LYTICS | Intellectual Property Analytics

SEP Licensing in the IoT

March 23rd 2023

Webinar Recording: https://youtu.be/KbT_8fNCjqc

Low-power wide-area (LPWA) market trends

NB-IoT / LTE-M advancements

- Low-power wide-area (**LPWA**) is specifically designed for applications with **low bandwidth** requirements and **low power** consumption while providing wider and deeper **network coverage**.

- To meet these LPWA requirements, energy-efficient cellular technologies such as narrowband IoT (**NB-IoT**) and long-term evolution for machines (**LTE-M**) have been developed. **NB-IoT** and **LTE-M** are both cellular technologies designed specifically for **IoT devices**.

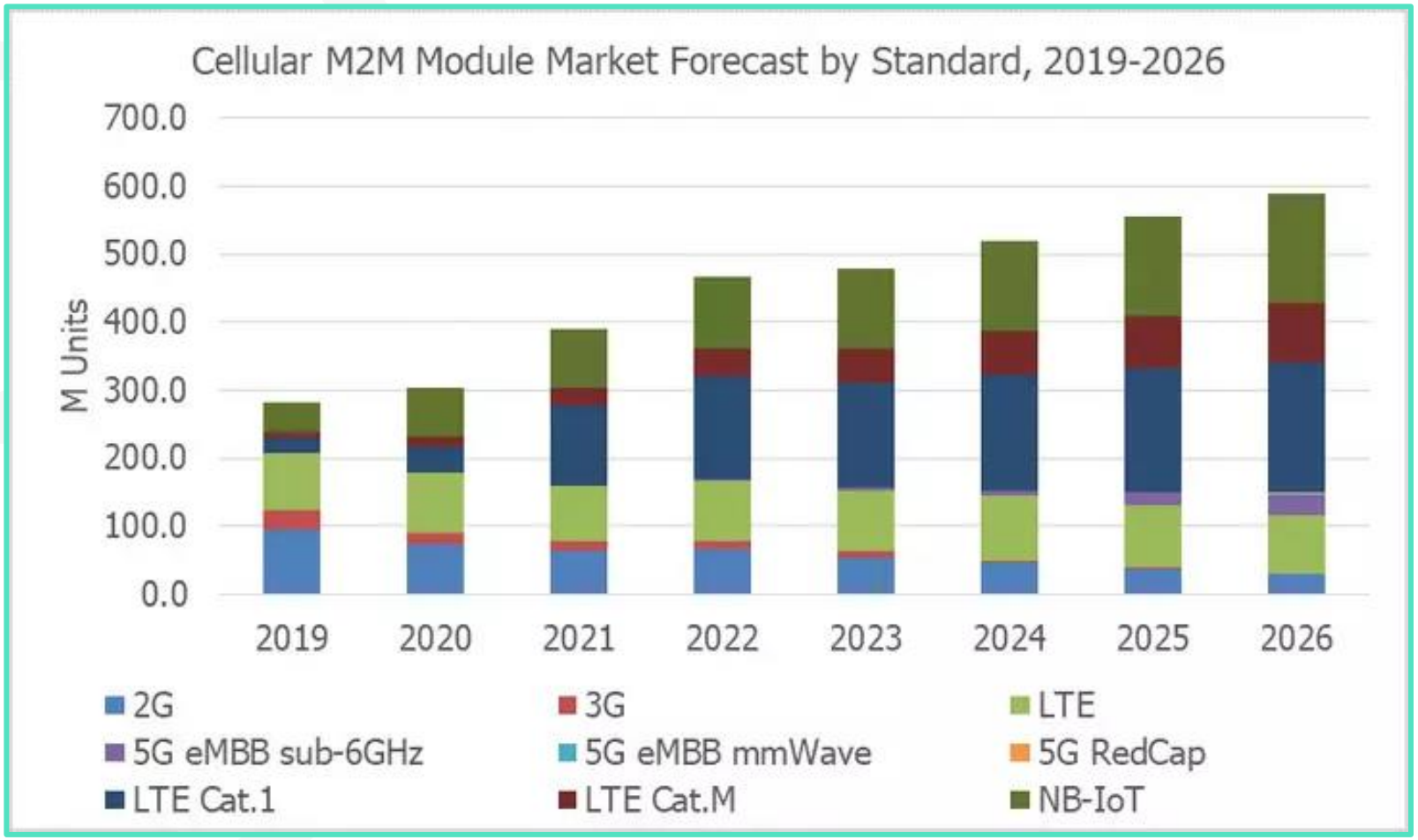
- While they share some **similarities**, they also have some **distinct technical advancements** compared to traditional cellular networks.

Module Market Trends

- **From two to 10 technologies**
  - In 2010, the **cellular IoT module market** consisted of only two connectivity technologies, 2G and 3G. Since then, **eight major** new technologies have been introduced to the market.
- **Adoption of NB-IoT and LTE-M**
  - Since 2019, we have seen mass adoption of the **LPWA dual mode module** (NB-IoT+ LTE-M), with adoption still growing at a higher rate in 2022.
- **The rise of LTE-CAT 1**
  - 2014 marked the beginning of the rise of the LTE-Cat 1 technology standard. The massive migration from 2G/3G to LTE-Cat 1 started in 2018

M2M module market forecast

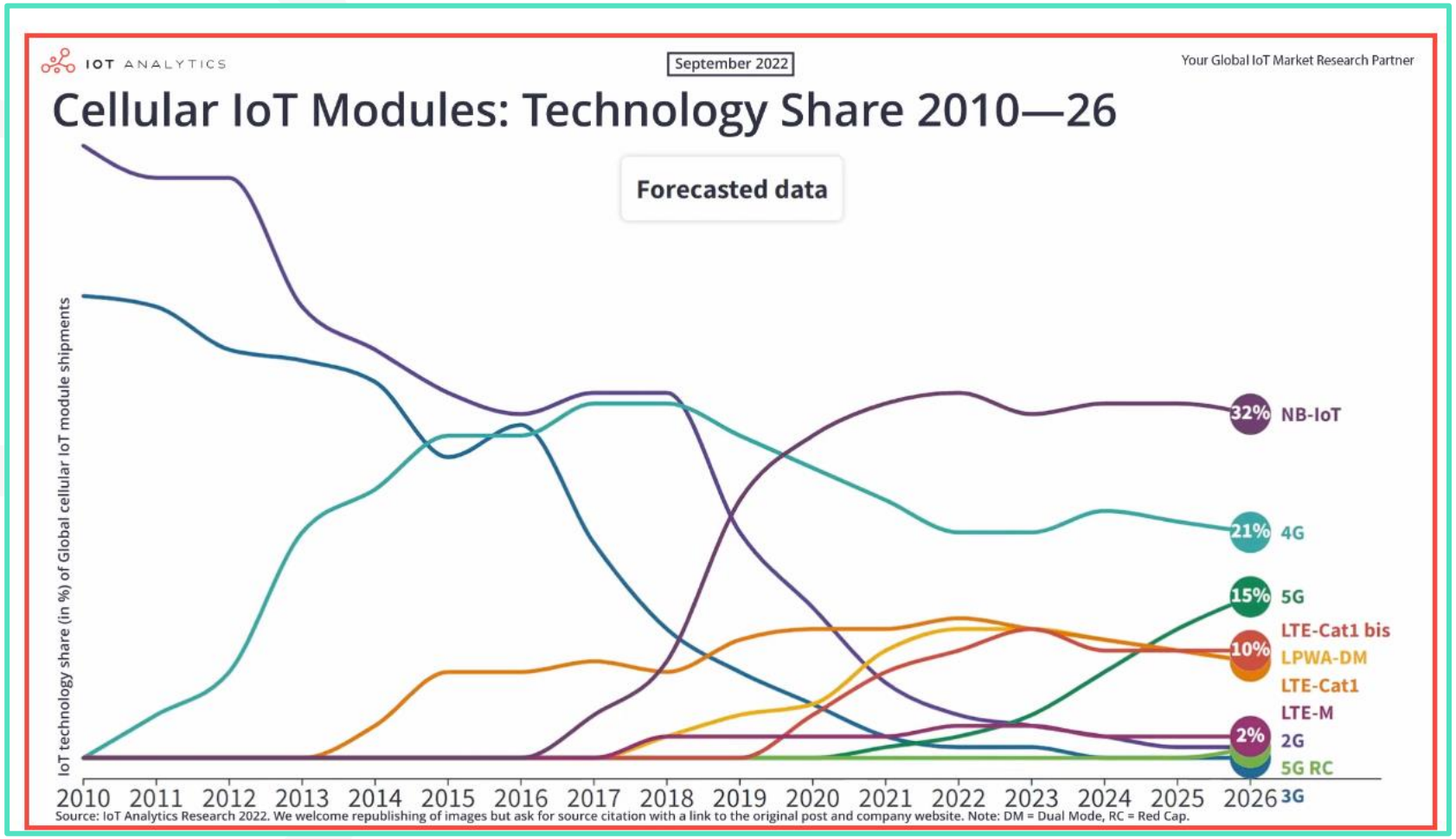
- **Market Synopsis**
  - Expected **M2M units** growth by cellular standard.
  - LTE Cat.1, LTE Cat.M, NB-IoT and 5G eMBB sub-6GHz with **increasing numbers**



Source: https://x.ua/p/cellular-iot-module-market-strong-demand-supply-constraint-possible-slowdown-in-2023-lte-cat1-rises-592156

IoT modules market share

- **Market Synopsis**
  - Share of global IoT module shipments by standard.
  - By 2026, **NB-IoT with highest share of 32%**



Source: https://iot-analytics.com/iot-modules/

IoT Network Deployment 2023

- **GSMA list of all Mobile IoT Commercial Networks (2022):**
  - Number of LTE-M Networks = **60**
  - Number of NB-IoT Networks = **110**
  - Total Number of Mobile IoT Networks = **170**

Number of LTE-M Networks	Number of NB-IoT Networks	Total Number of Mobile IoT Networks
60	110	170

Last Update: Feb 2022

Operator	Country/Region	Technology
3	Hong Kong, SAR China	NB-IoT
A1	Austria Belarus Bulgaria Croatia Serbia	NB-IoT
	Slovenia	LTE-M & NB-IoT
AIS	Thailand	LTE-M & NB-IoT
América Móvil	Mexico	LTE-M
Antel	Uruguay	NB-IoT
APTG	Taiwan, Province of China	LTE-M & NB-IoT
Altice	Portugal	NB-IoT
AT&T	Mexico United States	LTE-M
	United States	NB-IoT
BASE (Telenet)	Belgium	NB-IoT
Bell	Canada	LTE-M

Source: https://www.gsma.com/iot/mobile-iot-commercial-launches/

NB-IoT /LTE-M SEPs and Standards

NB-IoT / LTE-M SEPs and standards

- LTE alone is subject to over **1,000 standards** speciation.
- However, NB-IoT /LTE-M applications will not need all LTE standards specifications and thus also **not all SEPs are relevant**.
- The number of SEPs relevant for licensing depends on the specific **implementation of standards**.

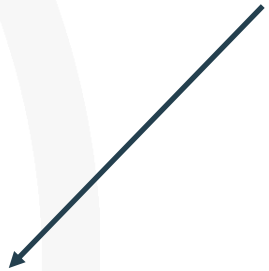
➢ To understand the key patent contributions to NB-IoT /LTE-M technology, one must identify **patent family declarations made against each NB-IoT and LTE-M relevant specification**.

Low-power wide-area (LPWA) patent declarations

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

- **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

Patent Declaration Practices

- **Connecting patent claims with standards sections**

Publication Number	Declaring Company	Standard Document	Section Number	Declaration Date
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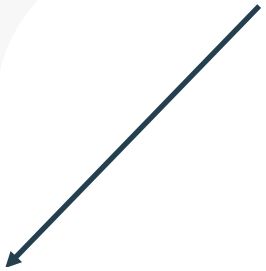
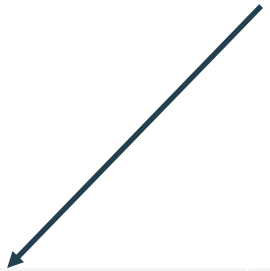


Publication Number	US8837381B2

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

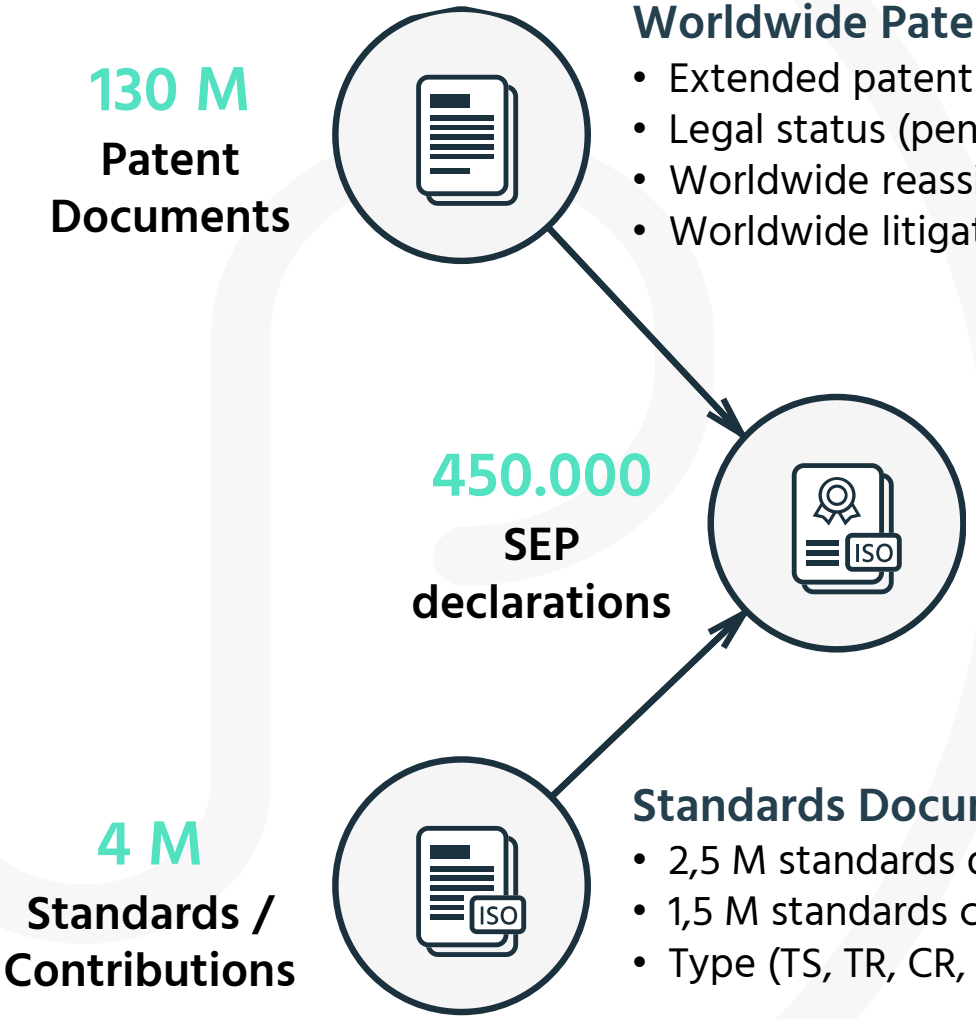
Increasing complexity

- **Connectivity is everywhere**, and it heavily relies on standards that are subject to SEPs.
- The number of IoT modules that **implement NB-IoT, LTE-M and LTE Cat 1,** technologies is set to drastically increase in the next years.
- 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

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

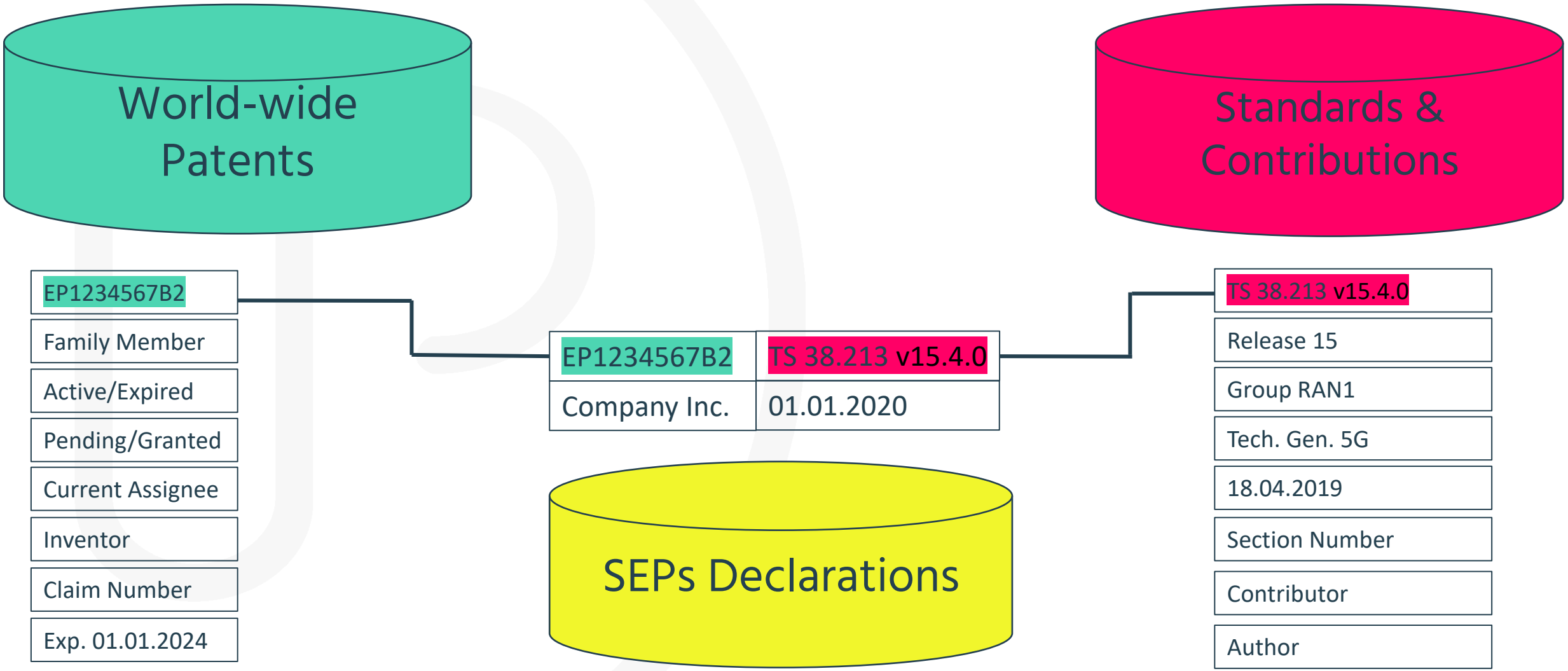
Declared Patents

- 25 SDOs and 11 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



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.

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.

Discussion topics

I. Use cases and market trends – Which industries will be first to implement NB-IoT / LTE-M technologies?

II. How to identify SEPs and major patent owners for NB-IoT and LTE-M

III. Best practice SEPs licensing approaches for NB-IoT and LTE-M

IV. Final statements

IPLYTICS LIVE

LexisNexis®

SEP Licensing for IoT

IPlytics Virtual Panel

Thursday, March 23rd
5pm CET, 11am ET, 8 am PT

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