

Who are SEP leaders and standards developers for smart factory technologies?

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5G for the Industrial Internet of Things

New connectivity standards such as 5G will shape the way in which smart factories work. As the manufacturing industry has specific 5G requirements that differ significantly from public mobile broadband services, smart factory applications must use different 5G application profiles. This article focuses on the most relevant 5G standards for these entities, although other highly patented standards such as Wi-Fi, Bluetooth, RFID, NFC, colour coding and QR codes are increasingly used in smart factory environments. The Industrial Internet of Things (IIoT) refers to a fully connected production environment that organises itself to facilitate product manufacturing. This involves communication between manufacturing facilities, logistics systems and networks of embedded production systems, whereby the product provides manufacturing information in a machine-readable form (eg, on an RFID chip). This is then used to control the path of the product along the production line.

5G standards play a central role in connectivity in smart factories, with three main application profiles:

- ultra-reliable and low latency communications (uRLLC);
- massive machine type communications (mMTC); and
- enhanced mobile broadband (eMBB).

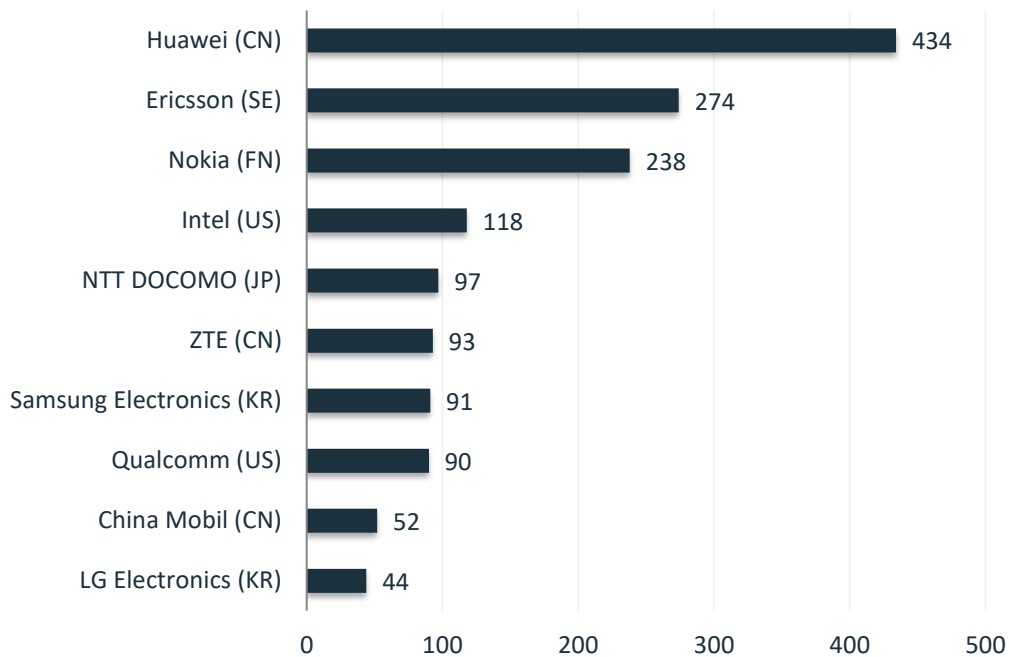
5G patent leadership for the smart factory application

The 5G standard is [subject to hundreds of thousands of potentially essential patents](#). The future of smart factory technologies will therefore rely on implementing patented connectivity standards. IPlytics's global database of declared patents and standard contributions was used to search for all relevant patent declarations and monitor standards-developing companies. All 5G technical specifications relevant to the three smart factory standards protocols were identified by searching for relevant keywords in the standards' title, abstract and specification description.

uRLLC

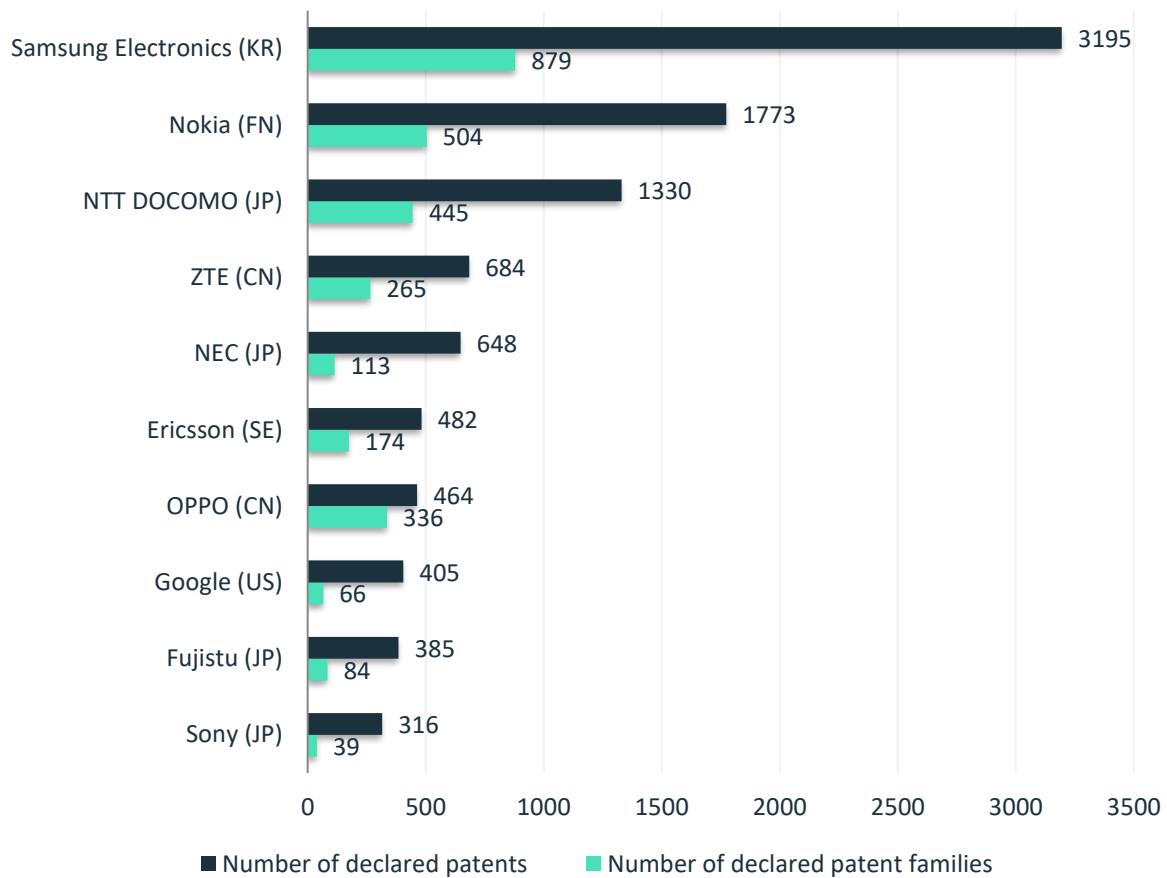
The uRLLC application profile is intended for time-critical applications with high demands on response times, availability and reliability (eg, as required for autonomous driving or automation). Figure 1 presents the top companies with regard to submitted approved technical contributions for uRLLC. The counted technical contributions do not include editorial modifications or formal corrections. It shows that the top standards developers for uRLLC are Huawei, Ericsson and Nokia

Figure 1. Top 5G standards developers as to approved contributions submitted to uRLLC specifications (IPlytics April 2021)



Standard contributions result in agreed and approved technical specifications, which are ready to be implemented. Companies must declare any patent that is potentially essential for these final technical specifications. The IPlytics database collects worldwide patent declarations and allows searches for declarations by individual standards specifications. Here, it was used to identify all patents declared for uRLLC-relevant technical specifications. Figure 2 shows the top uRLLC patent owners, with Samsung in the lead, followed by Nokia, NTT Docomo and ZTE.

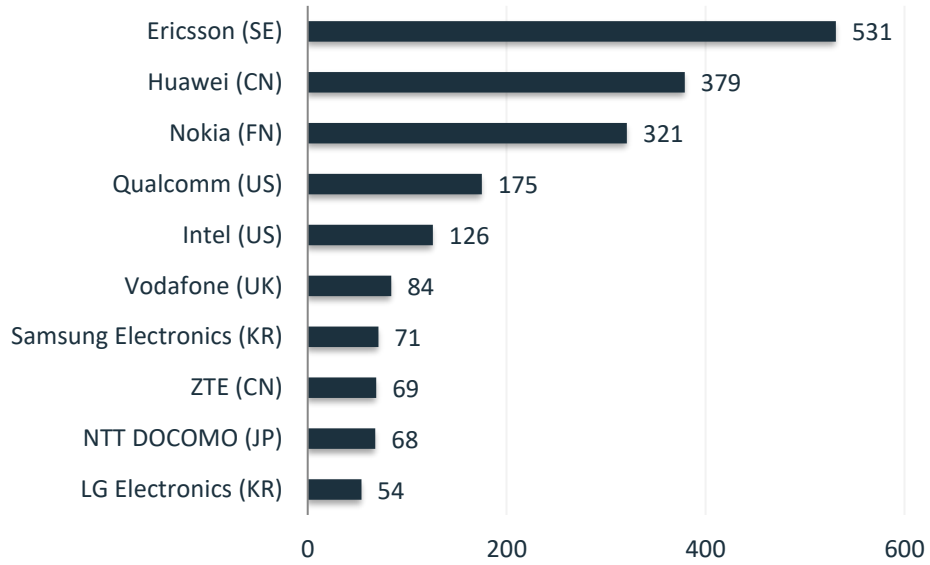
Figure 2. Top 5G patent owners as to patents declared for uRLLC specifications (IPLYtics April 2021)



Massive Machine Type Communications (mMTC)

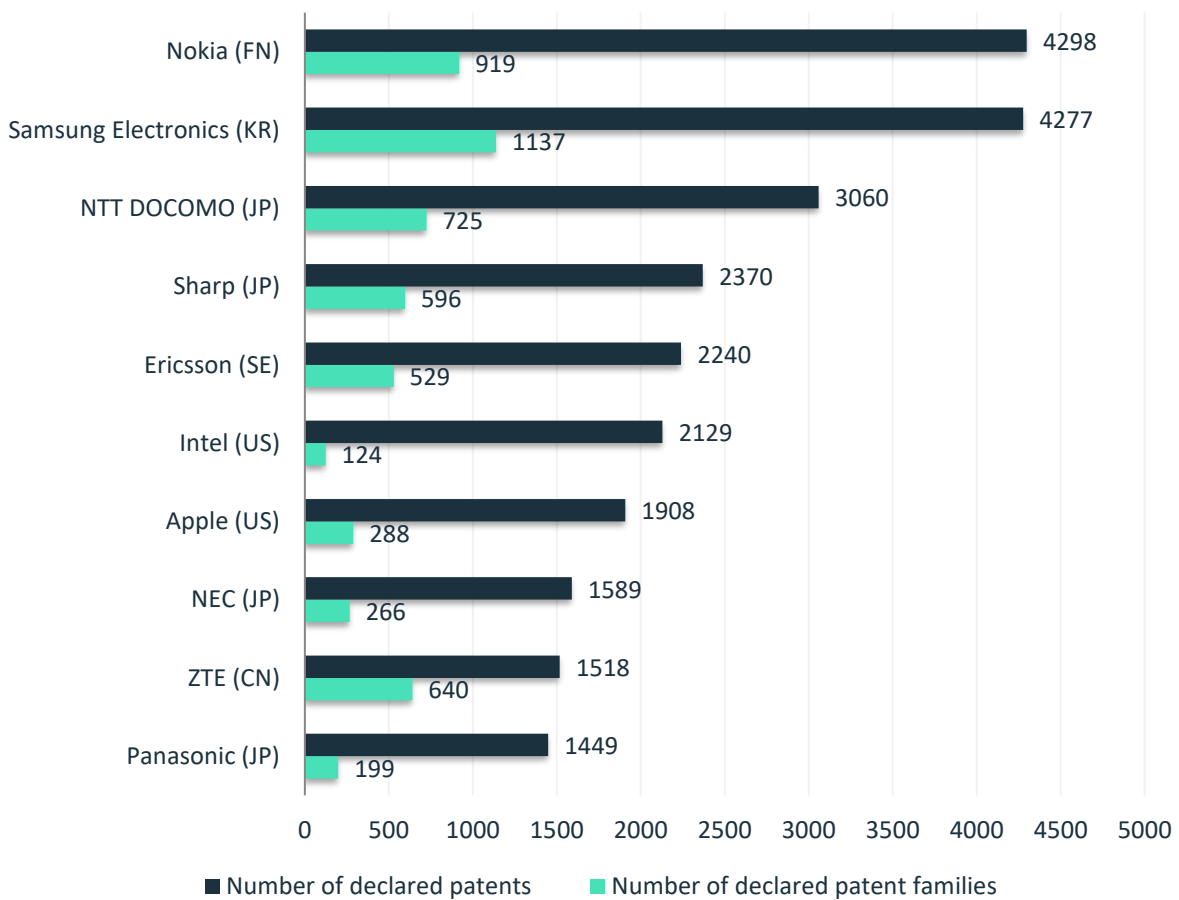
mMTC supports the use of a high number of devices per unit area and ensures high-energy efficiency of end devices. mMTC is used in the IIoT and for massively networked sensors with no external power supply. The top contributors to mMTC standards are illustrated in Figure 3. Ericsson is the leading standard contributor, followed by Huawei and Nokia.

Figure 3. Top 5G standards developers as to approved contributions submitted to mMTC specifications (IPlytics April 2021)



The top patent owners (figure 4) of patents declared to mMTC technical specifications are Nokia, followed by Samsung and NTT Docomo.

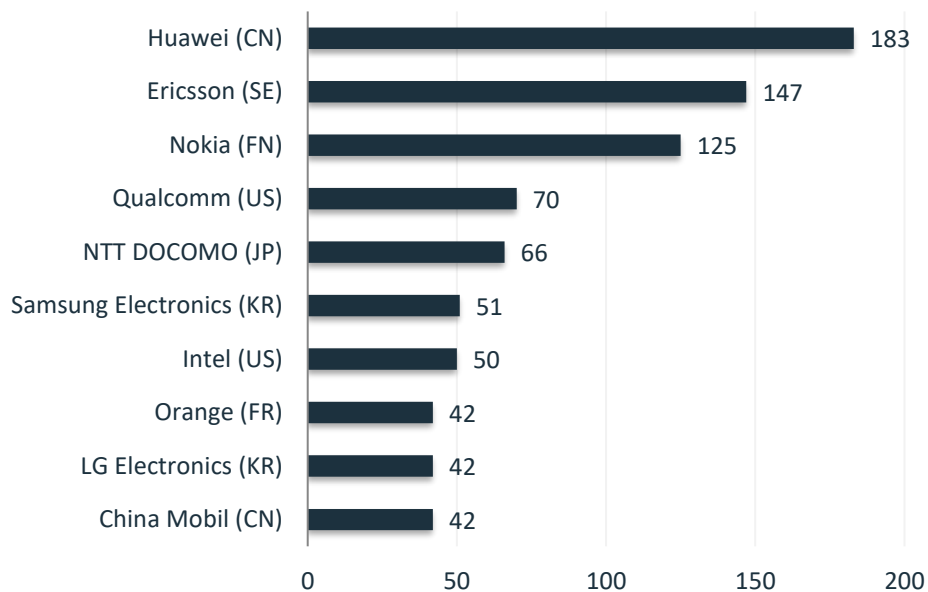
Figure 4. Top 5G patent owners as to patents declared for mMTC specifications (IPlytics April 2021)



Enhanced Mobile Broadband (eMBB)

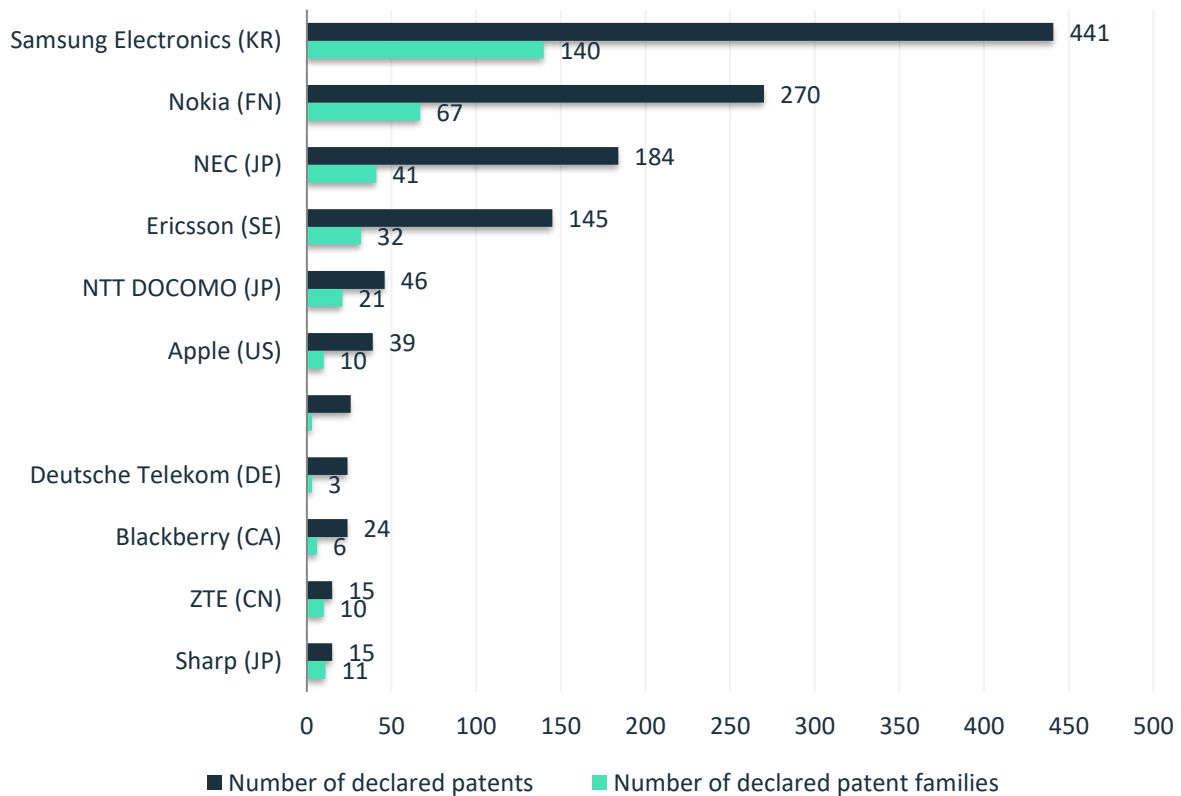
eMBB enables virtual and augmented reality applications and mass streaming of high and ultra-high-resolution videos. The technical capabilities of eMBB are therefore of the highest importance for multiple smart factory applications. Use cases that fall into the eMBB application profile require high transmission rates and a large capacity in relation to a specific area unit. Figure 5 shows the top standards developers with regard to approved contributions submitted to eMBB specifications. Huawei is top, with Ericsson and Nokia coming close behind.

Figure 5. Top 5G standards developers as to approved contributions submitted to eMBB specifications (iPlytics April 2021)



The top owners of patents declared to eMBB standards specifications are Samsung, followed by Nokia and NEC (figure 6).

Figure 6. Top 5G patent owners as to patents declared for eMBB specifications (IPlytics April 2021)



Outlook

IP professionals and technical standards experts face the ever-growing challenge of making use of the advances of the latest technology standards, while keeping up with the increasing number of SEPs that must be used when implementing connectivity standards and that will have to be licensed-in when patent owners ask for royalties. IP professionals across all industry verticals must rethink how they develop, evaluate and analyse patent portfolios with regard to standards. This means aligning these to protect innovations, participating in standards development and proactively engaging in continuous strategic portfolio development with regard to SEP licensing, acquisitions, joining patent pools and simply understanding the competition.

[For further information, please contact us.](#)



IPLYtics - The Gold Standard of Standards

Empowering IP professionals to understand the complexity of patents and standards in the connected world.

IPLYtics is the first solution on the market to bring together comprehensive, highly indexed technical standards information, declared SEPs, patent pools, global patents and standards contribution data, to provide industry-leading analysis on the past, present and future of standards-essential technology. Unlike other tools that are overly complex, IPLYtics provides fast, intuitive access to patents and standards to empower the user to strategically align patent portfolios to protect innovations and proactively engage in continuous strategic portfolio development as it relates to SEP assets, for initiatives such as licensing, acquisitions and joining patent pools, or to understand the respective positions of the competition. The next technology revolution will connect everything making it even more challenging to understand how technologies and IP rights overlap. IP professionals need to rethink – even revolutionize – how to approach both patent and standards data, to provide business-ready insights for actionable decision making across the organization.