NAVIGATING THE SEP ECOSYSTEM: STANDARDS, STANDARD ESSENTIAL PATENTS AND STANDARD-SETTING ORGANIZATIONS

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INTRODUCTION

The telecommunication industry is the backbone of modern technology that facilitates connecting people and devices across the globe. In India, the telecom sector has seen massive growth, with the total telephone subscriber vase reaching 1.99 billion in March 2024 and rural teledensity of 59.19%.[1] This connectivity is possible due to standards. Standards provide the technical specifications and guidelines necessary for ensuring that products made by different manufacturers work seamlessly. For instance, an Android phone is able to connect to an iPhone due to certain standardized technologies present in it which enable interoperability. Interoperability is indispensable in any industry, even more so in the telecommunications industry. Standards play a crucial role in facilitating interoperability, creating cost efficiency and fostering innovation and competition.

One of the major components in this standards ecosystem is Standard Essential Patents (SEPs). SEPs are patents that are given the status of essentiality due to them being indispensable to implementing a standard. This means that any product or service anticipating to comply with a technical standard such as 5G or 4G must have these SEPs in them. SEPs a[[re vital for the dissemination of standardized technologies and promote innovation. SEPs enable interoperability of devices and networks which is essential in the telecommunication industry.

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[1] INDIA BRAND EQUITY FOUNDATION, *Telecommunications*, available at https://www.ibef.org/industry/telecommunications. (Last visited 30th July, 2022)

SEPs are considered to be "prized possessions" in a company's portfolio as they yield high returns through licensing when compared to regular patents.

The dissemination and management of SEPs is in the hands of Standard Setting Organizations (SSOs). SSOs develop these standards through collaboration between various stakeholders such as manufacturers, licensees, businesses and regulatory bodies. SSOs maintain and ensure access to standards to licensees on terms that are Fair, Reasonable and Non-Discriminatory (FRAND). SSOs aim to balance the interests of SEP holders to monetize their SEPs and the implementers' interests to have access to standardized technologies.

This paper aims to explore the nature of standards, the importance of SEPs in the telecommunication industry and the role of SSOs in the development of SEPs.

STANDARDS ACROSS SECTORS

Standards are essentially formal documents that provide "specifications, guidelines, requirements, or characteristics to ensure that materials, products, processes, and services are fit for their intended purposes."[2] The objective of standards is to achieve interoperability and uniformity among different products, devices, and technologies. These documents safeguard consumer interests by upholding functionality and compatibility by considering the perspectives of all relevant stakeholders such as manufacturers, consumers and regulators. Historically, the role of standards has been an integral part of linking different societies. They enabled common measurements like the uniform stones used in Ancient Egypt, or the standardized railway gauges during the steam engine era, facilitating smoother operations and communication. In the current modern world, standards still remain central in our lives; a laptop is said to have around 251 interoperability standards.[3]

Standards can be found across many industries and can be grouped into the following categories:

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[2] INTERNATIONAL ORGANIZATION FOR STANDARDIZATION, *Standards,* available at
http://www.iso.org/iso/home/standards.htm (Last visited 30th July, 2022)
[2] BRITISH STANDARDS INSTITUTION, *What Is a Standard*? Available at https://www.bsigroup.com/en-IN/Standards-and-Publications/Information-about-standards/What-is-a-standard/ (Last visited 30th July, 2022)
[3] Biddle, B., Et. Al., *How Many Standards in a Laptop? (And Other Empirical Questions)*, Available at https://ssrn.com/abstract=1619440 (Last visited 30th July, 2022)

Vocabulary Standards

Vocabulary standards ensure that the various terms and definitions are understood consistently and similarly across different regions and sectors. These standards improve communication by reducing barriers and misunderstandings. This makes them essential for global trade, legal agreements and technical collaborations. Through standardization of vocabulary, organizations ensure that all parties involved; engineers, developers or end users, interpret the terms similarly.

Measurement Standards

Measurement Standards provide a uniform method for quantifying and describing physical properties such as weight, length, temperature and time through kilograms, Fahrenheit or Kelvin, seconds or minutes respectively. These standards are indispensable in our daily lives and commerce as they ensure that products meet specific criteria and perform as expected. These standards are used in every vital sector such as healthcare, engineering and food production where they facilitate safety, compliance and functionality.

Safety Standards

Safety standards are used in the protection of the health and safety of consumers and workers by setting minimum requirements for the safe design, manufacture and use of products and services. For instance, safety standards prescribe standards for electrical safety, ergonomic design and fire resistance. These standards prevent accidents and injuries providing a safe environment for everyone in industries such as construction, pharmaceuticals, electronics, etc.

Product Standards

Product standards specify the characteristics that products should meet to ensure reliability, compatibility, and safety. These standards prescribe the materials to be used in production, performance attributes and packaging requirements. Adhering to such product standards

enables manufacturers to guarantee that their products are of high quality, meet consumer expectations and comply with regulatory requirements.[4]

Technical Standards

Technical standards play a key role in industries where interoperability is necessary, like telecommunications, electronics and software development. These standards ensure that devices, systems or software from different manufacturers work together without any prior agreement. In the telecommunication industry, for instance, technical standards like 5G, 4G and Wi-Fi specify the protocols that enable mobile phones and other devices to communicate seamlessly across different network systems around the world. These standards promote innovation and enhance user experience as the devices become interoperable.

THE IMPACT OF SEPS IN THE TELECOMMUNICATION INDUSTRY

Standard Essential Patents (SEPs) are those patents that have been declared as essential or indispensable to a technological standard. In other words, a manufacturer wishing to implement a technological standard, would not be able to do so without infringing the said SEP. SEPs are important in industries like telecommunications and Information and Communication Technology (ICT) where a product's value increases as more people use compatible technology. These sectors are inherently global as products are designed, sourced and assembled across international borders. For instance, SEPs such as Wi-Fi, Bluetooth, USB, and 5G play a key role in the increasing adoption of these technologies. Interoperability is one of the biggest advantages of using SEPs as it results in different devices communicating with one another. For instance, any device irrespective of the make or model is able to connect to Wi-Fi as the Wi-Fi has standardized protocols that have hundreds of SEPs in them. This is the universal compatibility and interoperability that SEPs achieve.

In the telecommunications industry, SEPs emerge through both *de facto* and *de jure modes. De facto* standards emerge from the market when the market players implement a technology extensively where it becomes dominant technology. For instance, Microsoft's Operating

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[4] Spulber, Daniel F*., Standard Setting Organizations and Standard Essential Patents: Voting and Markets (July 1, 2017)*. NORTHWESTERN LAW & ECON RESEARCH PAPER NO. 16-21, Available at https://ssrn.com/abstract=2865763 (Last visited 30th July, 2022)

System was a *de facto* standard in most computers as it was widely chosen over competitors such as Linus or iOS. Microsoft Operating System was not developed or designated as standard by SSO but became an informal or *de facto* standard due to its popularity which prompted developers to create compatible applications. *Formal* or *de jure* standards are developed and set by Standard Setting Organizations (SSOs) such as the European Telecommunications Standards Institute (ETSI), International Telecommunication Union (ITU), Telecom Standards Development Institute of India (TSDSI) etc. These standards are methodologically developed to ensure broad compatibility. *De jure* standards include telecommunication frameworks like the 5G technology standard, 3G UMTS, and GPRS. These formal standards ensure that different devices work together efficiently which is essential for the global connectivity and functionality of modern ICT networks.
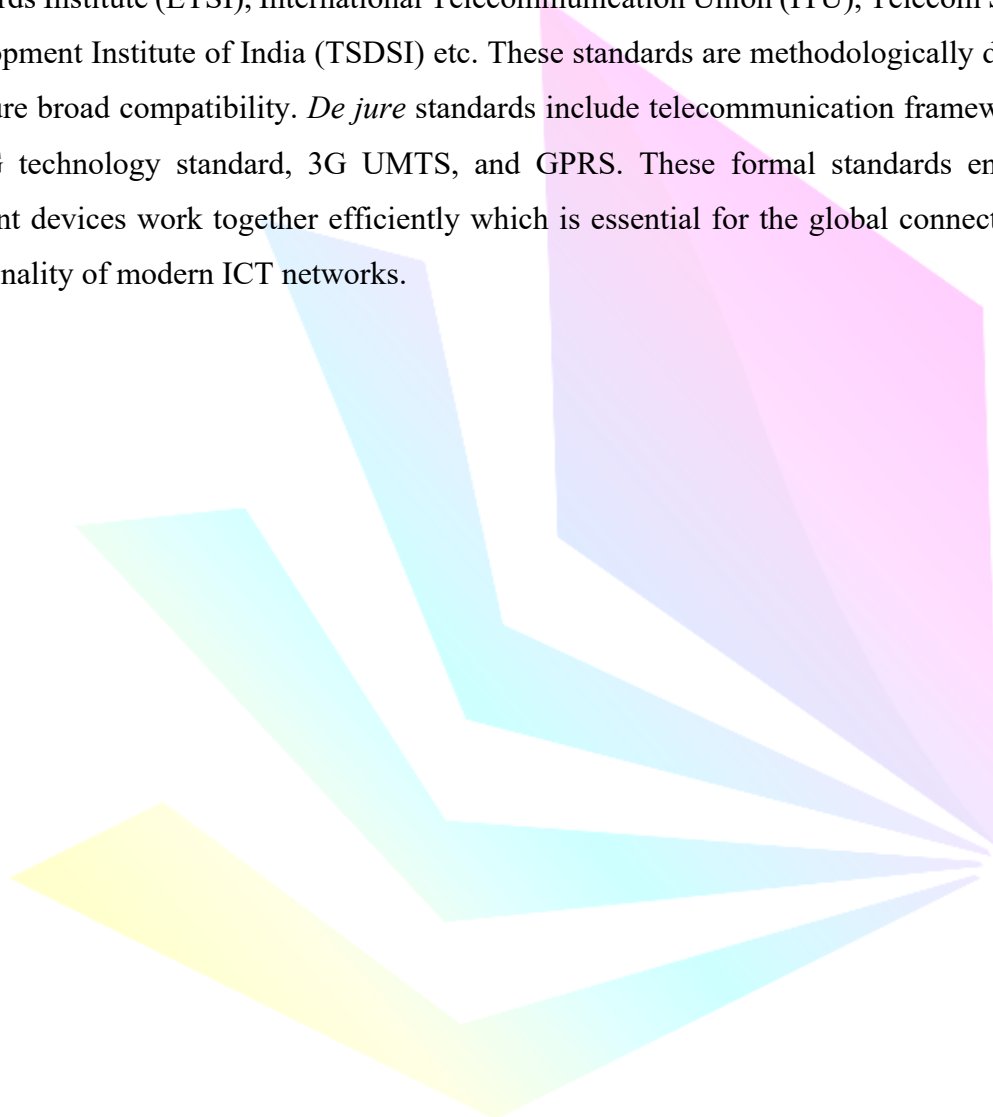
ROLE OF STANDARD SETTING ORGANIZATIONS IN THE DEVELOPMENT OF SEPS

Standard Setting Organizations (SSOs) or Standard Development Organizations (SDOs) are tasked with the development, management and maintenance of standards. They are primarily engaged in the development, coordination, promulgation, revision, amendment, re-issuance and interpretation of a plethora of standards for both SEP holders and SEP licensees or implementers.[5] SSOs or SDOs work collaboratively with all the stakeholders such as manufacturers, businesses, universities and individuals worldwide. This mitigates the risk of exclusion of any technology option as a potential SEP.[6] SEPs perform the task of meticulously assessing the technologies proposed by patent owners to determine their suitability as standard. SSOs engage in deliberations and discussions with their participating members for the inclusion or exclusion of the standard. The selected technology or patent that is suitable for widespread dissemination of a standard is then given the status of a 'Standard Essential Patent'. Once this essentiality status is given to a patent, such a patent becomes essential to implement a technological standard. Consequently, the SSOs also mandate that the owners of SEPs must license their patents must license their patents on terms that are fair, reasonable and non-discriminatory (FRAND).

Standard-setting entities are categorized into three distinct types: individual companies, formal SSOs or SDOs and Consortia or Forums. The implication of a standard is dependent on the entity that has developed it.

STANDARDS DEVELOPED BY INDIVIDUAL COMPANIES

Standards developed by individual companies are often termed as 'proprietary specifications' where a single firm retains control over specific standards or specifications. This exclusivity means that other companies are not involved in the development process and can only engage with these standards through licensing agreements. These proprietary specifications are an asset to any company as they enable them to dominate a market segment if the standard gains widespread adoption. For instance, *defacto* standards like the VHS format by JVC and

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[5] Jeanne Froust, Understanding the role of SDOs, ESRI, Available at
https://proceedings.esri.com/library/userconf/proc17/tech-workshops/tw_2180-578.pdf (Last visited 30th July, 2022)
[6] Scott Bosworth D., *Mangum III R.W., Matolo E.C. (2018) FRAND Commitments and Royalties for Standard Essential Patents*, Available at https://doi.org/10.1007/978-981-10-6011-3_2 (Last visited 30th July, 2022)

Microsoft's Windows Operation System emerged because these companies effectively set benchmarks that became widely accepted. In the case of Hewlett-Packard (HP), it chose not to license its Printer Command Language (PCL), a pivotal technology in its printers, thereby keeping a tight grip on its printer technology such as laser and inkjet printers.

However, in a few cases, owners of proprietary standards may offer their standard to an SSO or SDO to broaden its impact by transitioning into a formal standard. This transition can transform a proprietary standard into an industry wide standard managed by the SSO. A prominent example of this is Adobe System's decision to offer its Portable Document Format (PDF) to the International Organization for Standardization (ISO). Once the ISO approved it, PDF became a formal standard being widely used across industries.

STANDARDS DEVELOPED BY SSOS OR SDOS

Standard Setting Organizations (SSOs) or Standard Setting Organizations (SSOs) play a crucial role in the development of SEPs. Recognizing the role of an open and accessible standard-setting system, governments across the world have established SSOs. In cases such as the European Telecommunications Standards Institute (ETSI), formal status has been given later by the European Union. Such formal SSOs collaborate closely with a broad range of stakeholders, including industry experts from competing companies, academic institutions, and individual experts to develop standards that ensure interoperability and support innovation.

Among the key players in the world, SSOs such as the International Organization for Standardization (ISO) and the International Telecommunication Union (ITU) set international standards that govern a multitude of sectors. The 3rd Generation Partnership Project (3GPP) is a significant SSO that developed the standards related to 3G. In India, the Telecommunications Standards Development Society of India (TSDSI) is tasked with the development of telecommunications standards. These formal SSOs ensure that the standards developed are comprehensive, inclusive and supportive of technological advancement and consumer needs.

The International Telecommunications Union

The International Telecommunications Union (ITU) is an international standard-setting body for the ICT sector. As a specialized agency under the United Nations (UN), ITU is recognized as the largest organization in the telecom sector. It was established in the year 185 with

membership extending beyond 191 countries. The objective of ITU is to"…facilitate international connectivity in communications networks, allocate global radio spectrum and satellite orbits, develop the technical standards that ensure networks and technologies seamlessly interconnect and strive to improve access to ICTs to underserved communities worldwide…"[7] ITU's efforts are credited with enabling global internet connectivity and advancing the reach of telecommunication networks to the undeserving communities. By fostering collaboration among governments, service providers, network operators, equipment manufacturers, and various scientific and technical organizations, ITU plays a crucial role in promoting telecommunications development and access to ICT services. Standardizing JPEG images for digital photography, Voice over Internet Protocol (VoIP) for digital voice communications and X.509 for cybersecurity has been done by ITU.[8] These initiatives reflect ITU's commitment to making telecommunications accessible to people worldwide.

European Telecommunications Standards Institute (ETSI)

ETSI was given a formal status by the European Union as a European Standards Organization (ESO). ETSI was established in 1988 in response to proposals from the European Commission, by the European Conference of Postal and Telecommunications Administrations (CEPT). Its primary goal is to facilitate collaboration among various stakeholders to develop global standards for ICT systems and services.[9] ETSO plays a crucial role in shaping standards across the broad spectrum of the ICT sector including fixed, mobile, radio, broadcast and internet technologies.[10] By 2017, ETSI has published over forty thousand standards demonstrating the extensive impact and leadership in the ICT sector.[11] A significant milestone was achieved when ETSI in collaboration with 3GPP released the standards related to 5G technology in 2018.

Third Generation Partnership Project (3GPP)

3GPP is a partnership project between seven national standard-setting organisations (SSOs) across the globe. It was established in the year 1998. The purpose of 3GPP initially was to

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[7] International Telecommunications Union (ITU), *About ITU*, Available at
https://www.itu.int/en/about/Pages/default.aspx (Last visited 30th July, 2022)
[8] *I.d.*
[9] European Telecommunications Standards Institute, *History of ETSI*, Available at
https://www.etsi.org/technologies/14-about (Last visited 30th July, 2022)
[10] *I.d.*
[11] *I.d.*

develop 3G UMTS standards. However, as it progressed the partnership also developed standards for GSM, 4G LTE, and now it is working on developing standards for 5G.[12] Currently, this partnership comprises "The Association of Radio Industries and Businesses (ARIB), Japan, Alliance for Telecommunications Industry Solutions (ATIS) USA, China Communications Standards Association (CCSA) China, European Telecommunications Standards Institute (ETSI), Europe, Telecommunications Standards Development Society (TSDSI) India, Telecommunications Technology Association (TTA), South Korea and Telecommunication Technology Committee (TTC) Japan."[13]

Telecommunications Standards Development Society (TSDSI)

TSDSI is the standard-setting body of India which was established by the Indian Government in 2014 as part of the National Telecom Policy of 2012. As an autonomous and membership-based Standard Development Organization (SDO), TSDSI plays a critical role in the development of ICT and telecommunications standards that cater to the unique needs of the country. It develops standards specifically for "access, back-haul, and infrastructure systems, solutions and services that best meet India-specific Telecom/ICT needs, based on research and innovation in India"[14] TSDSI emphasizes fostering technological advancements that align with global standards while simultaneously driving innovation locally.

STANDARDS DEVELOPED BY QUASI-FORMAL SSOS, FORUMS AND CONSORTIA

In additional to individual companies and formal Standard Setting Organizations (SSO), there exists a middle ground occupied by quasi-formal SSOs and consortia. These entities bridge the gap between individual companies and fully recognized SSOs. They typically consist of a select group of implementers focused on a specific technology who believe that they can establish standards more swiftly than the larger, more bureaucratic SSOs. Such consortia usually target the development of a single standard and often have limited lifespans, though there are thousands of such organizations globally today.[15] One notable example is the

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[12]*What is 3GPP? An overview*, ELECTRONICS NOTES Available at
https://www.electronicsnotes.com/articles/connectivity/3gpp/what-is-3gpp-tutorial.php (Last visited 30th July, 2022)
[13] *I.d.*
[14] TELECOMMUNICATIONS STANDARDS DEVELOPMENT SOCIETY OF INDIA, *About TDSI*, Available at
https://tsdsi.in/about/ (Last visited 30th July, 2022)
[15] Updegrove, A., *Standard Setting Organizations and Standards List* Available at:
https://www.consortiuminfo.org/links/linksall.php#.X8-t9KHitPY (Last visited 30th July, 2022)

Organization for the Advancement of Structured Information Standards (OASIS). It is a consortium that welcomes participation from all interested parties. Other quasi-formal SSOs include the Internet Engineering Task Force (IETF) which is responsible for the development of the Internet Protocol suite (TCP/IP) and the World Wide Web Consortium (W3C) which has set numerous standards related to the Internet.

KEY FUNCTIONS OF STANDARD-SETTING ORGANIZATIONS

One of the significant aspects of SSOs is their role in the governance of standard essential patents. SEPs cover technologies that are crucial to standard compliance. SSOs are tasked with ensuring the widespread adoption of the standard, making it accessible to all industry players under Fair, Reasonable and Non-Discriminatory (FRAND) terms. The objective of FRAND is to prevent SEP holders from exploiting their position to engage in patent holdup; where they demand excessive royalty rates from implementers that are locked into the standard. This forces the implementers to either accept the high royalty rates or exit the market. SSOs generally have an IPR policy where they prescribe rules of disclosure and guidelines for licensing. For instance, the ETSI IPR Policy consists of rules of disclosure:

Clause 4.1. "...each MEMBER shall use its reasonable endeavours, in particular during the development of a STANDARD or TECHNICAL SPECIFICATION where it participates, to inform ETSI of ESSENTIAL IPRs in a timely fashion. In particular, a MEMBER submitting a technical proposal for a STANDARD or TECHNICAL SPECIFICATION shall, on a bona fide basis, draw the attention of ETSI to any of that MEMBER's IPR which might be ESSENTIAL if that proposal is adopted"[16]

The policy also specifies rules relating to licensing where it requires its members to license its SEPs on Fair, Reasonable and Non-Discriminatory (FRAND) terms:

Clause 6.1. "

When an ESSENTIAL IPR relating to a particular STANDARD or TECHNICAL SPECIFICATION is brought to the attention of ETSI, the Director-General of ETSI shall

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[16] ETSI IPR POLICY, Available at, https://www.etsi.org/images/files/IPR/etsi-ipr-policy.pdf (Last visited 30th July, 2022)

immediately request the owner to give within three months an irrevocable undertaking in writing that it is prepared to grant irrevocable licences on fair, reasonable and non-discriminatory ("FRAND") terms…"[17]

SSOs facilitate negotiations between SEP holders and licensees to ensure that licensing agreements to ensure that licensing agreements are in tune with the needs of the industry and are FRAND compliant. SSOs also develop comprehensive policies that fairly compensate SEP holders while keeping royalty rates accessible to implementers thereby balancing the interests of both parties. SSOs often declare disclosure policies that require members to transparently declare patents that might become essential to the standard being developed. They prescribe early disclosure to prevent patent ambush where a company asserts a patent after the standard is adopted, undermining the integrity of the SSO and the standard.

SSOs such as ETSI, and ANSI form a robust network that supports the process of standard development. This collaborative ecosystem not only drives the evolution of technical standards but also fosters competition and innovation in the market.

CONCLUSION

This paper has delved into the concepts of standards, standardization and standard-essential patents. It also explored the role of standard-setting organizations (SSOs) in the development and dissemination of standards. Standards are not merely technical endeavours but are also crucial for fostering innovation, ensuring market competition and upholding consumer interests. Standards are the foundation for interoperability that allows for diverse products or devices to communicate irrespective of the make and model. SEPs further enhance this landscape by ensuring that technologies are accessible to all market players under FRAND terms. SSOs are an integral part of the development of standards and also balance the interests of both SEP holders and licensees.

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[17] *I.d.*