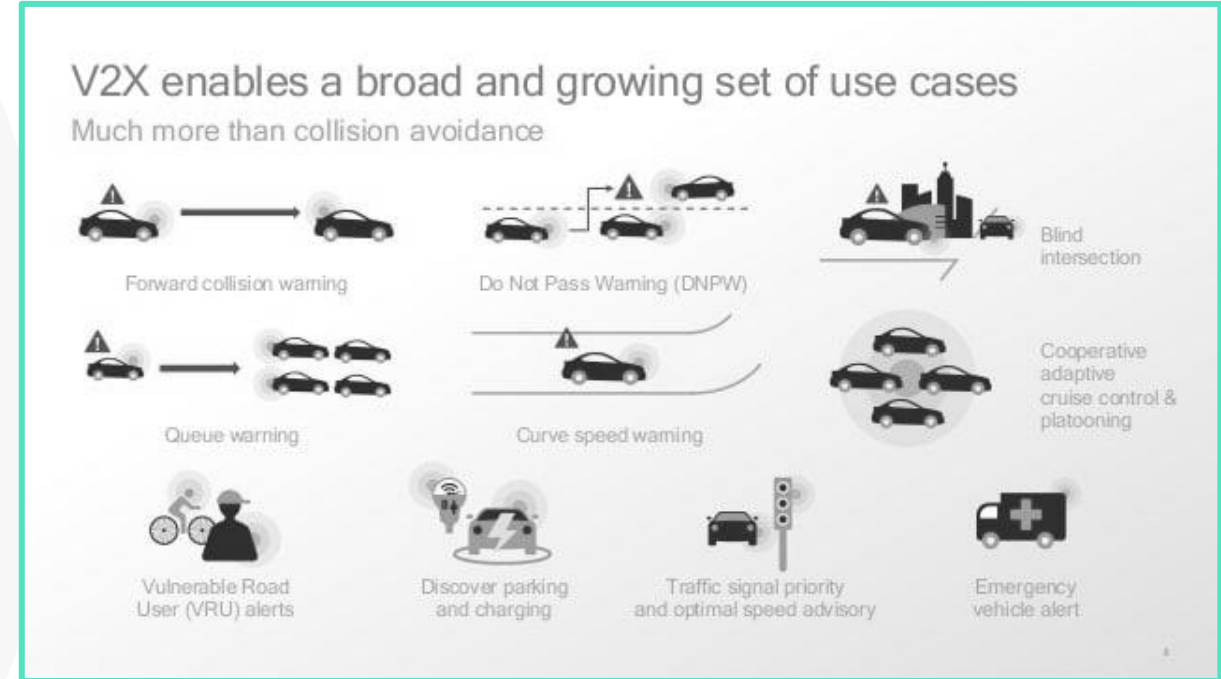# VVC and autonomous driving

➢ 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.

➢ The cameras alone, leaving the radar and LiDAR out of it, are expected to generate data at a rate between **20 Mbps and 40 Mbps**.
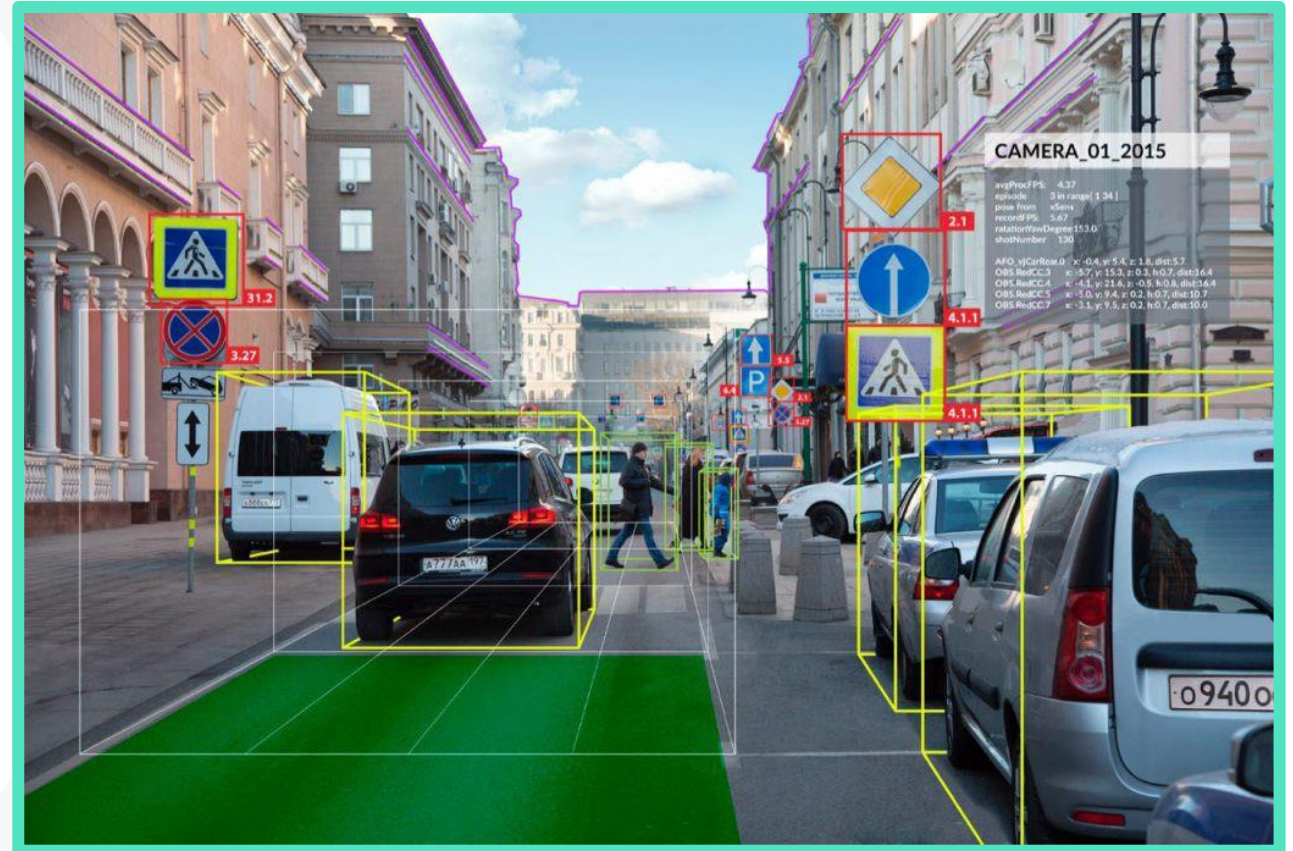
5G and Connectivity – Smart Cars

➢ **4G**, has a typical download speed in the range of **8 – 10 Mbit/s**, and a typical upload speed of **5 -6 Mbit/s**. The current cellular network is wholly unsuited for the level of data which autonomous vehicles will create.

➢ **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.

V2X enables a broad and growing set of use cases
Much more than collision avoidance

Forward collision warning
Do Not Pass Warning (DNPW)
Blind intersection
Queue warning
Curve speed warning
Cooperative adaptive cruise control & platooning
Vulnerable Road User (VRU) alerts
Discover parking and charging
Traffic signal priority and optimal speed advisory
Emergency vehicle alert

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II. The market potential for V2X technology

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V2X industry trends

➤ **Market Synopsis**

- The global Automotive Vehicle-To-Everything (**V2X**) market size reached **US$ 3.21 billion** in 2021 and it is expected to hit **USD 15.3 Billion by 2030**, growing at a **CAGR of 45%** during the forecast period 2022 to 2030.

Source: https://www.precedenceresearch.com/automotive-v2x-market

AUTOMOTIVE V2X MARKET SIZE 2020-2027

(USD BILLION)
$12.93

2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027

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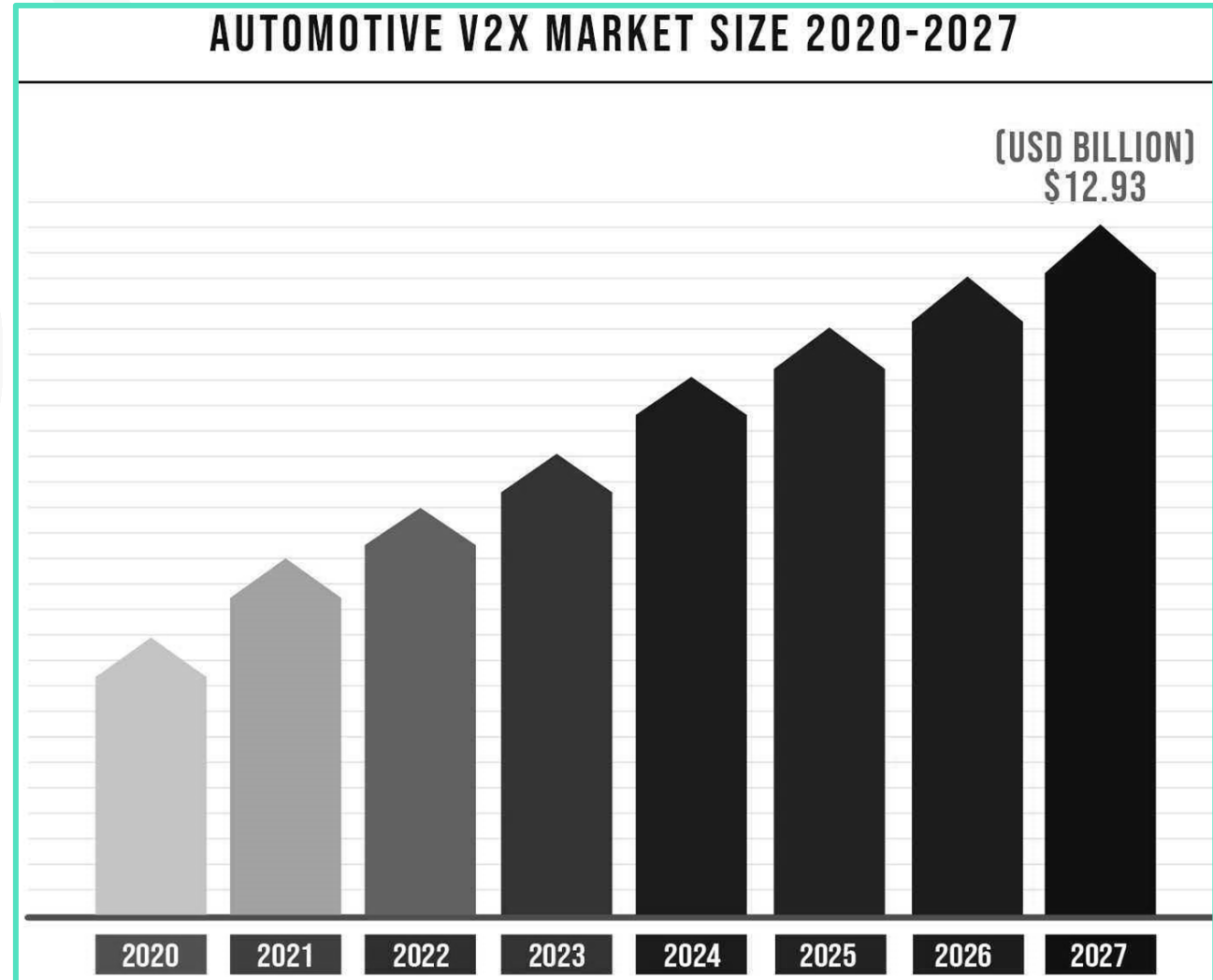
V2X industry trends

➢ **Market Synopsis**

- Based on vehicle type, passenger cars accounted for the largest market value share of nearly **75% in the year 2020** and analyzed to continue its dominance throughout assessment period.

Source: https://www.precedenceresearch.com/automotive-v2x-market

AUTOMOTIVE V2X MARKET SHARE, BY VEHICAL, 2020 (%)

COMMERCIAL VEHICLES

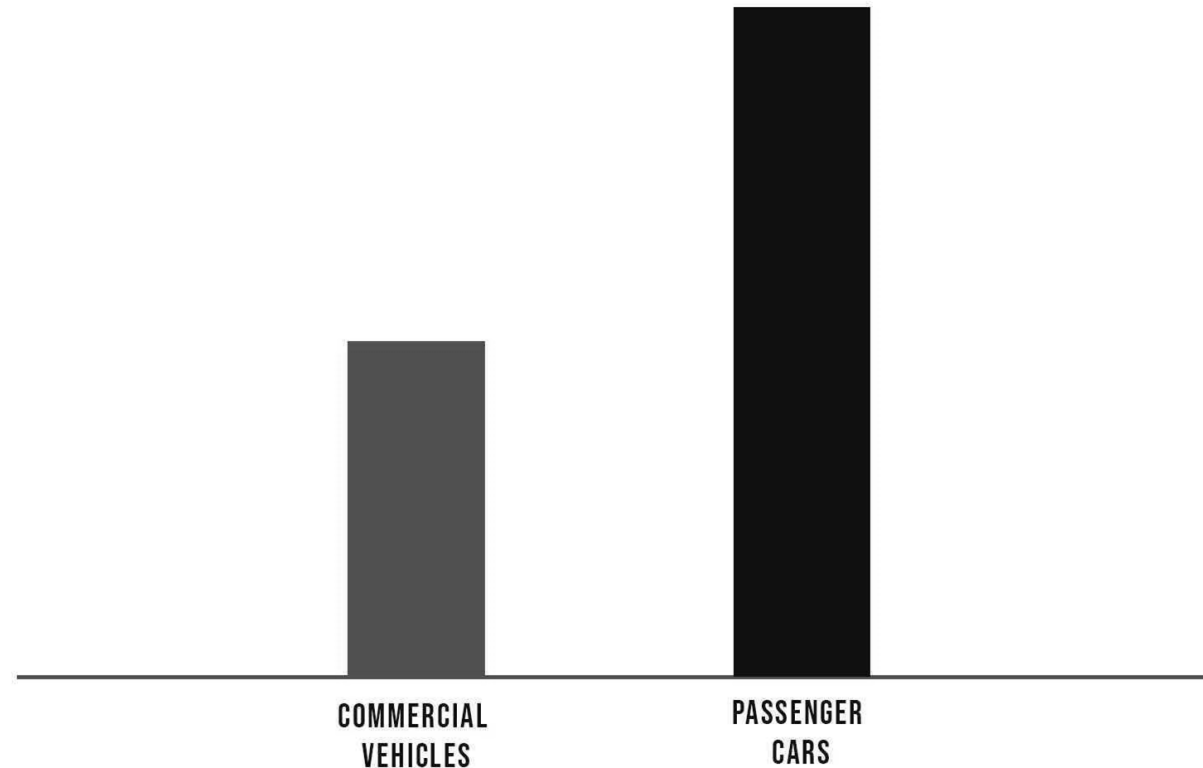PASSENGER CARS

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V2X industry trends

➢ **Market Synopsis**

- **North America and Europe** estimated to dominate the global automotive V2X market due to presence of **technologically advancement** as well as **safety and environmental regulations.** Also, North America and Europe are the largest markets for automobile in general.

- However, **connectivity infrastructure** is expected with larger growth numbers in **APAC countries.**

Source: https://www.precedenceresearch.com/automotive-v2x-market

AUTOMOTIVE V2X MARKET SHARE, BY REGION, 2020 (%)

ASIA PACIFIC

NORTH AMERICA

LATIN AMERICA

MIDDLE EAST AND AFRICA

EUROPE

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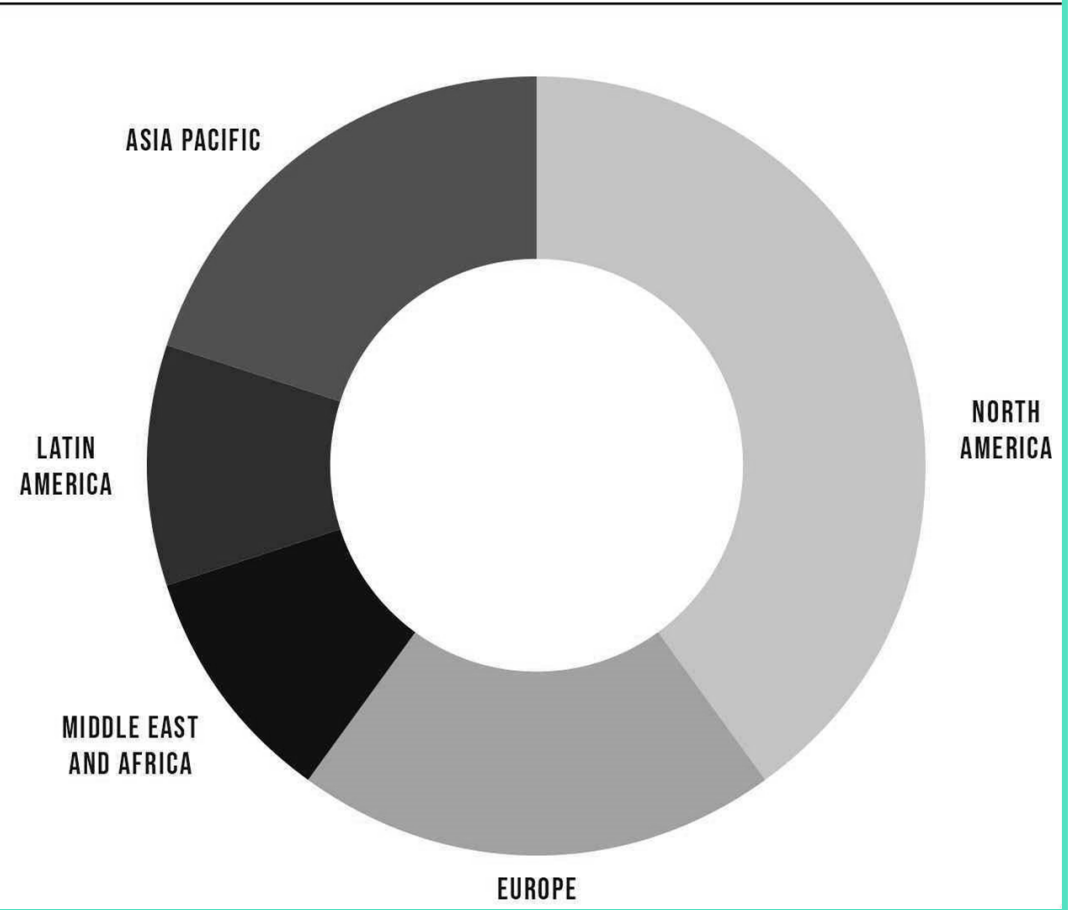
III. V2X standards development

4G/5G V2X standards development
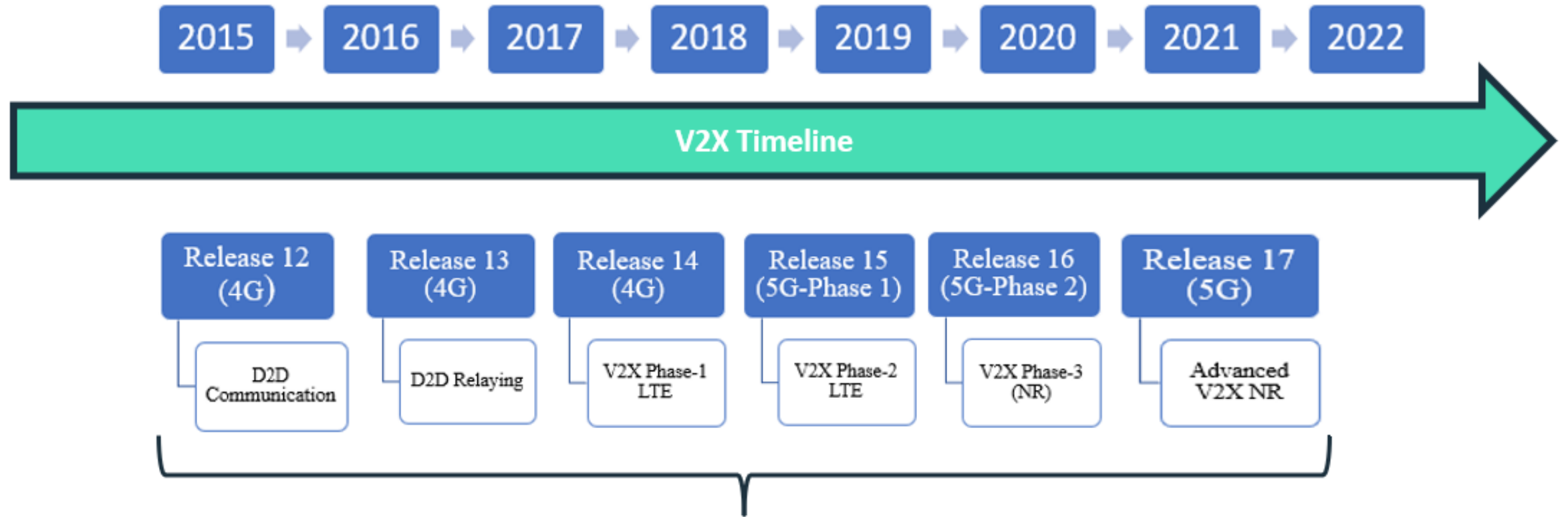
Here, we can see the V2X technology evolution from 4G to 5G.

Note: This information is based on the various V2X 3GPP standards and releases.

4G/5G V2X standards development

➢ **4G and 5G technology**

- The diagram illustrates that LTE C-V2X (R14/15) enabled devices will be able to communicate with 5G NR-V2X enabled vehicles.

- The 5G NR-V2X will support the LTE-V2X PC5 interface in addition to 5G NR-V2X, PC5.

LTE & NR V2X car

LTE & NR V2X car

LTE & NR PCS

LTE PCS

LTE PCS

LTE only V2X car

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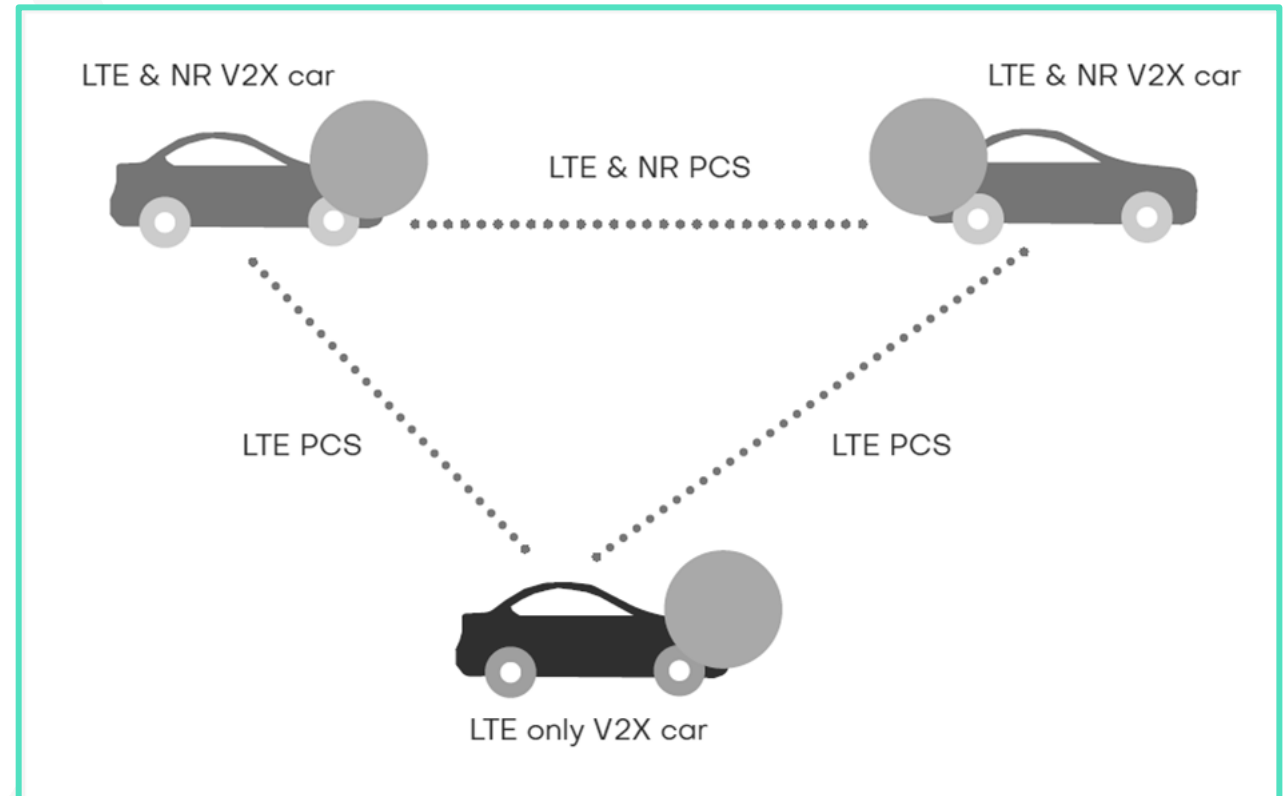
4G/5G V2X standards development

D2D Communications	Enhanced Safety	Autonomous Driving
R12/R13	R14/ R15	R16 5G NR C-V2X

D2D Communication	Enhanced Communication Range for V2X	Ultra-reliable, low-latency, high throughput communication for autonomous driving

Feature	D2D Communications	Enhanced Safety	Autonomous Driving
Positioning	No	Share positioning information	Wideband ranging
Communications	Broadcast Only	Broadcast Only	Broadcast + Unicast/Multicast
High Speed Support	No	Yes	Yes
High Density Support	No	Yes	Yes
Latency		Low Latency	Ultra Low Latency

4G/5G V2X standards development

AUTOMOTIVE INDUSTRY

Vehicle Platform, Hardware and Software Solutions

TELECOMMUNICATIONS

Connectivity and Networking Systems, Devices and Technologies

End to end solutions for intelligent transportation, mobility systems and smart cities

New 3GPP logo for 5G
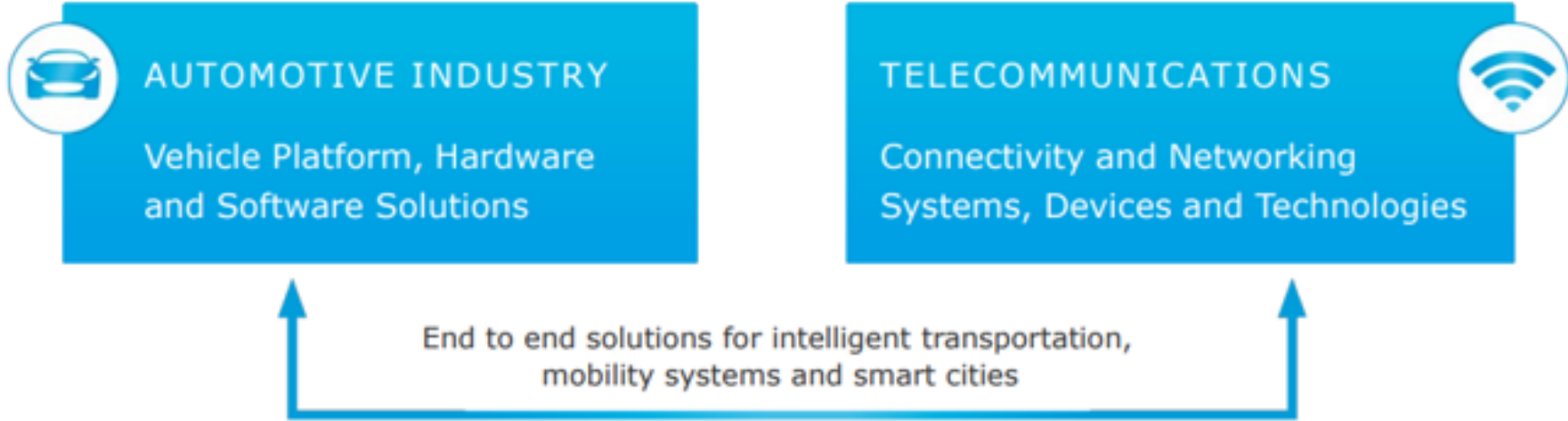
The telecom industry is in the process of defining the 5G standards

5G will be much more than mobile broadband connectivity, covering a variety of use-cases and industries

One of the most interesting 5G use-cases is V2X, the framework that will allow vehicles to communicate with each other and beyond

5GAA will partner with the relevant SDOs to drive the requirements of 5G V2X create a successful V2X ecosystem

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, 2022)

Company	Value
LG Electronics (KR)	102
Huawei (CN)	88
Samsung (KR)	66
Qualcomm (US)	44
Volkswagen (DE)	35
Ericsson (SE)	26
Intel Corporation (US)	13
Vodafone (UK)	10
Orange (FR)	10
General Motors (US)	9
AT&T (US)	9
ROBERT BOSCH GmbH (DE)	5
Swift Navigation (US)	4
Fraunhofer (DE)	3
Continental Automotive (DE)	3
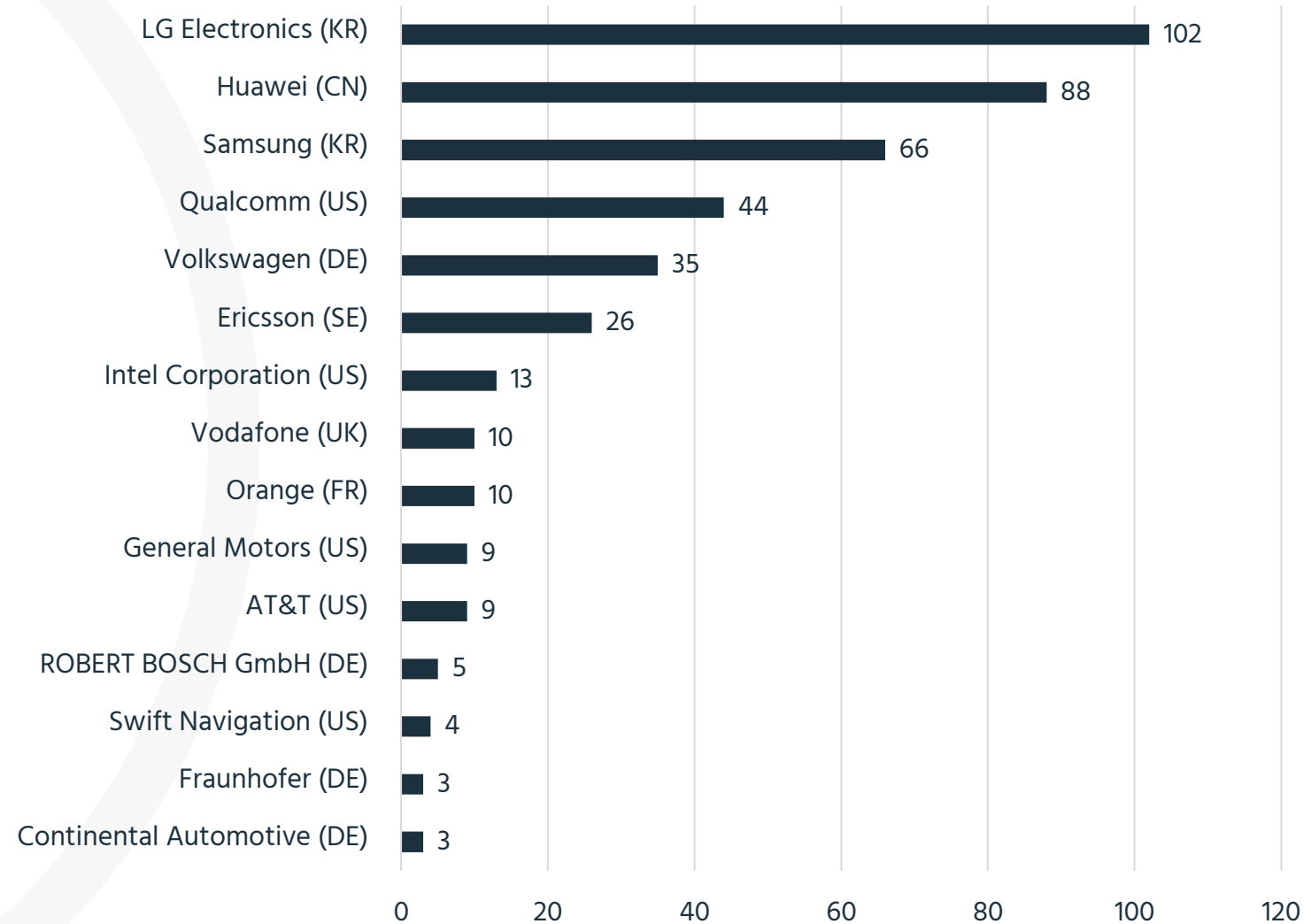
V2X contains the following four different types

- **Vehicle-to-Vehicle (V2V):** V2V applications expect UEs that are in proximity of each other to exchange V2V application information. 3GPP transport of messages containing V2V application information requires the UE to have a valid subscription and authorization from a network operator.

- **Vehicle-to-Infrastructure (V2I):** The UE supporting V2I applications transmits messages containing V2I application information to an RSU or locally relevant application server. The RSU and/or the locally relevant application server transmit messages containing V2I application information to one or more UEs supporting V2I applications.

- **Vehicle-to-Network (V2N):** The UE supporting V2N applications communicates with an application server supporting V2N applications. Both parties communicate with each other via EPS.

- **Vehicle-to-Pedestrian (V2P):** V2P applications expect UEs that are in proximity of each other to exchange V2P application information. 3GPP transport of messages containing V2P application information requires the UE to have a valid subscription and authorization from a network operator.

IV. How to identify V2X SEPs and standards

V2X SEPs

V2X SEPs and standards

- 4G and 5G are subject to over **1,600 standards** speciation.

- However, V2X applications will not need all 4G and 5G standards specifications and thus also **not all SEPs are relevant**.

- The number of SEPs relevant for licensing depends on the specific **implementation of standards**.

➢ To understand the key patent contributions to V2X technology, one must identify **patent family declarations made against each V2X specification**.

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Patent Declaration Practices

- **Patent declarations and standards specifications**

Publication Number	Declaring Company	Standard Document	Section Number	Declaration Date
US8837381B2	Ericsson	TS 38.213 v17.1.0	10.2A	19.05.2017
EP2208384B1	Panoptis	TS 38.213 v17.1.0	19.2	07.05.2020
EP1952549B2	Huawei Technologies	TS 38.212 v17.1.0	5.5	23.10.2018
EP2234452B2	ZTE	TS 23.292 v17.0.0	7.4.2.1.2	24.10.2019
EP3496334B1	InterDigital	TS 23.502 v17.4.0	4.15.2	30.09.2021
EP2124499B1	Innovative Sonic	TS 38.331 v17.0.0	8	09.07.2020
US8228827B2	Samsung Electronics	TS 38.321 v15.6.0	5.1.5	23.08.2019
EP3557938B1	Guangdong Oppo	TS 38.331 v17.0.0	5.7.10.5	25.05.2021
EP1705828B2	Nokia Technologies	TS 33.220 v15.3.0	3.2	29.10.2018
EP2289268B8	Xiaomi	TS 24.008 v17.6.0	4.4.4.5	05.06.2020
US8000717B2	QUALCOMM	TS 38.473 v17.0.0	9.3.1.271	16.03.2018
US7643456B2	Conversant Wireless	TS 24.008 v11.8.0	9.5.15a	21.08.2018
US9426697B2	BlackBerry UK Limited	TS 24.301 v17.6.0	5.5.1.2.5C	06.11.2014
US7782818B2	Core Wireless	TS 24.301 v8.8.0	5.3.2	09.06.2017

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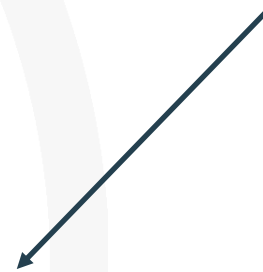
Patent Declaration Practices

- **Connecting patent declarations with standards specifications**

Publication Number	Declaring Company	Standard Document	Section Number	Declaration Date
US8837381B2	Ericsson	TS 38.213 v17.1.0	10.2A	19.05.2017

Standard Document ID	Standard Project	Technology Generation	Releases	Committee Groups	ISLD	Pooled?	FRAND	Reciprocity
TS 38.213 v17.1.0	3GPP NR Rel 17	5G	Release 17	RAN1	ISLD-201704-009	not true	true	true

Patent Declaration Practices

- **Connecting patent claims with standards sections**

Publication Number	Declaring Company	Standard Document	Section Number	Declaration Date
US8837381B2	Ericsson	TS 38.213 v17.1.0	10.2A	19.05.2017

Publication Number	US8837381B2

CLAIM 13

13. A user equipment (UE) for providing channel state feedback from the UE to a base station, the UE comprising: a determining unit configured to determine whether the UE has received an uplink grant from the base station; and a transmitting unit configured to transmit a first type of channel state feedback information to the base station on the granted resource when the UE has received an uplink grant, wherein the first type of channel state feedback information is a high-resolution type, and a second type of channel state feedback information on a dedicated resource when the UE has not received an uplink grant, wherein said second type of channel state feedback information is a low-resolution type, using a smaller number of bits than the first, high-resolution type.

Standard Document Id	TS 38.213 v17.1.0

SECTION 10.2A

A UE validates, for scheduling activation or scheduling release, a SL configured grant Type 2 PDCCH if - the CRC of a corresponding DCI format 3_0 is scrambled with a SL-CS-RNTI provided by sl-CS-RNTI, and - the new data indicator field in the DCI format 3_0 for the enabled transport block is set to '0' Validation of the DCI format 3_0 is achieved if all fields for the DCI format 3_0 are set according to Table 10.2A-1 or Table 10.2A-2. If validation is achieved, the UE considers the information in the DCI format 3_0 as a valid activation or valid release of SL configured grant Type 2. If validation is not achieved, the UE discards all the information in the DCI format 3_0. ETSI ETSI TS 138 213 V17.1.0 (2022-05)1603GPP TS 38.213 version 17.1.0 Release 17 Table 10.2A-1: Special fields for SL configured grant Type 2 scheduling activation PDCCH validation DCI format 3_0 HARQ process number set to all '0's Table 10.2A-2: Special fields for SL configured grant Type 2 scheduling release PDCCH validation DCI format 3_0 HARQ process number set to all '1's Frequency resource assignment (if present) set to all '1's

V2X Technical Specification (TS) and V2X Technical Reports (TR)

V2X Technical Specification	V2X Technical Reports
TS 22.185	TR 22.885
TS 23.285	TR 36.785
TS 23.286	TR 22.886
TS 24.385	TR 37.985
TS 24.386	TR 23.786
TS 29.388	TR 38.885
TS 29.389	TR 38.886
TS 24.486	TR 23.776
TS 33.185	
TS 33.536	
TS 22.186	
TS 23.287	
TS 24.587	
TS 24.588	
TS 29.486	
TS 36.300	
TS 38.300	
TS 38.101	
TS 38.331	

Patents   SEPs   Standards   Companies

⌄ Query Builder

▼ Untitled Query   ✎ Edit   ◉ Code Preview   ❓ Quick Help

Select   [All ⇕]   [e.g. biotech, 3D print*, car or vehicle]   •••

AND ⇕   [Standard Document Id ⊕ | ⇕]   [e.g. IEEE 802.11g OR ETSI TS 123401]   ⬇ 🗑 + +

AND ⇕   [Current Assignee ⊕ | ⇕]   [e.g. Nokia, "Volkswagen AG" OR Siemens]   •••

⊕ Add Query

Related Keywords:

[Search]   [Save]   [Load]   [History]   [Reset]   [Visual | Expert]

Results: **Analytics**   Search Data

Results: Analytics

Currently no analytics visible. Please use the query
builder above to construct a relevant search.

[Need Help?]

Patents   SEPs   **Standards**   Companies

⌄ Query Builder

⊙ Untitled Query   ✎ Edit   ⊙ Code Preview   ? Quick Help

Select | All ⇕ | | e.g. biotech, 3D print*, car or vehicle | •••

AND ⇕ | Standard Document Id ✛ ⇕ | | e.g. IEEE 802.11g OR ETSI TS 123401 | ⤓ 🗑 ➕ ➕

AND ⇕ | Committee Groups ✛ ⇕ | | e.g. 3GPP OR GERAN OR RAN | •••

⊕ Add Query

Related Keywords:

Search   Save   Load   History   Reset | Visual | Expert |

Results: Analytics   Search Data

Results: Analytics

Currently no analytics visible. Please use the query
builder above to construct a relevant search.

Need Help?

V. SEP Licensing in the Automotive Industry

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

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The clash of cultures

AVANCI ▶

Often, SEP holder or patent platforms will not license to component manufacturer

Negotiates SEP license with patent holder or patent platform

| Component Manufacturer | Supplies connectivity box | Original Equipment Manufacturer |

Some tier 1 supplier indemnify OEMs

Connectivity box implements standards subject to SEPs

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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?

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SEP litigation cases

Recent SEP auto industry litigation :

- Nokia vs. Daimler (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)
- IV vs. GM, Toyota, Honda (USA, 2021)
- Sharp vs. Volkswagen (Germany, 2021)

Automotives: the next battlefield of SEP litigation?

01-07-2019   Pauline Debré and Simon Corbineau-Picci

Editor's Picks

Booking.com—floodga

Sky v SkyKick goes to

Donald Trump fights fi
copyright row

US Copyright Office w
box row

CPA Global to make re
'new normal'

Automotive Legal & IP
World Summit 20

08 - 09 SEPTEMBER 2020   HEAR

Radisson Blu
Scandinavia
Düsseldorf,
Germany

CLARI

ParabolStudio / Shutterstock.com

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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.

WIRELESS TECHNOLOGY PATENT HOLDERS
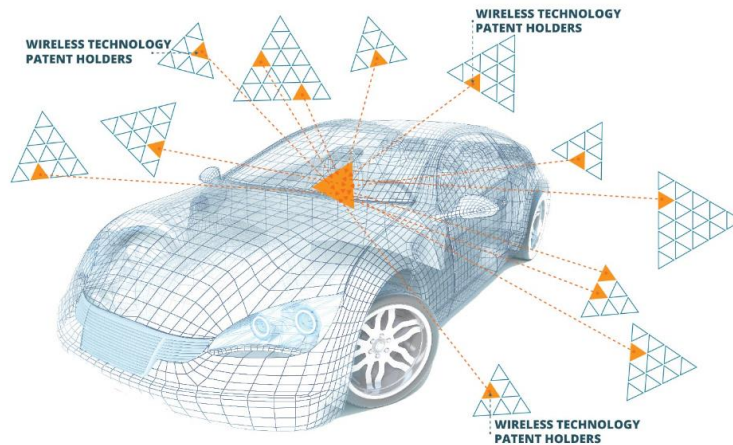
Vehicle pricing	
eCall only	$3/vehicle
3G (includes 2G and eCall)	$9/vehicle
4G (includes 2G, 3G and eCall)	$20/vehicle

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AVANCI Pool Member and Outsider

3G and 4G SEP owner AVANCI Member

3G and 4G SEP owner AVANCI Outsider

SEP Licensing – Patent Pools

Avanci 2G, 3G and 4G:

o The patent platform Avanci covers the portfolios of **54 2G-4G SEP owners.**

o Avanci offers a license to **OEM vehicle maker**s only.

o By summer of 2022, **almost all major car makers** (except Chinese car makers) had an Avanci license.

o As to the Avanci website more than **80 auto brands** with a total of **100 million licensed connected vehicles** were under the Avanci license.

Avanci 5G:

o The launch of a **5G pool and announcement of licensors and rates** was promised over a year ago.

o Likely the **5G pool will be split into different 5G technologies, with V2X being one of them.**

VI. How to get the right insights from your V2X technology SEP analysis

Increasing complexity

- **Connectivity is everywhere**, and it heavily relies on standards that are subject to SEPs.

- The number of fully connected **cars that implement V2X** technologies is set to drastically increase in the next years.

- The **number and variety of use case of standardized connectivity** technology has increased over the past years with a growing number of newly implemented standard subject to SEPs.

- 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.

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IPlytics Data Source

120 M
Patent Documents

Worldwide Patents (USA, Europe, Korea, Japan, China, etc.)
- Extended patent families
- Legal status (pending/granted, lapsed/revoked/active/expired)
- Worldwide reassignment information
- Worldwide litigation information

380.000
SEP declarations

Declared Patents
- 25 SDOs and 11 patent pools
- Patent and standards document ID
- Licensing commitments (e.g. FRAND, reciprocity)
- Patent Pools

4 M
Standards / Contributions

Standards Documents
- 2,5 M standards documents (Full text, author, supporting company)
- 1,5 M standards contributions (Full text, author, contributing company)
- Type (TS, TR, CR, WI), Status (revised, agreed, approved, noted)

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Data Sources

World-wide Patents

EP1234567B2	
Family Member	
Active/Expired	
Pending/Granted	
Current Assignee	
Inventor	
Claim Number	
Exp. 01.01.2024	

Standards & Contributions

TS 38.213 v15.4.0	
Release 15	
Group RAN1	
Tech. Gen. 5G	
18.04.2019	
Section Number	
Contributor	
Author	

SEPs Declarations

EP1234567B2	TS 38.213 v15.4.0
Company Inc.	01.01.2020

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IPlytics Platform

Access multiple data sources on One Platform

Patents

Patents are a window into technology competition and legal risks.

SEPs

SEPs provide ownership information of essential assets for standards.

Standards Contribution

Standards contributions show companies' technology investments in standards.

Litigation Cases

Litigation cases indicate market disputes on patented technology.

Patent Pools

Patent pools provide information about access to SEP protected technology.
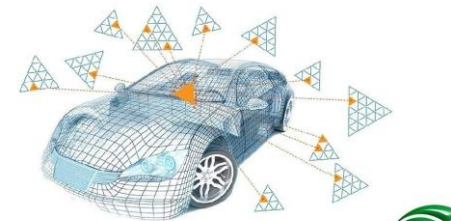
Patent Pool Data (1990-2023)

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."

Problem: Claim charting takes time and is expensive

Average claim charting costs by portfolio size

Portfolio	Cost
200 patents	550,000 €
100 patents	275,000 €
50 patents	137,500 €
20 patents	55,000 €
10 patents	27,500 €
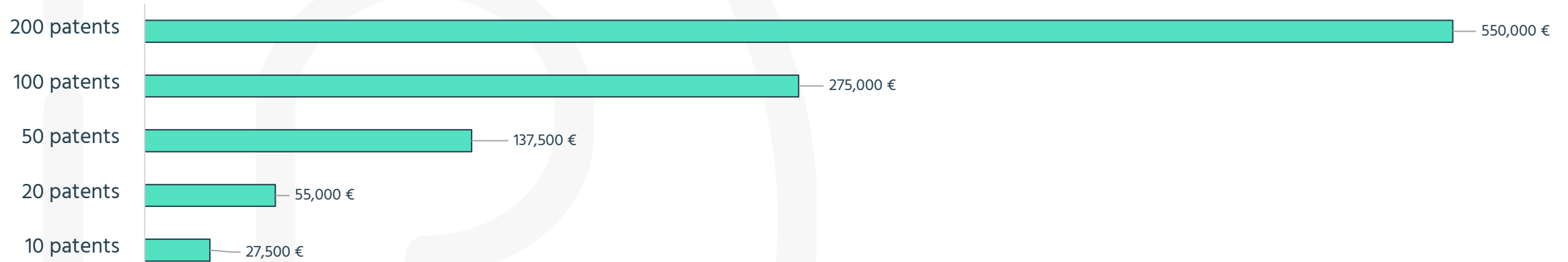
Average claim charting days per SME by portfolio size

Portfolio	Days
200 patents	283
100 patents	142
50 patents	71
20 patents	28
10 patents	14

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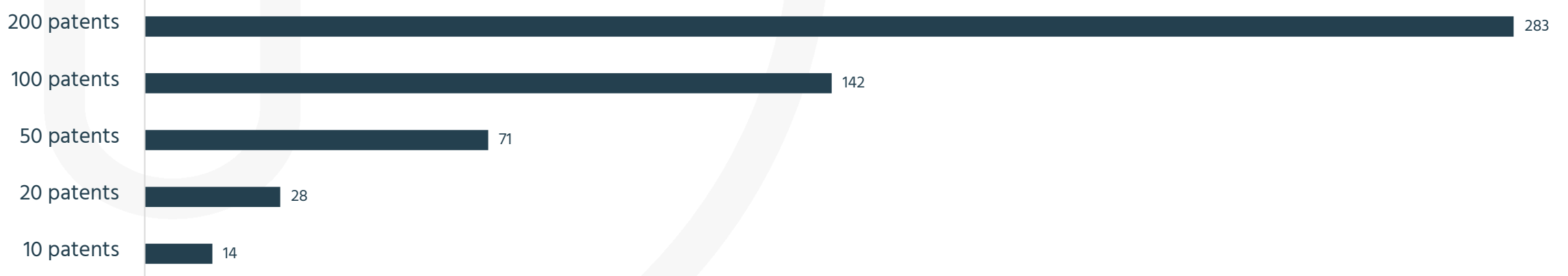
Problem: Claim charting takes time and is expensive

What is your biggest challenge with regards to SEP determination? Multiple answers possible, N=245

Category	Percentage
The time needed for claim charting	44.08%
Cost of claim charting	33.06%
Finding high quality subject-matter experts for claim charting	30.20%
Understanding the claim chart results	17.14%
None of the above	30.61%
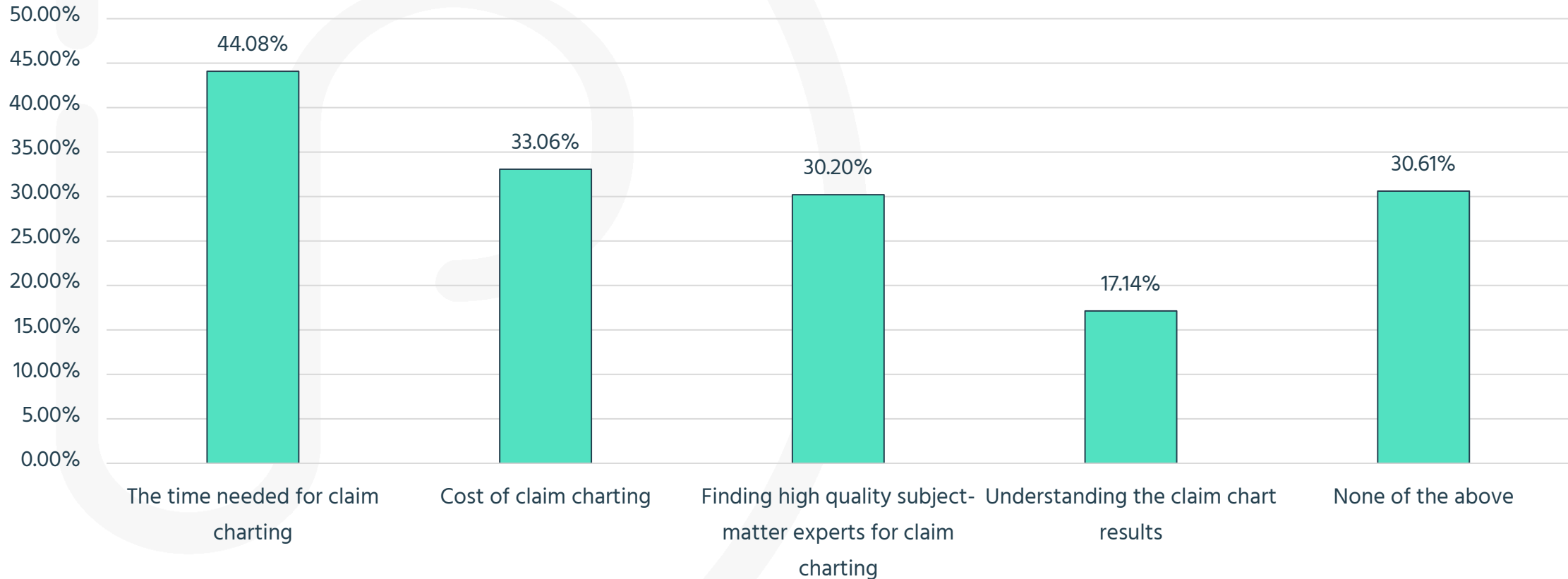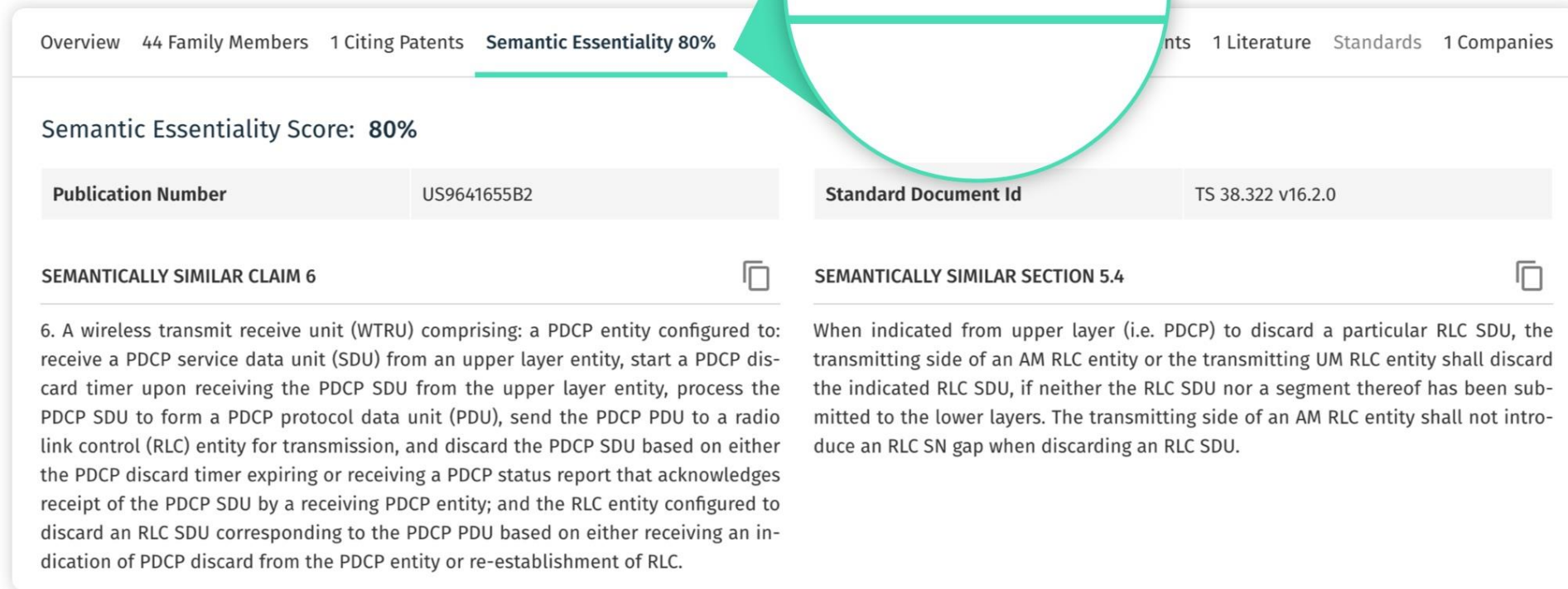
Semantic Essentiality Scores (SES) can be a first efficient step towards SEP portfolio determination

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Semantic analysis of patent claims and standards

Standard map

Patent map
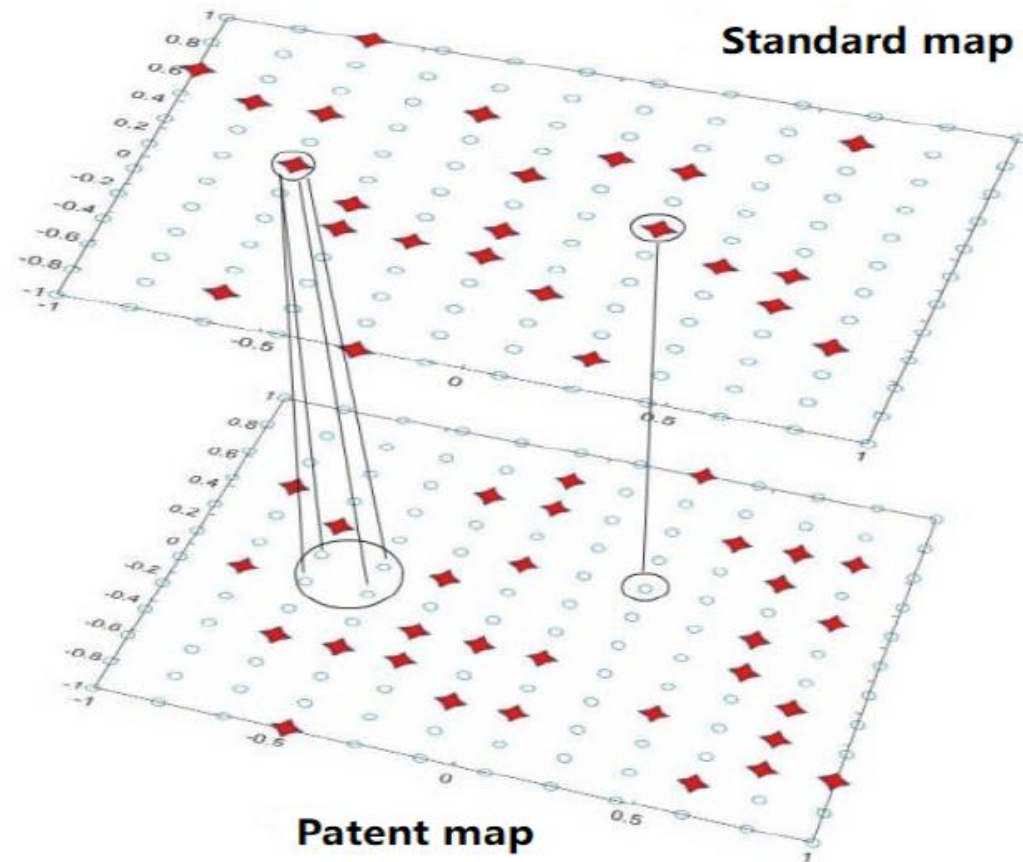
➢ While claims and standards describe the very same topic and thus can be mapped and charted by experts – the **actual language used can be very different**.

➢ To overcome this, we **train a semantic model** that understands the context of claims and standards and recognizes the use of different expressions for certain concepts to identify claim elements.

➢ We use **claim charts** manually created by experts as **training data**.

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SES – Patent claim and standard section side by side

Semantic Essentiality 80%

| Overview | 44 Family Members | 1 Citing Patents | **Semantic Essentiality 80%** | | | nts | 1 Literature | Standards | 1 Companies |

Semantic Essentiality Score: **80%**

Publication Number	US9641655B2

Standard Document Id	TS 38.322 v16.2.0

SEMANTICALLY SIMILAR CLAIM 6

6. A wireless transmit receive unit (WTRU) comprising: a PDCP entity configured to: receive a PDCP service data unit (SDU) from an upper layer entity, start a PDCP discard timer upon receiving the PDCP SDU from the upper layer entity, process the PDCP SDU to form a PDCP protocol data unit (PDU), send the PDCP PDU to a radio link control (RLC) entity for transmission, and discard the PDCP SDU based on either the PDCP discard timer expiring or receiving a PDCP status report that acknowledges receipt of the PDCP SDU by a receiving PDCP entity; and the RLC entity configured to discard an RLC SDU corresponding to the PDCP PDU based on either receiving an indication of PDCP discard from the PDCP entity or re-establishment of RLC.

SEMANTICALLY SIMILAR SECTION 5.4

When indicated from upper layer (i.e. PDCP) to discard a particular RLC SDU, the transmitting side of an AM RLC entity or the transmitting UM RLC entity shall discard the indicated RLC SDU, if neither the RLC SDU nor a segment thereof has been submitted to the lower layers. The transmitting side of an AM RLC entity shall not introduce an RLC SN gap when discarding an RLC SDU.

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SES – **Sort and refine** patents as to essentiality score

Declaring Co...	SSO	SE Publ. No.	SE Stand. Doc. ID	SE Section No.	SE Claim No.	SES
Samsung Electronics Co. Ltd.	ETSI	US9049718B2	TS 38.322 v16.2.0	5.2.2.1	17	82%
Samsung Electronics Co. Ltd.	ETSI	US9049718B2	TS 38.322 v16.2.0	5.2.2.1	17	82%
InterDigital Holdings, Inc.	ETSI	US9641655B2	TS 38.322 v16.2.0	5.4	6	80%
Samsung Electronics Co. Ltd.	ETSI	US10805048B2	TS 38.322 v16.2.0	5.6.1	5	79%
Samsung Electronics Co. Ltd.	ETSI	US10602563B2	TS 38.322 v15.5.0	5.2.2.1	1	81%
Samsung Electronics Co. Ltd.	ETSI	US10602563B2	TS 38.322 v16.2.0	5.2.2.1	1	81%

No. SES

82%

	Yes	15
	Yes	15
	Yes	0
LITIGATED	Yes	1
POOLED	Yes	0

ESSENTIALITY SCORE   62–100% ⊗

0%   50%   100%

62   100

0 documents without Essentiality Score ⓘ

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Connecting the data points

Scoreboard to **valuate** declared patents:

➢ Claim sections similarity, inventor attendee overlap, first applicant contribution overlap, FWD citation, NPL citation, timing and classification.

Indicators Matrix Chart	Team Size (TE)	Legal Breadth	Market Coverage	Radicalness (RA)	Scope (SC)	Technical Relevanc	Cooperation (CO)
QUALCOMM Incorporated	1.23	2.09	1.56	1.67	1.02	0.67	1.06
Intel Corporation	1.34	1.92	1.78	1.56	1.09	1.1	1.1
Samsung Electronics Co. Ltd.	1.28	1.59	1.35	1.62	1.1	1.11	0.97
Huawei Technology Co.,Ltd.	0.94	1.55	0.93	1.64	0.86	0.91	0.96
Xiaomi Inc.	0.81	1.8	0.75	1.44	0.92	0.94	0.94
Telefonaktiebolaget LM Ericsson...	1.03	3.33	0.99	1.51	0.95	0.82	1.01
LG Electronics Inc.	1.06	1.83	1.35	1.57	1.12	1.22	0.94
Apple Inc.	1.31	1.66	2.14	1.54	1.1	1.33	1.01
NTT DOCOMO, Inc.	1.2	1.79	0.85	1.85	1.03	0.9	0.95
ZTE Corp.	0.84	1.72	0.52	1.82	0.88	0.87	0.96
BlackBerry Limited	1	1.98	1.2	1.48	1.07	0.99	1.02
Nokia Corporation	0.96	2.06	1.01	1.78	1.12	0.98	1.02
Sony Corporation	0.96	1.69	1.27	1.3	1.14	0.9	1.01
Google Inc.	1.08	1.27	2.63	1.46	1.17	1.35	0.97
Canon Inc.	1.09	1.52	1.48	1.12	0.98	1.13	0.96
Nokia Technologies OY	0.96	2.01	1.03	1.32	1.03	0.83	1.07
NEC Corporation	0.8	1.77	1.15	1.6	1.06	0.84	1.01
International Business Machines...	1.26	1.29	1.13	1.09	0.95	0.69	0.94

Filters
0 applied

- ☐ ACTIVE
- ☐ GRANTED
- ☐ TRANSFERRED
- ☐ LITIGATED
- ＞ PATENT OFFICE
- ＞ DATES
- ＞ INDUSTRY SECTOR
- ＞ INDUSTRY FIELD
- ＞ KIND TYPE

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Patents   **SEPs**   Standards   Companies

⌄ Query Builder

🔵 Untitled Query   ✎ Edit   🔵 Code Preview   ❓ Quick Help

Select | All ⇕ | | e.g. biotech, 3D print*, car or vehicle | ⬇   ➕ ➕

AND ⇕ | Technology Generation ⇕ | | Select... ⇕ | •••

AND ⇕ | Current Assignee ⇕ | | e.g. Nokia, "Volkswagen AG" OR Siemens | •••

➕ Add Query

Related Keywords:

| Search | Save   Load   History   Reset   **Visual**   Expert

Results: **Analytics**   Search Data

Results: Analytics

Currently no analytics visible. Please use the query
builder above to construct a relevant search.

| Need Help? |

VII. Takeaways

Why information is key!

Growing challenges:

➤ The **volume and complexity** of worldwide patents, standards and SEPs is growing daily, making it difficult to manually **identify, analyze and understand** relevant information on connected technologies.

➤ **Digitization** of products and services is forcing companies to **build expertise** in new technology fields.

➤ As a result, there is a growing demand for **IP analytics** in many departments like **strategic product planning, R&D, standards development, licensing, M&A, IP Asset Management and legal divisions**.

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SEP licensors (patent owners)

SEP licensors use of IPlytics Platform:

➢ Align R&D investments, standards development, patent prosecution, patent portfolio management and licensing/monetarization strategy to **file valid and essential patents** and to **commercialize SEPs** in world-wide licensing campaigns.

➢ Compare SEP portfolios for **cross-license** negotiations and **monitor competition** making sure to sustain revenues both on the downstream product market as well as upstream licensing market.

➢ Monitor **competitors' standards development** investments (contribution count) and identify new standards groups to maintain leading positions in standards development.

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Use Cases

Patent portfolio manager:

➢ Compare and value your portfolios against competitors

➢ Identify strength and weaknesses to further develop your portfolio

➢ Support keep/kill decisions in patent portfolio pruning analysis

Licensing executives / deal maker:

➢ Find gold nuggets in your portfolio to prepare licensing negotiations

➢ Identify patent portfolios to commercialize/license or use for acquisition

➢ Use SES to weed out 'weaker' patents, focusing resources on higher ranked patents

SEP licensees (standards implementers)

SEP licensees use of IPlytics Platform:

➢ Value and determine SEP portfolios offered for license. Prepare for **FRAND negotiation**. Identify the numerator and denominator to measure the patent holder's market share.

➢ **Identify standards subject to SEPs** in the complex value chain of suppliers as SEP holder approach OEMs or at least Tier 1 supplier

➢ Monitor SEP filing, SEP change of ownership and litigation to **quantify risks and plan royalty payments**.

➢ **Identify** industry related (e.g. V2X or M2M) **standards development initiatives** to have a seat at the table when future connectivity technology is developed.

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Use Cases

Strategic IP attorneys / legal divisions:

➤ Use IPlytics in discovery

➤ Use SES before claim charting/review to focus on most important patents first

➤ Make use of objective data to consider for FRAND preparation, negotiations, argument formulation

Licensing executives / deal maker:

➤ Use IPlytics to prepare for FRAND negotiations

➤ Use IPlytics to understand the share of third-party SEP portfolios

➤ Identify litigation trends in your industry for standards you integrate

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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with Tim Pohlmann

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