IPLYTICS | Intellectual Property Analytics

2023 - IPlytics - Closing the SEP Transparency Gap Part 2:

How to Deal with SEP Determination of Large SEP Portfolios

Tim Pohlmann CEO @ IPlytics GmbH

Video Recording: https://youtu.be/YRQtkyghenQ

IPlytics Webinar Series 2023

I. Part 1: "How to Deal with Data Accuracy Challenges"

July 27th, 2023

Recording: https://www.iplytics.com/events/past/

II. Part 2: "How to Deal with SEP Determination Valuation Challenges"

August 29th, 2023

Register: https://www.iplytics.com/events/upcoming/

III. Part 3: "How to Deal with FRAND Determination Challenges"

September 26th, 2023

Register: https://www.iplytics.com/events/upcoming/

Today's Speaker

- **PhD & Post Doc.** TU Berlin, CERNA, MINES ParisTech.
- CEO and **founder of IPlytics**.
- **2023 IAM Strategist 300**. Recognized 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.

Agenda

I Pitfalls when analyzing and counting declared patents

II How to match, clean, deduplicate and enhance patent declaration data

III Declaration sources, declarations practices and data implications

IV How to identify patent declaration for protocols such as V2X or NB-IoT

V How to identify patent for standards subject to blanket declarations

V Patent declarations and essentiality tests – Claim Chart Sampling

VI Patent declarations and essentiality tests – Essentiality Prediction

VII How to leverage access to patents and standards data cross-departmental?

Pitfalls when analyzing and counting declared patents

Patent declarations may be declared more than once!

Common pitfalls when analyzing and counting declared SEPs

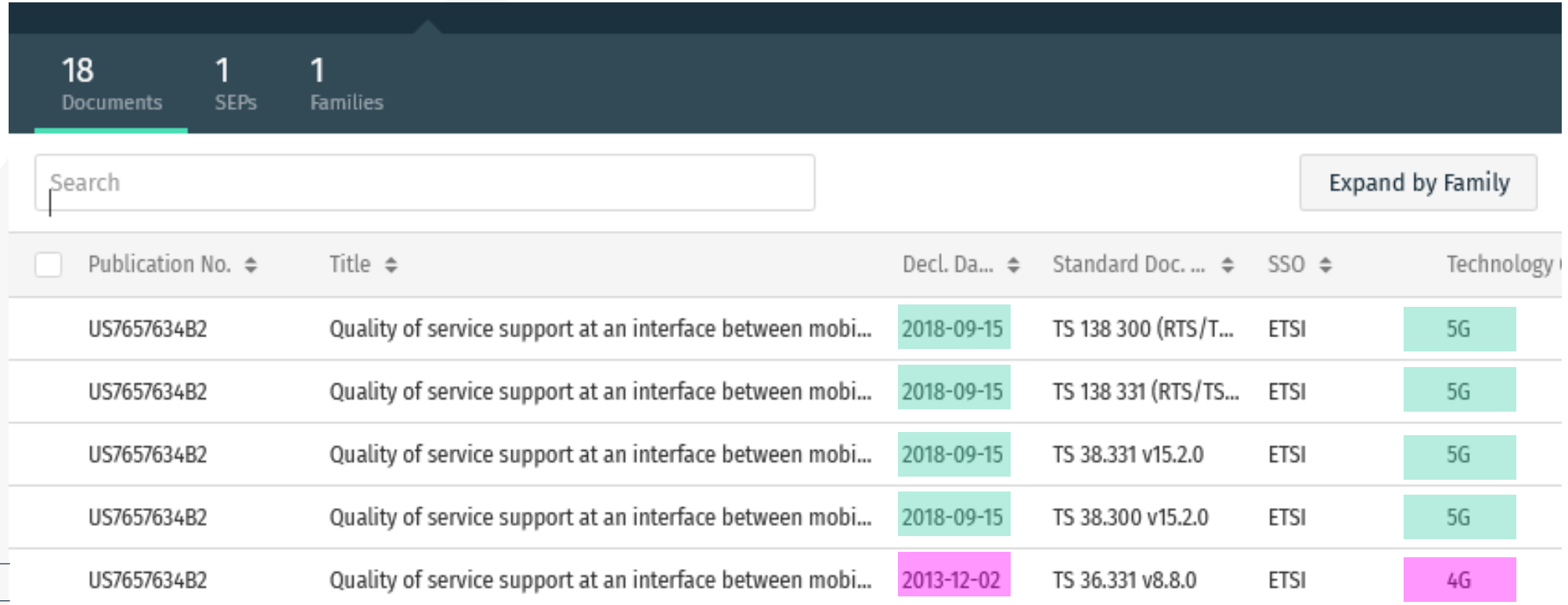
Redeclaration of patents

- Companies may "**re-declare**" patents they have already declared a years ago.
  - Some patents' claims are relevant across different generations of standard e.g. 4G as well as 5G. These patents may be again declared to a new standard version or generation.
  - Sometimes patent ownership changes and the new owner again declares the patent.
- The "**re-declaration**" of patents e.g. across different generations of standards or across different patent owners **may cause double counting of patents**.

SEP declaration- the matter of **redeclaration**

Patent declared to **5G** in **2018**

Patent declared to **4G** in **2013**



Publication No.	Title	Decl. Da...	Standard Doc. ...	SSO	Technology
US7657634B2	Quality of service support at an interface between mobi...	2018-09-15	TS 138 300 (RTS/T...	ETSI	5G
US7657634B2	Quality of service support at an interface between mobi...	2018-09-15	TS 138 331 (RTS/TS...	ETSI	5G
US7657634B2	Quality of service support at an interface between mobi...	2018-09-15	TS 38.331 v15.2.0	ETSI	5G
US7657634B2	Quality of service support at an interface between mobi...	2018-09-15	TS 38.300 v15.2.0	ETSI	5G
US7657634B2	Quality of service support at an interface between mobi...	2013-12-02	TS 36.331 v8.8.0	ETSI	4G

SEP declaration to **multiple standards**

- The patent has been declared at **3 different SSO databases**
- The patent has been declared at **4 different standards**
- The patent has been declared at **9 different releases**
- The patent has been declared at **7 different technical specs**

Declaration Overview

Publication Number	SE198800698D0
Standard Setting Organization	ARIB | ETSI | ITUR
Standard Project	UMTS | M.1225 | LTE | IMT-2000 MC-CDMA System
Technology Generation	4G
Releases	Release 8 | Release 13 | Release 12 | Release 9 | Release 11 | Release 10 | Release 16 | Release 15 | Release 14
Groups	RAN3
Standard Document Id	M.1225 | TS 136 440 (DTS/TSGR-0336440v900) v9.0.0 | TS 136 300 (RTS/TSGR-0236300v920) v9.2.0 | ARIB STD-T64 Ver.1.30 | TS 36.440 v9.0.0 | TS 36.300 v9.2.0 | ARIB STD-T64 Ver.1.00
Declaring Company	Telefonaktiebolaget LM Ericsson | Ericsson | Ericsson Inc.

II How to match, clean, deduplicate and enhance patent declaration data?

Patent Declaration Data Cleaning

Match

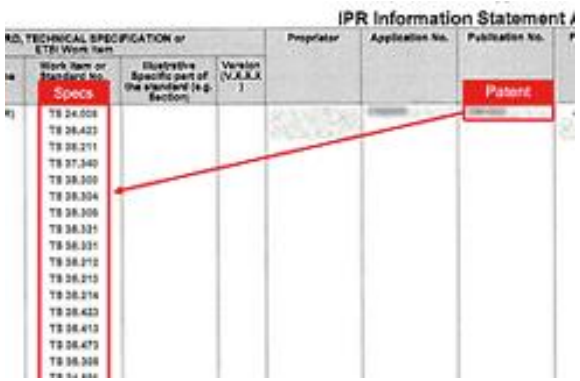
Declared number	Matched application number
WO2006KR03250	WO2006KR3250A
KR20020063942	KR200263942A
HK20010104144	HK2001104144A
KR19980053228	KR199853228A
KR19990054258	KR199954258A
US20060420323	US2006420323A

Declared patent numbers are messy. >40% of the declared **numbers** must be **normalized** to match patent office data.

Clean

Almost 20% of all declared patent numbers are ambigous which makes it required to check and **clean out false positive**.

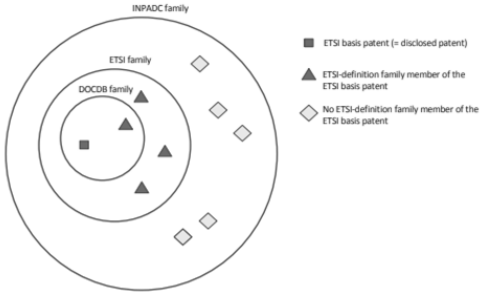
Deduplicate



Patents of the same family are declared multiple times which makes it required to **dedupliucate** and count by family.

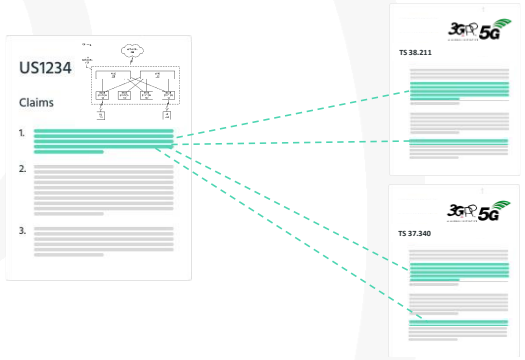
Patent Declaration Data Processing

Expand



ETSI requires to declare one basis patent only which makes it required to **add family counterparts** from all jurisdictions.

Classify



Patents are declared to ambigous standard projetcs which makes it required to to **classify** patents to distinct **standards generations** using TS.

Enhance

IPlytics connects declared patents with accurate **ultimate patent owner** data, **legal status** and **patent family** information.

III Declaration sources, declarations practices and data implications?

II. Which SSOs provide SEP data for which standards?

- Information about potential SEPs is only provided by a limited number of SSO that operate in standards areas where patents matter:
  - Communication technology e.g. Wi-Fi (4-7) or cellular technology (3G, 4G, 5G)
  - Audio or video coding technology (ITUT HEVC, VVC, AAC)
  - Broadcasting (DVB, ATSC, SMPTE)
- Such standards are of highest importance for the next technology revolution where everything will be connected through the Internet of Things.
- New upcoming standard project outside of the commutation world (e.g. Society of Automotive Engineers) increasingly provide information on potential SEPs.

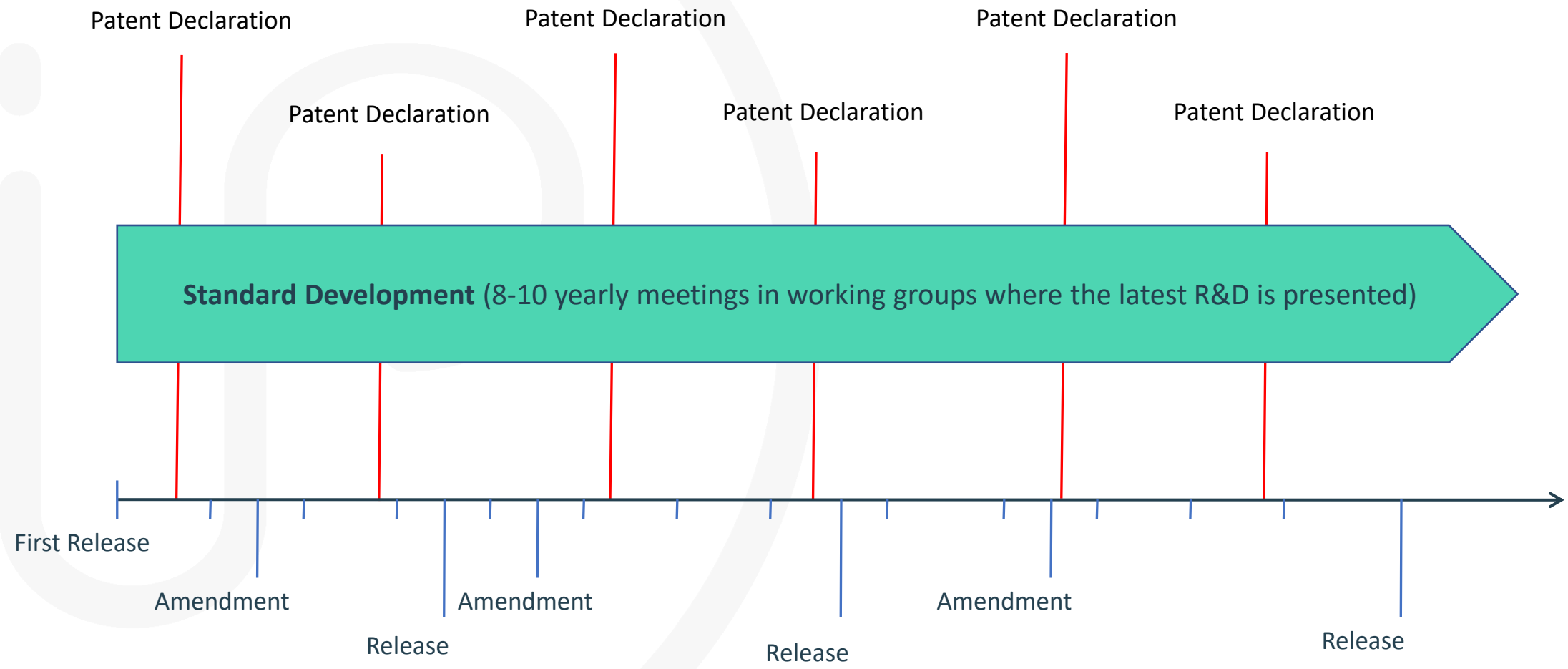
Standard Essential Patent Data (1978-2023)

SSO	Example Standards	Declared SEPs
ETSI	2G, 3G, 4G, 5G, NB IoT, LTE-E, ITS, C-V2X, DVB, DMR, DECT, TERA	466,862
ITUT	AVC H.264, HEVC H.265, VVC H.266	37,928
ATSC	ATSC -1.0- 3.0, Over the Air Internet TV Broadcasting	32,162
ISO	RFID, MPEG 1-4, mp3	12,507
ATIS	2G, 3G, 4G, 5G	14,070
IETF	Internet Protocol Standards	8,600
IEEE	Wi-Fi 1-7, DSRC, WAVE, LAN/MAN, Bluetooth, ZigBee, FireWire, WiMAX, Ethernet	7,848
ARIB	2G, 3G, 4G, 5G	2,500
IEC	Electric vehicle conductive charging, Industrial Networks, CQN series RF, RFID	2,200
Wireless Power Con.	Wireless Charging Qi Standard	2,400
OMA	GSM, UMTS or CDMA2000	5,400
ISO/IEC	MPEG Visual	1,770
SMPTE	Motion Picture and Television	2,250

Standard Essential Patent Data (1978-2023)

SSO	Example Standards	Declared SEPs
ANSI	Wi-Fi 1-7, LAN/MAN, Bluetooth, ZigBee, FireWire, WiMAX, Ethernet	1,044
IEEE / IEC	Wi-Fi 1-7, DSRC, WAVE, LAN/MAN, Bluetooth, ZigBee, FireWire, WiMAX, Ethernet	260
ITUR	Radio Transmission	1,690
CCSA	2G, 3G, 4G, 5G	332
VESA	DisplayPort	196
OASIS	XrML WSRP UOML | UOML UDDI	279
Broadband Forum	Ethernet, ADSL, DSL, Optical Fiber	83
TIA	TDMA, CDMA, WCDMA	96
CEN	IST, Electronic Identification, Authentication and Trusted Services	55
SAE	Broadband PLC Communication for Plug-in Electric Vehicles, Mobile Fueling Station	20
ECMA	NFC	3

Standards development and patent declarations



Patent Declaration Practices

- **Specific declarations with all details**

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

Patent Declaration Practices

- **Specific declarations with no details**

Publication Number	Declaring Company	Standard Document	Section Number	Declaration Date
US8837381B2	Ericsson	TS 38.213		19.05.2017
EP2208384B1	Panoptis	TS 38.213		07.05.2020
EP1952549B2	Huawei Technologies	TS 38.212		23.10.2018
EP2234452B2	ZTE	TS 23.292		24.10.2019
EP3496334B1	InterDigital	TS 23.502		30.09.2021
EP2124499B1	Innovative Sonic	TS 38.331		09.07.2020
US8228827B2	Samsung Electronics	TS 38.321		23.08.2019
EP3557938B1	Guangdong Oppo	TS 38.331		25.05.2021
EP1705828B2	Nokia Technologies	TS 33.220		29.10.2018
EP2289268B8	Xiaomi	TS 24.008		05.06.2020
US8000717B2	QUALCOMM	TS 38.473		16.03.2018
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US9426697B2	BlackBerry UK Limited	TS 24.301		06.11.2014
US7782818B2	Core Wireless	TS 24.301		09.06.2017

Patent Declaration Practices

- **Blanket declarations with no details**

Publication Number	Declaring Company	Standard Document	Section Number	Declaration Date
	Ericsson	TS 38.213		19.05.2017
	Panoptis	TS 38.213		07.05.2020
	Huawei Technologies	TS 38.212		23.10.2018
	ZTE	TS 23.292		24.10.2019
	InterDigital	TS 23.502		30.09.2021
	Innovative Sonic	TS 38.331		09.07.2020
	Samsung Electronics	TS 38.321		23.08.2019
	Guangdong Oppo	TS 38.331		25.05.2021
	Nokia Technologies	TS 33.220		29.10.2018
	Xiaomi	TS 24.008		05.06.2020
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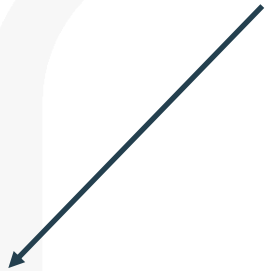
	BlackBerry UK Limited	TS 24.301		06.11.2014
	Core Wireless	TS 24.301		09.06.2017

Patent Declaration Practices

- **Specific declarations with all details**

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

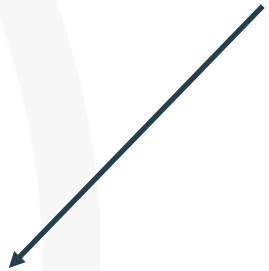


Publication Number	First Applicant/Assignee	Assignee Highest Parent	Inventor(s)	Publication Date	Application Date	Expiration Date	CPC/IPC	Active (not lapsed or expired)	Granted	Litigation Case Name	Litigation Filed Date
US8837381B2	Ericsson	Ericsson	ENGLUND EVA	16.09.2014	27.09.2007	14.10.2030	H04W72/14	true	true	Ericsson Inc., LM Ericsson Telefonaktiebolaget (publ) v. Apple Inc.	2015-02-26

Patent Declaration Practices

- **Specific declarations with all details**

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

- **Specific declarations with all details**

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

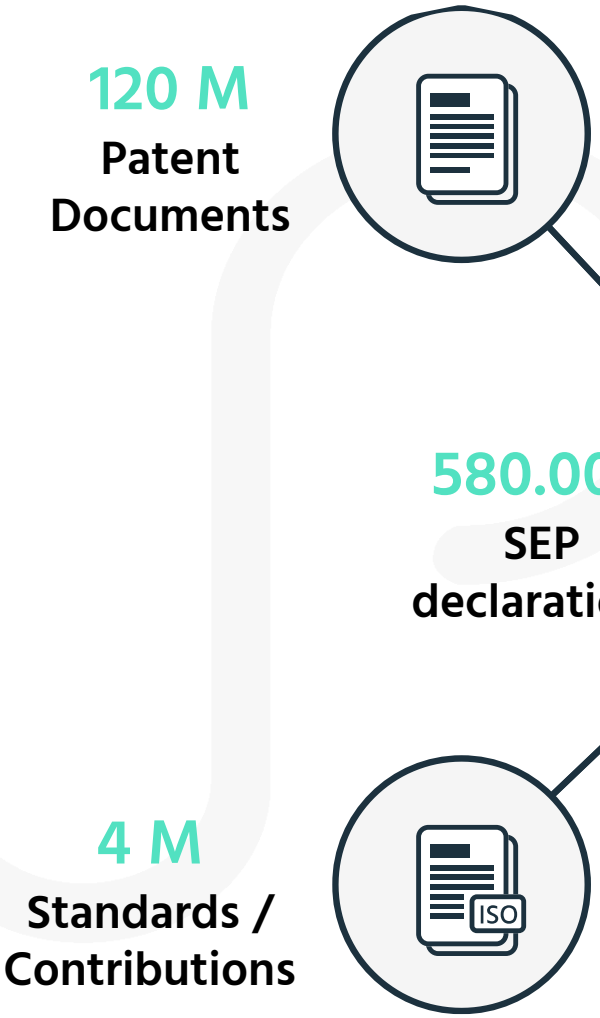
13. A user equipment (UE) for providing channel state feedback from the UE to a base station, the UE comprising: a determining unit configured to determine whether the UE has received an up-link grant from the base station; and a transmitting unit configured to transmit a first type of channel state 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 re-source 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

IPlytics Data Source



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

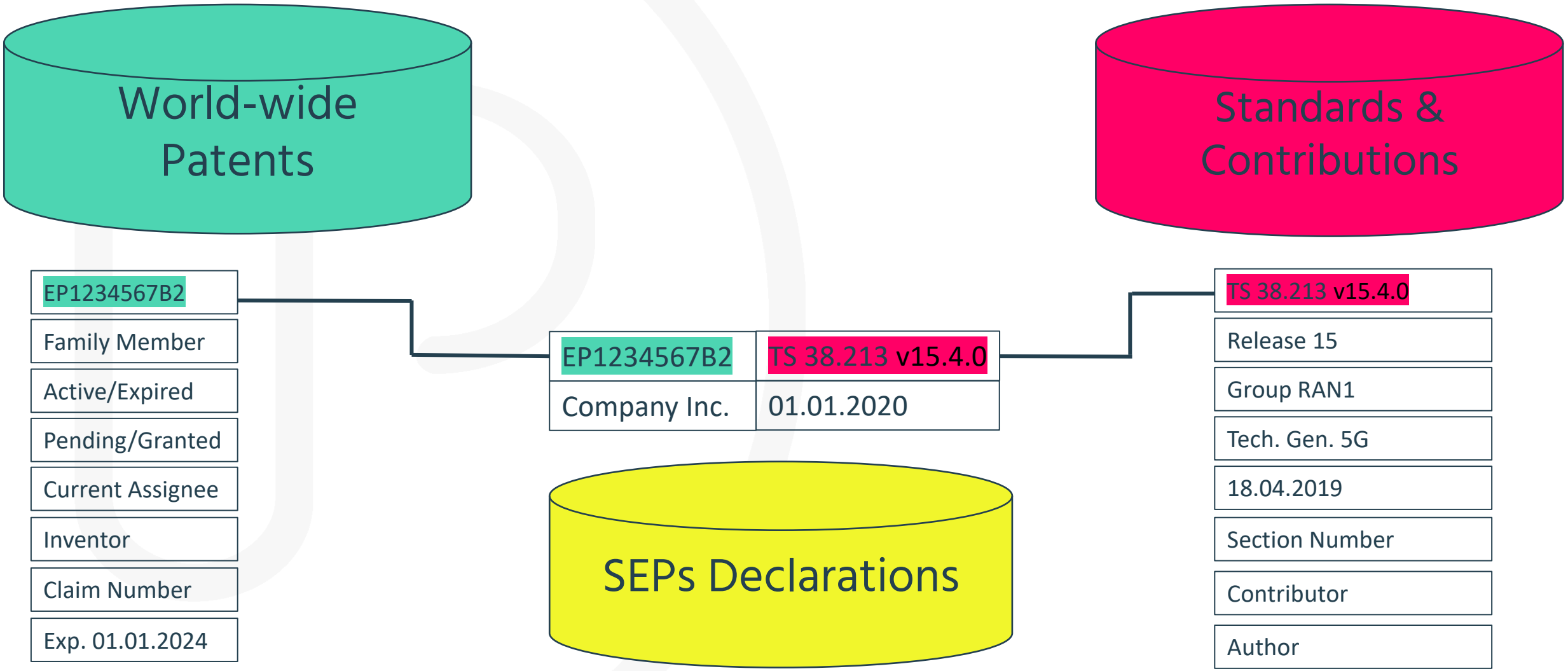
Declared Patents

- 25 SDOs and 10 patent pools
- Patent and standards document ID
- Licensing commitments (e.g. FRAND, reciprocity)
- Patent Pools

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)

Data Sources

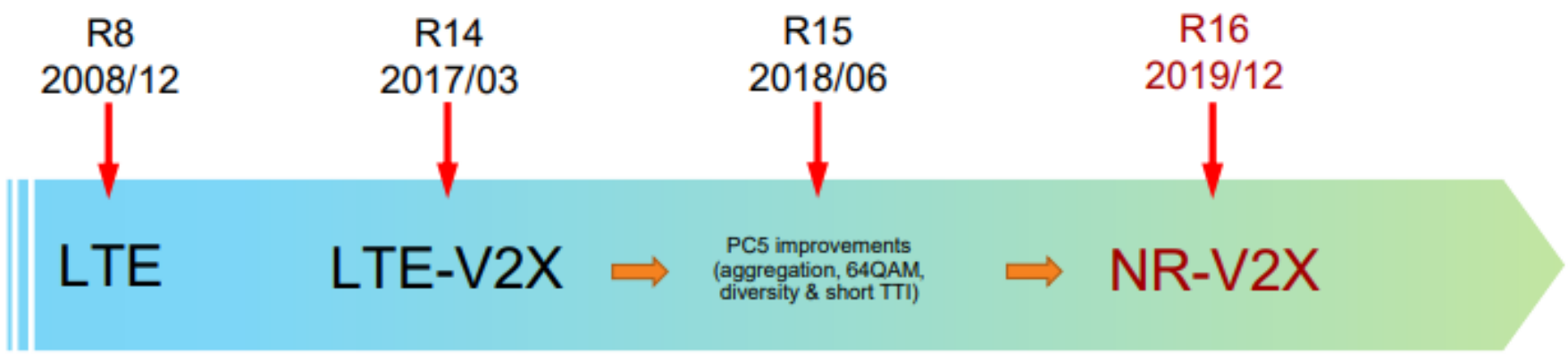


IV How to identify main SEP holders for a specific standards application e.g. V2X or NB-IoT?

5GAA Automotive Association

- Current version of C-V2X is called LTE-V2X as part of 3GPP Rel-14 & 15
- NR-V2X as part of Rel-16 comes as an improvement to support autonomous driving
- NR-V2X will complement and co-exist with LTE-V2X i.e. operation of NR-V2X alone is not considered.

3GPP A GLOBAL INITIATIVE

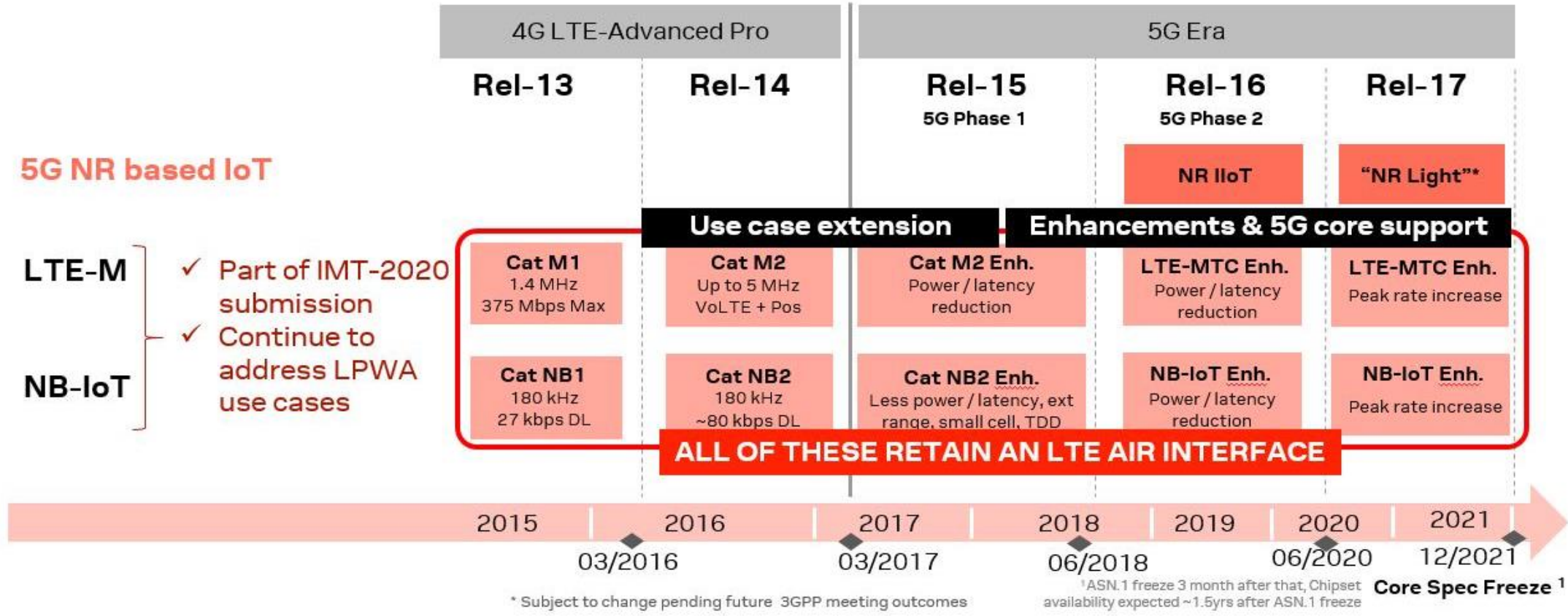


- NR-V2X study item started in June 2018.
- Subsequent NR-V2X work item by December 2019.

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	

LPWA Evolution – NB-IoT and LTE-M



Source: https://www.embedded.com/5g-roll-out-a-marathon-not-a-sprint/

- **NB-IoT,**
- **LTE-M,**
- **LET Cat 1**, Technical Specification (TS)

S.No	Technology	3GPP Standard	4G/5G
1	NarrowBand-Internet of Things (NB-IoT)	TS 36.300	4G
2		TS 36.304	4G
3		TS 36.331	4G
4		TS 36.306	4G
5		TS 23.501	5G
6		TS 37.104	4G/5G
7		TS 36.104	4G
8		TS 36.141	4G
9		TS 37.141	4G/5G
10		TS 36.101	4G
11		TS 36.213	4G
12		TS 36.413	4G
13	LTE-Machine Type Communication (MTC) (LTE-M)	TS 22.368	4G
14		TS 29.368	4G
15		TS 33.187	4G
16		TS 29.274	4G/5G
17		TS 36.413	4G
18		TS 38.413	5G
19		TS 23.501	5G
20		TS 23.401	4G
21	Long Term Evolution Category 1 (LTE CAT 1)	TS 36.306	4G
22		TS 37.104	4G/5G
23		TS 37.141	4G/5G

V How to identify main SEP holders for standards subject to blanket declarations?

Transparency Situation

The **“minimal declaration”** situation

- Approximately only about 10-20% of all Wi-Fi SEPs are declared at IEEE
- Approximately only about 20-30% of all AVC /HEVC or VVC SEPs are declared at ITU-T
- Only a limited number of Qi standard SEP holder list their patents online

**The numbers quoted above are examples of expert reports and may vary when considering other reports. No matter what the percentages are all reports show that patent declaration databases either include non-essential patents (e.g. ETSI and others) or are incomplete (e.g. IEEE, ITUT and others).*

Challenges with video codec patent declaration data

Available video codec declaration data:

- **IUT-T patent declaration** database include over **70%** so called “blanket” declarations → Companies state to own video codec SEPs without proving lists of declared patents.
- **Patent pools** such as MPEG LA, Access Advance or Velos Media only cover a **fraction** of the video codec patent owners.
- We identify almost **150 entities** that have submitted **standards contributions** for video codec technologies. Patent declaration information or patent pools are missing over for over **60% of these** companies.

Challenges with Wi-Fi patent declaration data

Available Wi-Fi declaration data:

- **The Wi-Fi patent declaration** database (IEEE IPR) include over **50%** so called “blanket” declarations → Companies state to own Wi-Fi SEPs without proving lists of declared patents.
- **Patent pools** such as SISVEL only cover a **fraction** of the Wi-Fi patent owners.
- We identify almost **100 entities** that have submitted **standards contributions** for Wi-Fi technologies (IEEE Mentor). Patent declaration information or patent pools are missing over for over **60% of these** companies.

Challenges with Qi standard patent declaration data

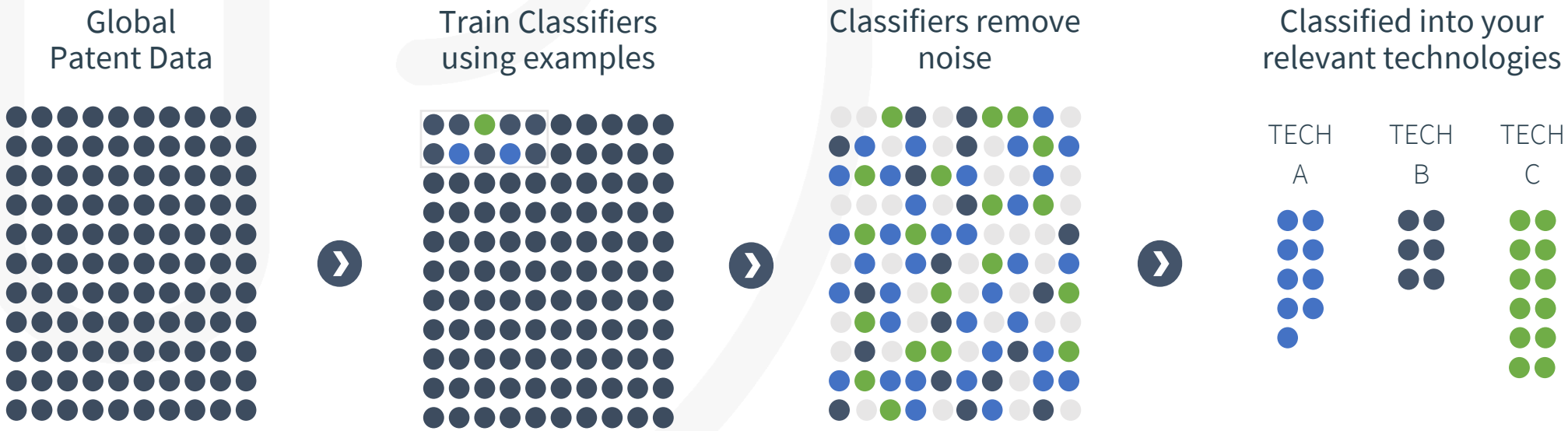
The following companies have publicly announced royalty rates and lists of patents they claim are infringed by products that implement the Qi standard:

Name	Link
Qi wireless power patent pool by Via LA	https://www.via-la.com/licensing/qi-wireless-power/
Phillips	http://www.ip.philips.com/licensing/program/128/wireless-power
Powermat	https://powermat.com/oem-3/ip-licensing-program/

- Market experts believe that there are Qi standard patent owners beyond the publicly listed information.

Identification approach with supervised ML

- The IPlytics data team has utilized a supervised ML algorithm to identify undeclared patents.
- The algorithm uses true positive and negative training data to build patent landscape classifiers with independently verified accuracy.



True Positives and True Negatives

True positive training set:

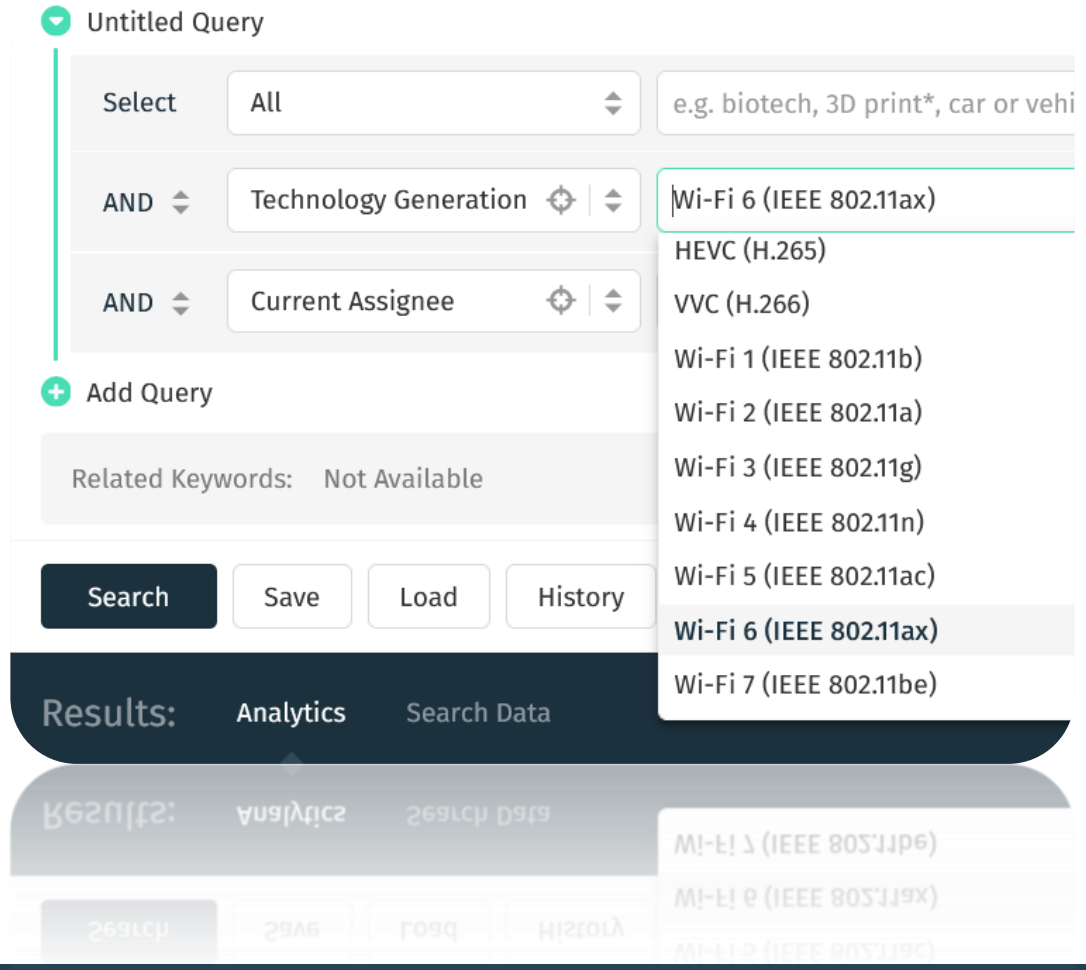
- Publicly known SEPs (patent pool lists)
- Highly relevant patents (based on SME review) as a result of an expert „claim standard section text comparison“

True negative training set:

- Patents with high scores but which are not relevant to the technology (based on SME review).
- Patents related to the technology but not to the standard (based on SME review).
- Patents owned by companies with no connection to technology standard (based on cluster).

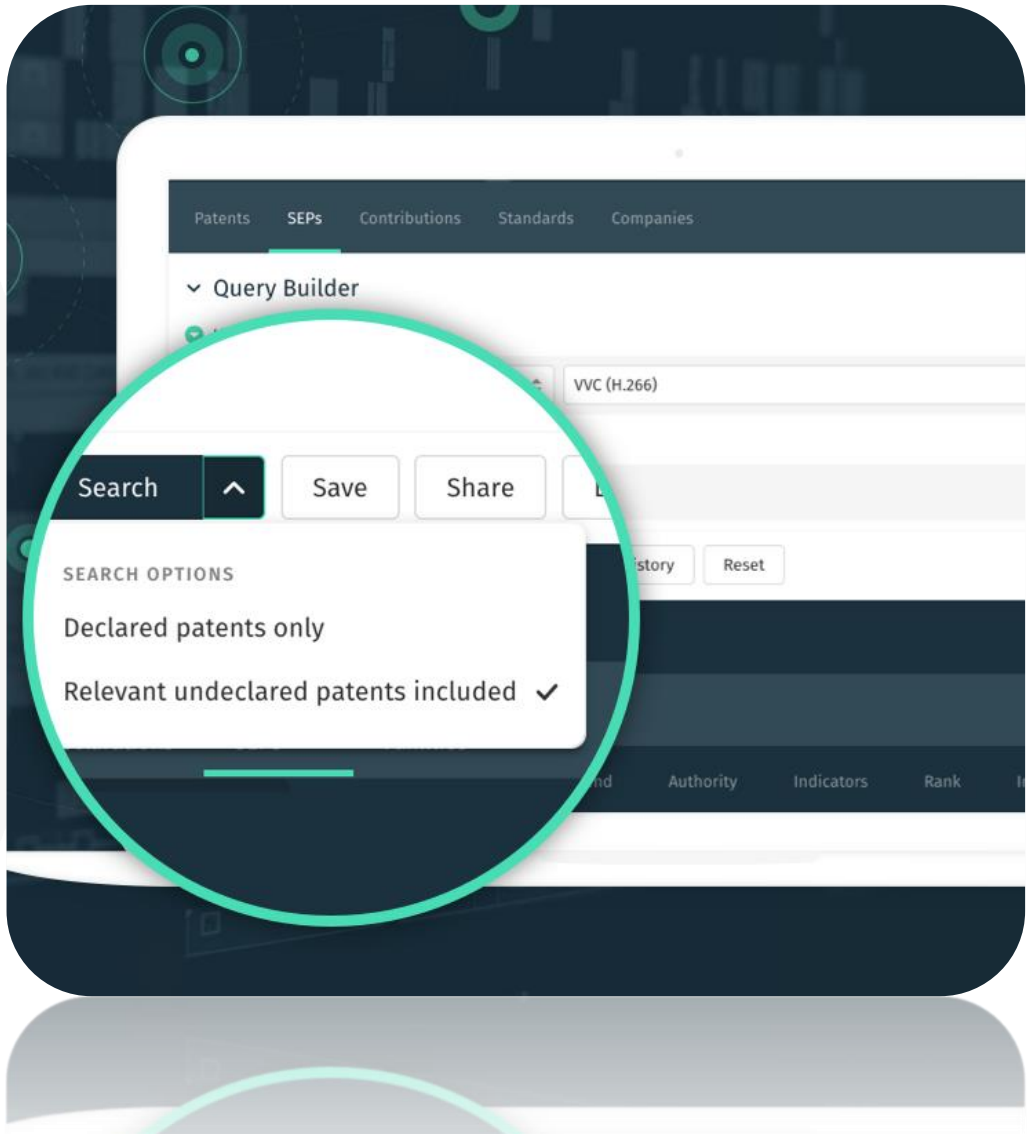
IPlytics undeclared patents

- Undeclared patents **Wi-Fi 4, 5, 6**
- Undeclared patents **AVC, HEVC, VVC**
- Undeclared patents **AV1, VP9** *(coming soon)*
- Undeclared patents **Qi standard** *(coming soon)*
- Undeclared patents **ATSC** *(coming soon)*



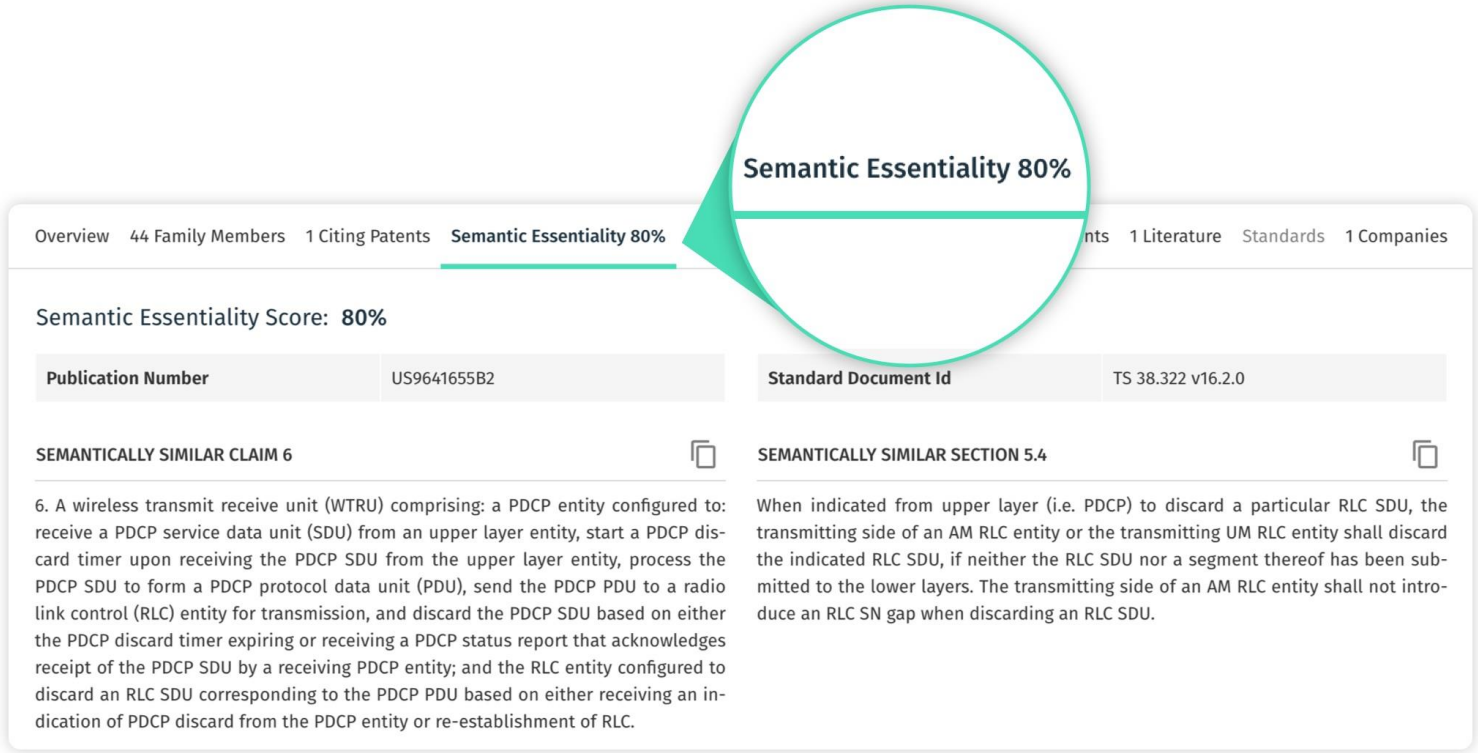
- IPlytics **Undeclared Patent Universe** provides a **technology standard landscape** of potentially essential patents.

- It allows to **discover patents** that may be essential, even though they’re not publicly listed.
- It enables to gain a clear view of the **competition** in the sector.



Semantic analysis of patent claims and standards

- We **semantically** map patent **claims** to standard **sections**



VI Patent declarations and essentiality tests

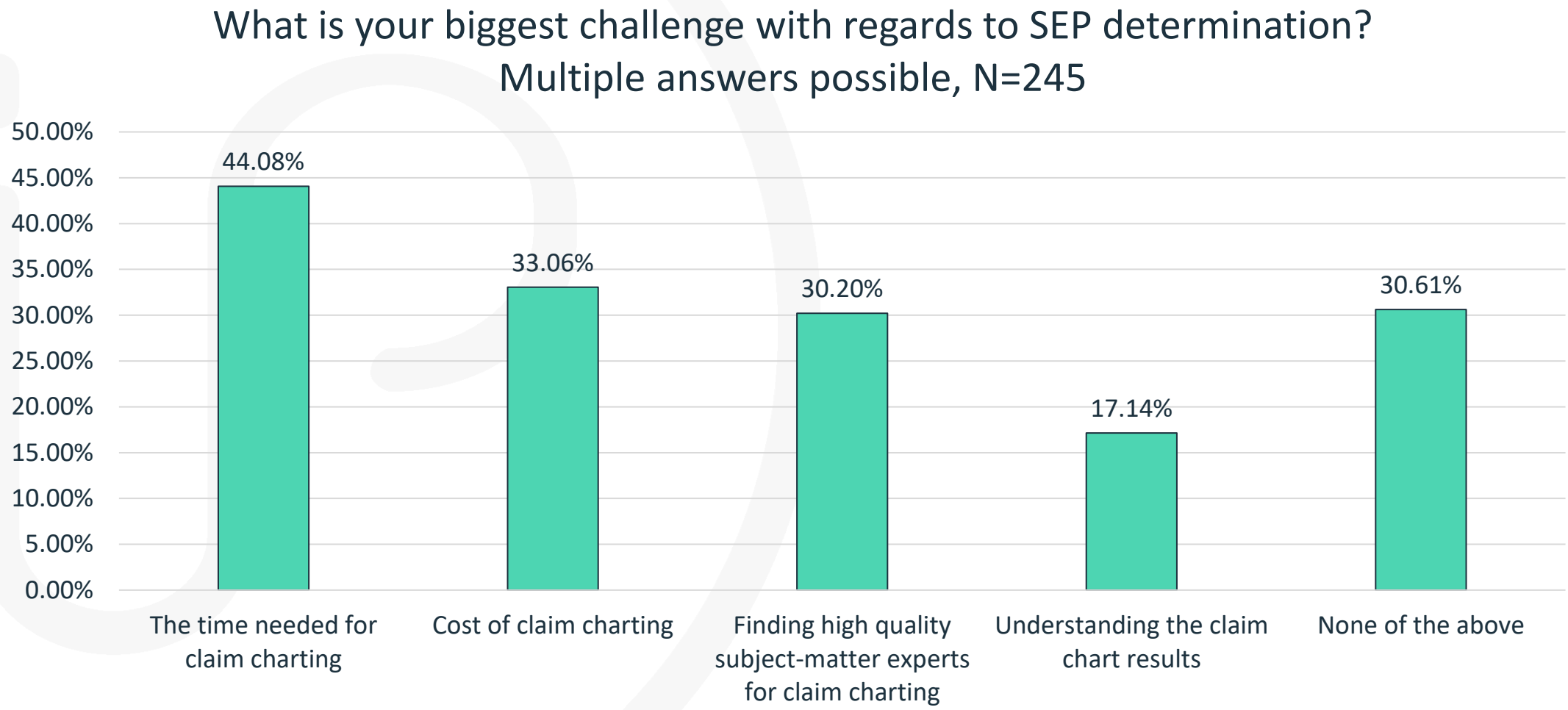
→ **Claim Chart Sampling**

SEP determination is a challenge

- Understanding whether a patent is essential or not is **expensive** and **time-consuming** requiring:
  - **SME review**, claim charting, attorney legal opinion and review is very expensive when done rigorously
  - **Slow manual human** processes - Legal teams and SMEs are limited resources

- Claim charting a portfolio of e.g. 200 patents takes almost a year (for one SME) and may need budgets of $500k-$600k for outside SME and counsel.

SEP determination is a challenge



SEP Claim Charting according to international experts

	SEP evaluation rigorousness level description	Average costs in €	**Median costs in €**	**Min. costs in €**	**Max costs in €**
A	Light SEP evaluation: Rough determination whether any TS could be relevant for given patent at all	355 €	**184 €**	31 €	1,285 €
B	Quick SEP evaluation: Rough determination, which TS could be relevant for which claim features of the given patent	789 €	**367 €**	92 €	2,753 €
C	Specific SEP evaluation: Determination of specific standard sections for each claim feature of the given patent	1,486 €	**734 €**	734 €	3,670 €
D	**Claim chart: Specific SEP evaluation plus arguments on mapping, i.e., specific correspondence**	**4,159 €**	**3,670 €**	**734 €**	**8,808 €**
E	Claim chart as to d) covering 2 different standards (e.g. 4G/5G)	6,117 €	**6,239 €**	4,404 €	8,808 €
F	Claim chart as to d) with potential objections on essentiality	7,095 €	**7,707 €**	2,936 €	8,808 €
G	Claim chart as to d) with potential objections on novelty, inventive step, and/or added subject-matter	7,860 €	**8,533 €**	5,872 €	8,808 €

SEP Claim Charting according to international experts

	SEP evaluation rigorousness level description	Average minutes	Median minutes	Min minutes	Max minutes
A	Light SEP evaluation: Rough determination whether any TS could be relevant for given patent at all	58	30	5	210
B	Quick SEP evaluation: Rough determination, which TS could be relevant for which claim features of the given patent	129	60	15	450
C	Specific SEP evaluation: Determination of specific standard sections for each claim feature of the given patent	243	120	120	600
D	**Claim chart: Specific SEP evaluation plus arguments on mapping, i.e., specific correspondence**	**680**	**600**	**120**	**1,440**
E	Claim chart as to d) covering 2 different standards (e.g. 4G/5G)	1,000	1,020	720	1,440
F	Claim chart as to d) with potential objections on essentiality	1,160	1,260	480	1,440
G	Claim chart as to d) with potential objections on novelty, inventive step, and/or added subject-matter	1,285	1,395	960	1,440

Statistical Sampling Methods

- ✓ Most statisticians agree that the **minimum sample size** to get any kind of meaningful result is **100**:
  - ➢ If your SEP declaration portfolio is less than 100 assets, then you really need to claim chart all of them.
- ✓ A good maximum sample size is usually around **10% of the population**, as long as this does **not exceed 1,000**:
  - ➢ For example, in a population of 5,000 patents, 10% would be 500. In a population of 200,000, 10% would be 20,000. This exceeds 1,000, so in this case the maximum would be 1,000.
  - ➢ Claim charting more than 1,000 patents won't add much to the accuracy given the extra time and money it would cost.

Statistical Sampling Methods

- The selection of patents to be mapped followed a **Statistical Sampling Methods** (used in Political Polling) ensuring no selection bias and providing both:
  - true **positive values**, patents fully mapped to a standard specification (verified SEPs) as well as
  - true **negative values**, patents that could not be mapped to any standard specification (verified non-SEPs).
- This method ensures a **balanced training data set** randomly selected proportionally across:
  - ✓ **Patent owners,**
  - ✓ **Technology modules** (as to groups e.g. RAN1, RAN2 and so on)
  - ✓ IPC/CPC main classes
  - ✓ **Patent priority dates**

IPlytics 5G Essentiality Sample

- IPlytics hosts a data set of **2,000** 5G declared **patent families (EP or US granted)** mapped by independent experts.
- The claim charting followed a **double-blind checking approach** where for each patent at least 2 experts mapped the patents:
  1. **Cellular technology expert** had on average 6 hours to conduct the initial claim section mapping.
  2. **US or EP patent attorneys** had on average 3 hours to double check and verify the mapping.
- In cases of disagreement both experts set up a call to discuss and conclude on a final **mapping status**: fully mappable, partially mappable, not mappable
- In total **18,000 hours** were spent on the mapping of the 2,000 5G declared **patent families**

Level of essentiality

a) **Full Mapped**: All the claim elements were found in the standard specification. A claim chart was made to justify that the patent is essential (100% Mapping).

b) **Partial Mapped**: Most of the claim elements were found in the standard specification, except one or two concepts. A mapping chart was made to justify that the patent is relevant (More than 60 % Mapping).

c) **Not Mapped**: All the claim elements were not found in the standard specification and the patent is found to be not relevant (If less than 50% Mapped).

Statistical Sampling Methods

Random Sampling results:

- ✓ As to our random sampling of 2,000 5G declared EP or US granted patents we identify an overall:
  - ➢ **essentiality rate of 15% for 5G declared patents,** compared to about
  - ➢ **25% for 4G declared patents**.
- ✓ The essentiality rate very much differs across patent owners.

Random Sampling limitations:

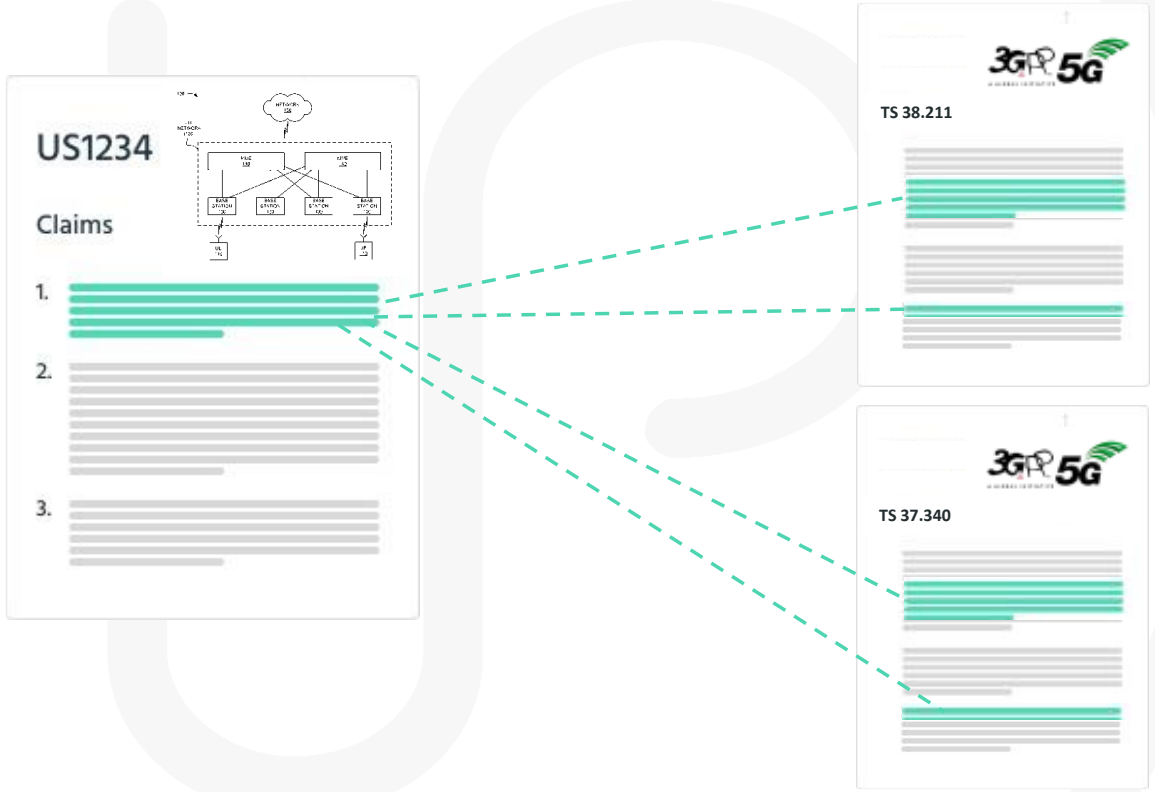
- ✓ The essentiality rate only related to EP or US granted patents declared to 5G up until October 2021.
- ✓ Only the top 10 5G patent owner portfolios deliver accurate results as here more than 100 patents have been mapped.

VII Patent declarations and essentiality tests

→ Data Driven Essentiality Prediction

Semantic Essentiality Scores (SES) can be a first efficient step towards SEP portfolio determination

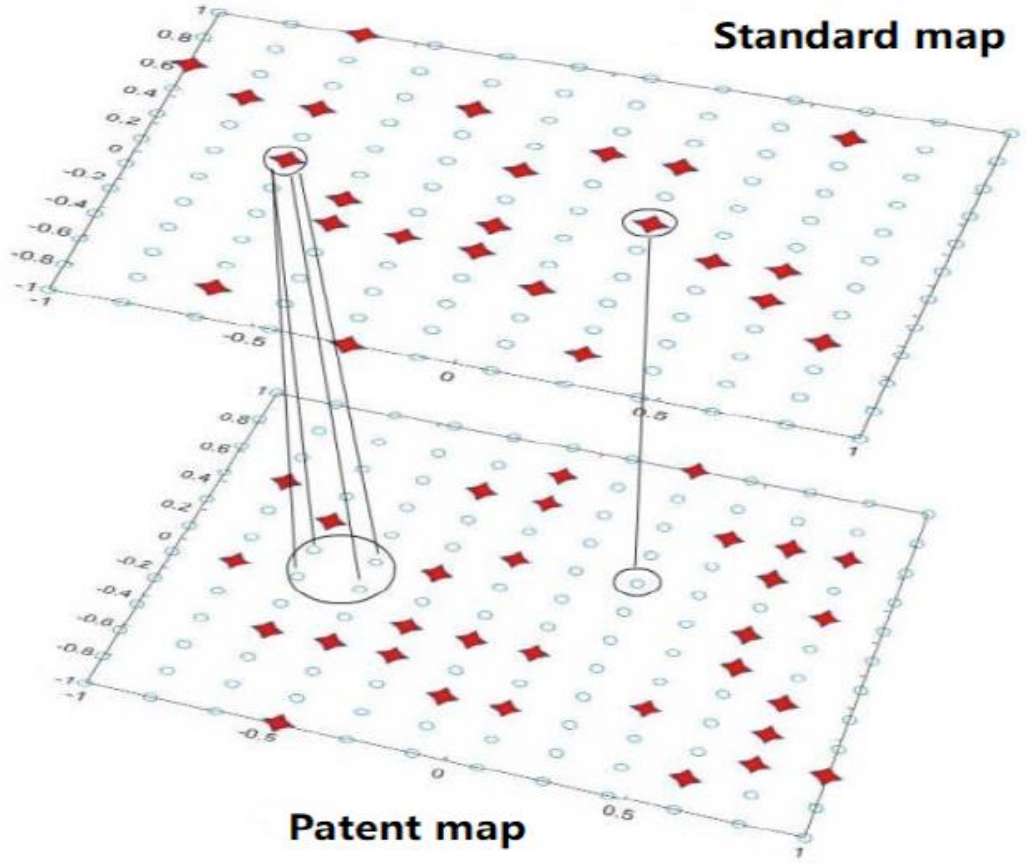
Claim language vs. standards language



Claim language and language in standard specifications may be very **different**:

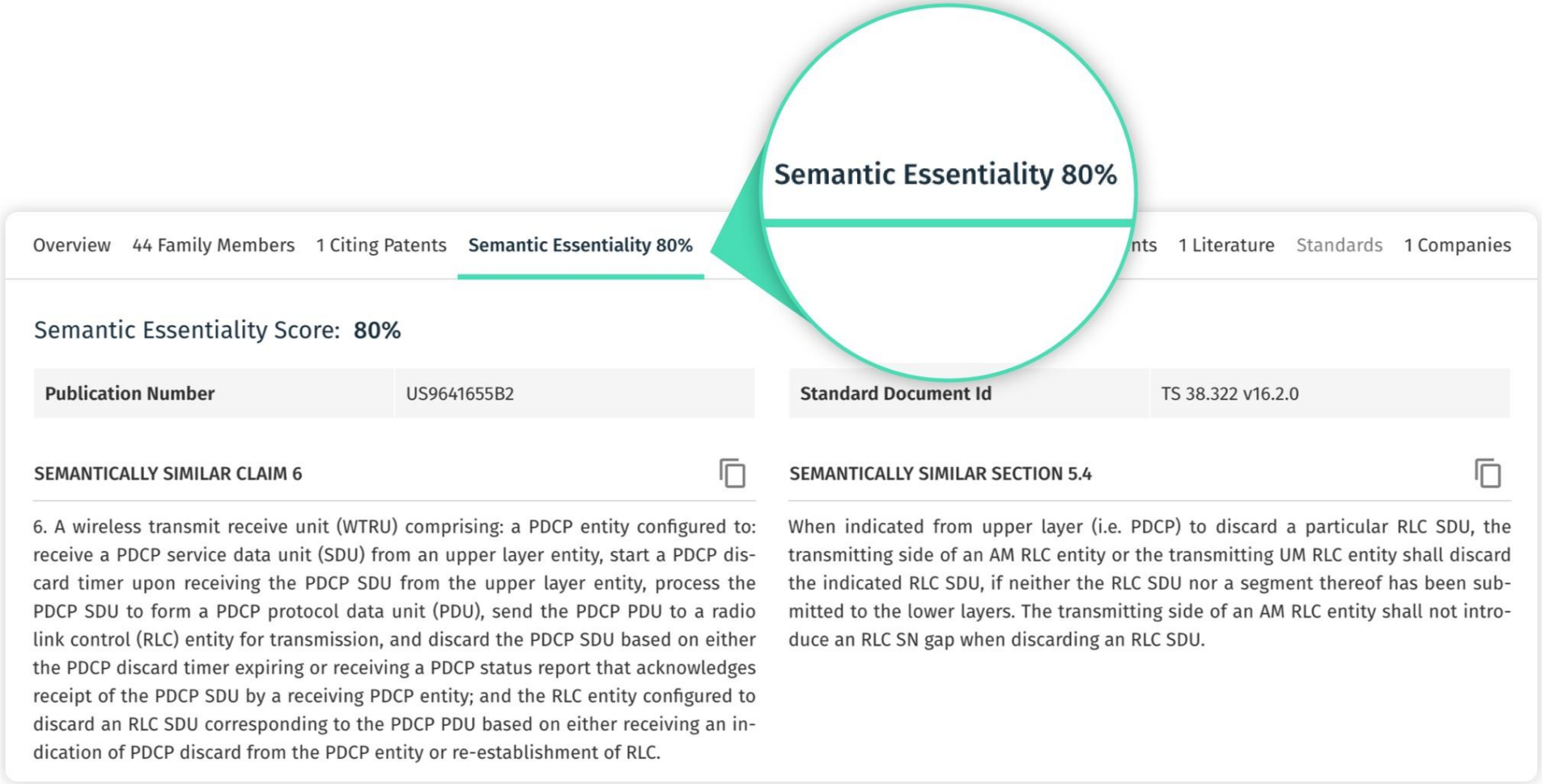
- **Patent claims** are drafted by patent attorneys using **broad terminology** so that the claims apply to as many applications possible.
- **Standard specifications** or standards contributions are written by technical engineers that develop the standard and **use very specific language**.

Semantic analysis of patent claims and standards

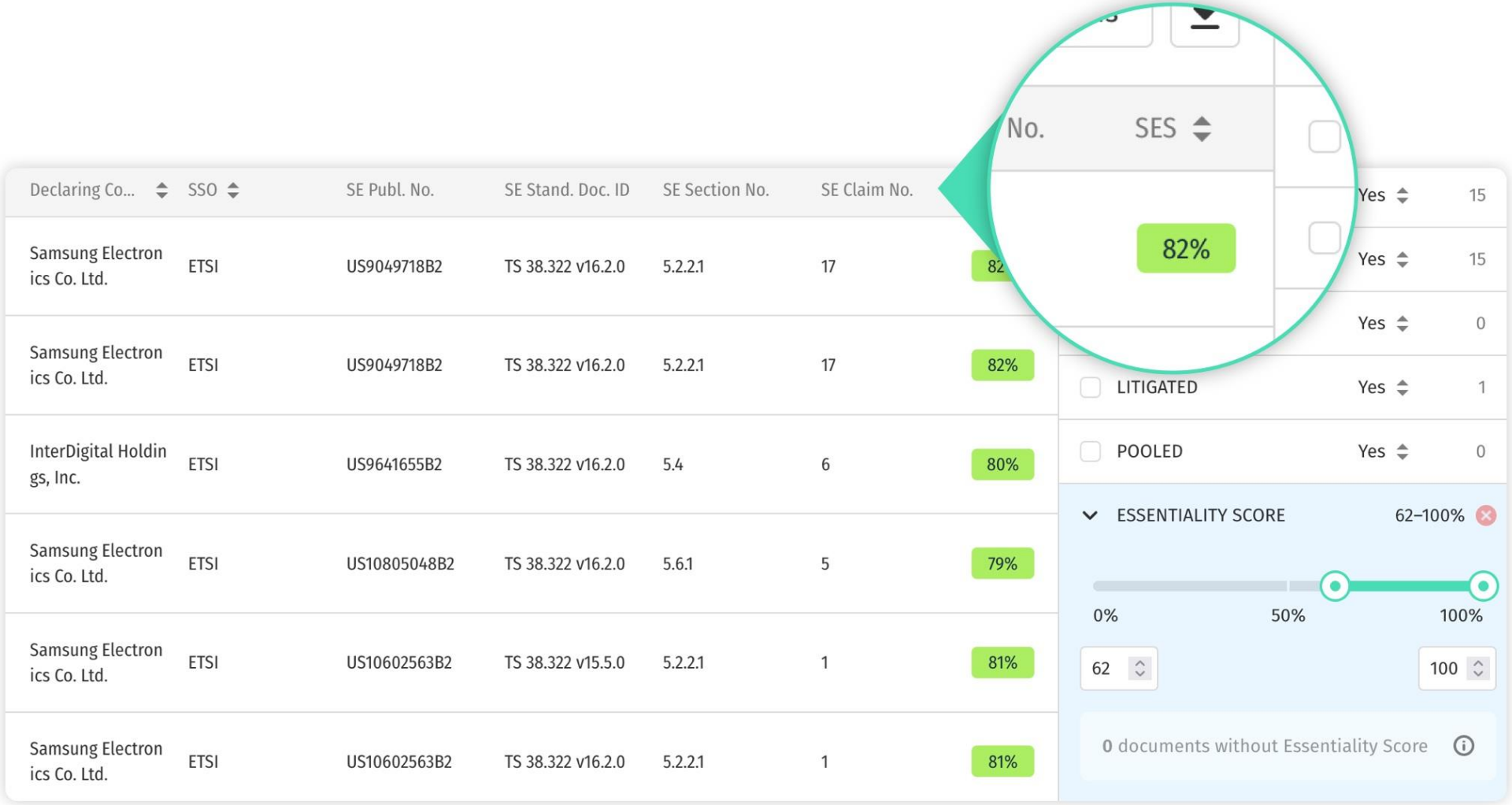


- While claims and standards describe the very same topic and thus can be mapped and charted by experts – the **actual language used can be very different**.
- To overcome this, we **train a semantic model** that understands the context of claims and standards and recognizes the use of different expressions for certain concepts to identify claim elements.
- We use **claim charts** manually created by experts as **training data.**

SES – Patent claim and standard section **side by side**



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%

VIII Takeaways

Why information is key!

Patent Declaration Data is incomplete and ambiguous:

- Most reports that provide rankings of declared patents rely on raw data that does not consider:

1. rigorous data matching and cleaning
2. false positive determination and cleaning
3. consideration of worldwide ownership changes as well as corporate trees, M&As and beneficiary shares.
4. accurate patent family expansion
5. undeclared patent identification

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.

SEP licensees (standards implementers)

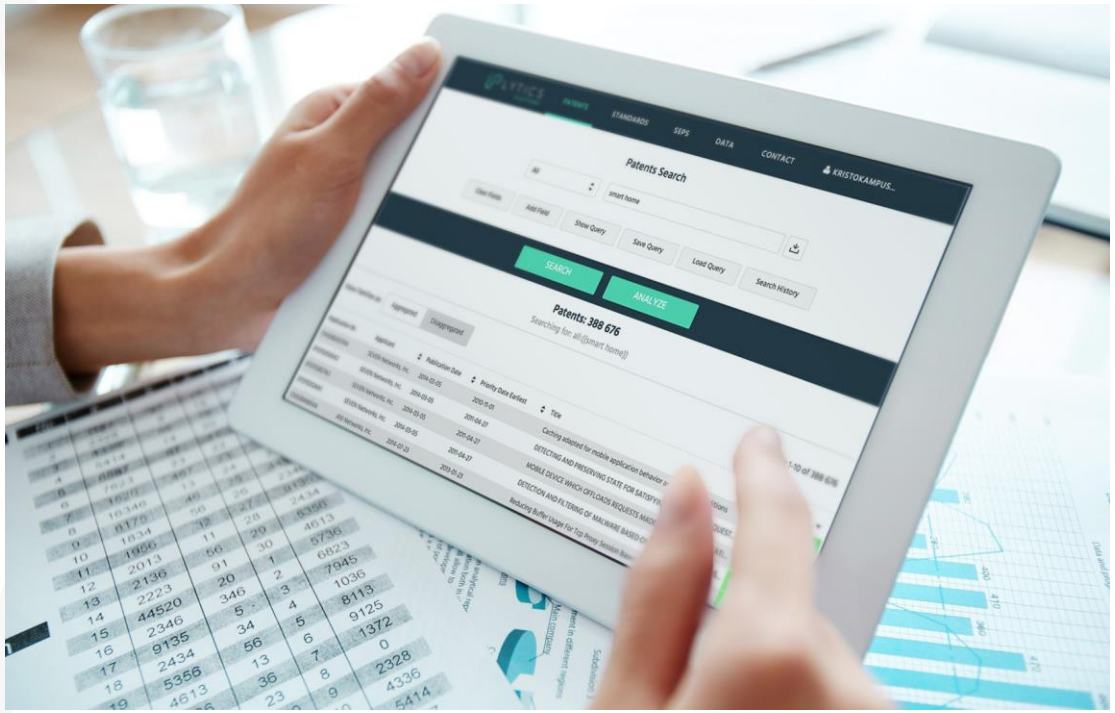
SEP licensees use of IPlytics Platform:

- 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 module supplier
- Monitor SEP filing, SEP change of ownership and litigation to **quantify risks and plan royalty payments**.
- **Identify** industry related (e.g. M2M, IoT, IIoT) **standards development initiatives** to have a seat at the table when future connectivity technology is developed.

IPlytics

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

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



IPlytics Podcast

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Questions?

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