STANDARDS SETTING, STANDARDS DEVELOPMENT AND DIVISION OF THE GAINS FROM STANDARDIZATION

By David J. Teece[1] and Edward F. Sherry[2]

Consider the degree of technology incorporated into various compatibility/interoperability standards. It can run a wide range, from little-to-none to cutting-edge.

At the former extreme are the standards for electrical plugs and sockets, where the physical layout of the plug/socket is key, and the value to society of having a standardized design is high (imagine the chaos that would ensue if different appliances from different manufacturers used different and mutually-incompatible plug designs and wall sockets were nonstandard too). However, there is little or nothing in the way of new technology involved in the choice of which standard to adopt for electrical plugs and sockets since many proposed designs are capable of handling the required degree of voltage and current without adverse effects, such as electrical arcing if different plugs are located too close together, or inadequate power handling capability.

At the latter extreme, consider the standards for next-generation cellular communications. Here the technology is often cutting-edge and being developed simultaneously with the standard-development process. Hundreds of millions of dollars get spent on R&D to come up with improved technology which can help advance the technology

[1] Thomas Tusher Professor, Haas School of Business, University of California at Berkeley, and Chairman of the Berkeley Research Group.
[2] Chief Economist, Expert Research Associates.

which ultimately gets embedded in the standard.

Obviously, other standards span the range, between these extremes. At both the low end and the high end of the technology spectrum, there clearly is a need for standardization, if only to ensure that products made by one firm are compatible/interoperable with products made by other firms. But the need to develop technology and coordinate in order to choose the best technology varies significantly, from very low at the low end of the spectrum to very high at the high end of the spectrum

The terms "standard setting organization" ("SSO") and "standard development organization" ("SDO") have often been used interchangeably. But from an economics and resource allocation perspective, there are differences between "setting standards" and "developing standards." In particular, the extent to which R&D investment is needed to advance the performance of the technology that is being standardized is sometimes significant and sometimes not.

We propose using the term "standards setting" for activities at the lower end of the spectrum, and "standards development" for activities at the higher end of the spectrum. The key difference is the extent to which it is necessary to develop new technology as one goes along (instead of merely selecting one alternative from a preexisting menu of technological choices). In the latter case, technological choices are needed and coordination of divergent viewpoints is required, especially at the cutting edge. At the low end, though some coordinated choice of standard is required, it rarely makes a difference which standard is adopted so long as some alternative is chosen for standardization and coordination. One example is the pin assignment for semiconductors. Standardization of pin assignment is clearly important; it simply would not work if chips from firm A used pin 5 to send/receive signal X and chips from firm B used pin 6 to send/receive the same signal X. But with the possible exception of avoiding cross-talk between different signals, the choice of which pin assignment schema to use appears largely arbitrary. At the high end, the choice between the best technological alternative and the next-best can have a significant impact on industry performance. For example, the choice between Time Division Multiple Access ("TDMA") and Code Division Multiple Access ("CDMA") for cellular communications has significant implications.

When there is new technology being developed contemporaneously with the standardization process, it is important that the SSO/SDO work with its members to choose the best technology to be incorporated into the pending standard. In many standardization fields, such as telecommunications or semiconductors, it is rarely the case that different standards are technologically identical/equivalent, unlike the situation with electrical plugs/sockets, where the choice of which plug/socket standard to adopt has very little effect on technological performance and may be driven by ergonomic, backwards-compatibility or manufacturing cost considerations. Instead, much of the technology proposed for incorporation into many standards is often being developed at or about the time that the standardization process is being conducted, as revealed by a comparison between the dates at which standardization proposals are being made and the dates at which patent applications covering the technology are being filed (such "just-in-time" patenting is common). In many fields, it is rarely the case that the standards development process simply uses existing "off the shelf" technology. That

is not surprising, as many technological standards are intentionally being developed for next-generation products (such as the next generation of telecommunications products), and those involved in the standardization process want to obtain the longest life possible for new standards (to reduce the risk that they will become obsolete quickly).

The standards-development process is often a collaborative process, typically taking inputs from both rival and complementary technology developers and from those who anticipate making products complying with the standard. There are clearly gains from standardization; those gains accrue to various interested parties, including consumers, implementers and technology developers whose technology is incorporated into the standard. As with most collaborative processes, one would anticipate that the gains would be divided among those contributing and those impacted by the process (including end-users, who typically do not participate in the process). This raises two questions: (1) how are the gains from standardization divided among end-users, implementers and technology developers? And (2) how should the gains be divided?

Most SSOs/SDOs require that holders of patents covering technology incorporated into standards (so-called "standards-essential patents" or "SEPs") commit to making patent licenses available to an "unlimited" number of potential licensees on licensing terms and conditions that are "reasonable and non-discriminatory" ("RAND") or "fair, reasonable and non-discriminatory" ("FRAND").[3] Such requirements, typically set forth in the intellectual property rights ("IPR") policies of the SSO/SDO, rarely provide much in the way of detailed guidance as to what RAND/FRAND licensing terms are. Some have deplored the lack of specificity as to what RAND/FRAND requires, but others acknowledge that it is unrealistic to expect much in the way of additional clarification.

A number of recent U.S. court decisions have tried to cast light on what RAND/FRAND licensing terms are. We have discussed those decisions in a separate paper,[4] and will not repeat that discussion here. Most of those decisions start with (and then modify in various ways) the *Georgia-Pacific* factors, a list of fifteen court-developed factors that are traditionally used to help to assess what a "reasonable" royalty is under 35 USC 284, which provides that the patent holder is entitled to "damages adequate to compensate for the infringement, but in no event less than a reasonable royalty for the use made of the invention by the infringer."

We have seen language in several court cases suggesting that a FRAND royalty should be limited to the "inherent value" of the patented technology. That argument makes no sense from an economic perspective. Value is context-dependent; there is no such thing as the "inherent value" of patented technology. Consider a book. A book can be read, but it can also be used as a doorstop, paperweight, source of fuel or decorative object (e.g. displayed on a shelf in a furniture store or home for sale). If the book is in a language I cannot read, the book has little value to me other than in the paperweight/doorstop/fuel/decoration uses, but it may

[3] In our experience, U.S.-based SSOs/SDOs are more likely to use the term RAND, while European SSOs/SDOs are more likely to use the term FRAND. We are not aware of any analysts that believe that there is any substantive distinction between RAND and FRAND. Like others, we will use the terms interchangeably.

[4] Teece and Sherry, "A Public Policy Analysis of RAND Decisions in US Courts," forthcoming in *Criterion Journal on Innovation* (2016).

be much more valuable to you if you can read the language in which the book is printed. If "the same" book is translated into a language I can read, I can obtain benefits from reading it too.

Some courts have suggested (in what appears to us to be dicta) that a FRAND royalty should not include *any* of the value arising from the fact that the technology was incorporated into the standard. We have never seen any articulation of the (supposed) justification for such a position, and it makes no economic sense. As noted above, the standardization process is a collaborative activity, dependent on the inputs not only of potential implementers but on the inputs of those who contribute their technology into the standard. In our view, it would be perfectly appropriate for a patent holder to obtain a "fair share" of the gains from standardization. (The only alternative is that all of the gains from standardization are split (in the first instance) as between implementers and end-users; we see no economic or public policy justification for allowing them to reap the gains from standardization, but denying any share of those gains to innovators whose technology is incorporated into standards.)

We would fully agree that it is inappropriate for a patent holder to seek to "hold up" implementers by demanding more than a "fair share" of the gains from standardization. We would also agree that there is a potential "slippery slope" problem in drawing the line between acceptable and non-acceptable royalties. It is much easier to implement a bright- line policy (along the lines of "patent holders should capture none of the gains from standardization") than it is to implement a more nuanced policy (along the lines of "patent holders should capture a 'fair share' of the gains from standardization"). But in our view, the simplistic "none" approach has nothing to recommend it over the more nuanced "fair share" approach. In fact, the opposite is more likely correct inasmuch as there needs to be a strong incentives to invest in enabling technology which is generally under rewarded[5]

In theory, patent holders can benefit in two separate ways when their technology is incorporated into a standard. The first is what we term the "volume effect," an increase in the number of units incorporating the technology on which royalties will have to be paid, compared to the situation in which no standard is adopted and different firms may (or may not) make non-standardized products some of which may use the technology in question), resulting in a fragmented (and typically much smaller) market. We are not aware of anyone that suggests that patent holders whose technology is incorporated into a standard "should not" be able to benefit from the "volume effect."

But there is also the possibility of what we will term a "price effect," the idea that the royalty rate for a given technology associated with being incorporated into a standard can be higher than the royalty rate appropriate for the same technology in non-standardized contexts. The suggestion we have seen in certain cases is that there "should" be no price effect – the FRAND royalty rate "should not" include any of the value associated with the technology being incorporated into the standard—but only a volume effect. Again, we have never seen any clear articulation for the rationale behind this suggestion, other than as a reaction to the prospect of hold-up. In our view, there is no economic or public policy justification for such a rule.

[5] See David J. Teece "Profiting from Innovation in the Digital Economy: Standards, Complementary Assets, and Business Models in the Wireless World," (forthcoming), Research Policy

In conclusion, standards development frequently involves significant R&D and related investments by technology contributors. These contributions benefit the standardization process and therefore the implementers that use the standards, and consumers that buy the product. It is important that technology contributors are rewarded for their inventions. The F in FRAND should stand for “fair,” not “free” or de minimus.