

Byron Holz Responses to Questions from Senator Tillis

Thank you for the opportunity to answer these questions and I look forward to any opportunity to continue working with the subcommittee and its staff.

1. How has the current state of patent eligibility inhibited the development of next generation technologies like 5G? What is the long-term technological and economic impact of the current eligibility jurisprudence?

The exact effects of patent eligibility law may vary depending on the nature of a company, its technology, and its role in an industry. Small startups, for example, may face inability to secure investment altogether when vague and overly restrictive rules about patent eligibility call into doubt their ability to differentiate themselves by patenting inventions. Absent patent protection, a startup's innovation might be copied at lower cost by competitors who have not invested a comparable amount in R&D; this risk could prevent a venture from ever starting if it cannot expect patent protection and its work is not amenable to other forms of protection, *e.g.*, trade secret. For a company with a large, diverse patent portfolio like Nokia's, reduced patent protection puts downward pressure on licensing revenue and thus threatens reinvestment in R&D. For example, in 2018, Nokia had approximately \$1.6 billion in licensing revenue¹ compared to roughly \$5.2 billion invested in R&D—*i.e.*, about 30% of its R&D investment. Thus, while Nokia does not rely solely on patent licensing revenue, it represents a significant contribution to the cycle of reinvestment in R&D.

Uncertainty in patent eligibility threatens investment because it lowers the potential value of patent protection for inventions whose claims could invite dispute under Section 101 case law. For example, high tech inventions for communications systems like 5G may face ambiguities in eligibility from current "abstract idea" doctrine. 5G can provide enormous economic value through improved communications efficiency, building on many innovations in how data is encoded across a network. Yet, the highly mathematical nature of many of these innovations can raise uncertainties under current "abstract idea" law, even for deserving and well-intentioned applicants. Other technologies can face similar issues, such as the highly mathematical nature of work done in artificial intelligence, video encoding, and others. The state of Section 101 law creates risk valuable innovations in these types of fields will not receive protection.

Even where one obtains a patent despite the state of Section 101 law, the uncertainty itself has potential economic consequences including: (i) increased cost of obtaining a patent due to prolonged prosecution; and (ii) reduced market prices for patent acquisitions or licenses due to perceived risks of a court invalidating a granted patent under Section 101. These all have the potential to drive down investment available for R&D.

¹ Nokia's reported licensing revenues include patent, technology, and brand licensing, of which patent licensing predominates.

Some economic consequences from changes in patent law may be immediate while others can lag years behind their implementation. Some investment decisions may be deterred immediately, for example, if venture capital funds decline to invest in startups whose technology is seen as too vulnerable to Section 101 challenges. Other effects may manifest gradually. For example, it can take years to prosecute a patent, followed by additional time to negotiate licenses for that patent.

Investment decisions being made and influenced today may therefore reach far beyond even 5G. Consider, for example, that 5G services are already being offered in some cities, and SK Telecom of Korea has just announced a “Memorandum of Understandings (MOUs) with Ericsson, Nokia and Samsung Electronics, respectively, for joint research and development in advanced 5G *and* 6G mobile network technologies” (emphasis added).² Thus, R&D investments are already looking beyond 5G.

2. Outside of 5G, what other next generation technologies is your company not investing in developing because of the current law?

As discussed above, the current Section 101 law has put negative pressure on patent value and thus on licensing revenue for companies who monetize their patent portfolio. Nokia is one such company. Due to the scale and complexity of Nokia’s portfolio and R&D operations, it may not be possible to correlate these effects to specific R&D investment decisions. Nevertheless, it is likely that, had Section 101 been conducive to stronger patent value in recent years, Nokia would have benefited from more opportunities to reinvest licensing revenue in the cycle of R&D.

Nokia may have also missed opportunities to invest in, or acquire, startup companies whose innovations never came to light because of inability to secure their business via patent protection. As discussed for Q1, small firms may face a fundamental, existential threat if they cannot be secure adequate patent protection.

3. Can you quantify, in easy to understand terms, the economic impact of the current state of patent eligibility? In other words, how much is the current uncertainty costing our economy in terms of jobs, innovation, and development?

Unfortunately, this question implicates an enormously complex topic that does not appear to be easily quantifiable. For example, it may be impossible to quantify how many startup ventures failed to develop innovative technology, with corresponding job and economic growth, because Section 101 uncertainties deterred investment. It may also be infeasible to isolate completely the effects of Section 101 law on licensing revenue for large portfolios, whose valuation is influenced by many factors. Despite these challenges in quantifying effects precisely, I believe that Section 101 law has clearly contributed to chilling investment in fields sensitive to this issue.

² https://www.sktelecom.com/en/press/press_detail.do?page.page=1&idx=1410&page.type=all&page.keyword=
(dated June 18, 2019)

Byron Holz Responses to Questions from Senator Mazie K. Hirono

Thank you for the opportunity to answer these questions, and I look forward to any opportunity to continue working with the Subcommittee and its staff.

1. Last year, Judge Alan Lourie and Judge Pauline Newman of the Federal Circuit issued a concurring opinion to the court's denial of *en banc* rehearing in *Berkheimer v. HP Inc.*, in which they stated that "the law needs clarification by higher authority, perhaps by Congress, to work its way out of what so many in the innovation field consider are § 101 problems."

Do you agree with Judges Lourie and Newman? Does § 101 require a Congressional fix or should we let the courts continue to work things out?

Congress is the appropriate body to resolve this issue. Section 101 law needs greater clarity to reduce obstacles to innovation. Rather than helping to provide clarity, court decisions have, on the whole, added to the confusion.

2. The Federal Circuit rejected a "technological arts test" in its *en banc Bilski* opinion. It explained that "the terms 'technological arts' and 'technology' are both ambiguous and ever-changing." The draft legislation includes the requirement that an invention be in a "field of technology."

a. Do you consider this a clear, understood term? If so, what does it mean for an invention to be in a "field of technology"?

This term, construed in accordance with the current proposal, should not present serious difficulties as-is. Some flexibility must be retained for the unknowable scope of future advancements.

To the extent the subcommittee considers modifications or definitions of this term, Nokia suggests the following guidance:

- (1) any new language should be construed in favor of eligibility, as indicated by the current proposal;
- (2) any new language should be open-ended, in the sense that it allows for protection of new, unanticipated fields of research; and
- (3) any new language should avoid broad, bright-line boundaries that could hinder future innovation in unforeseen areas.

Contrary to criticisms about the feasibility of using a "technology" or "technological" restriction, the European patent system has been functioning well for many years using analysis that considers whether a patent provides a technical solution to a technical problem. For more on this, please see my answer for Question 2b.

b. The European Union, China, and many other countries include some sort of “technology” requirement in their patent eligibility statutes. What can we learn from their experiences?

Foreign laws, and European law in particular,¹ can provide significant guidance on this topic, and confirm that inclusion of a “technology” requirement can be made compatible with predictable and effective examination and review.

The European approach also shows that subject matter eligibility can be a “coarse filter” applied broadly without the ambiguities of US Section 101 case law, while relying other on provisions to address overly broad patents. These protections against overbreadth include concepts that parallel our Sections 102 and 103 (novelty and obviousness) and Section 112(a) (written description and enablement), but without a counterpart to Section 112(f). Broadly speaking, European patent laws emphasize protection for novel and inventive technical solutions to technical problems. There is not, and has never been, an approach like the current state of US Section 101 law. Once an application has passed the broad threshold for patentable subject matter, it is examined in light of how it purports to provide a technical solution to a technical problem. When evaluating a patent claim in view of prior art (under the European counterparts of 35 U.S.C §§ 102 and 103, referred to as “novelty” and “inventive step,” respectively), only those aspects that contribute to the technical solution are given patentable weight. In detail:²

According to Art. 52 of the European Patent Convention (EPC), which sets out the general requirements for patentability, patents shall be granted for subject matter that meets the following four requirements:

- (1) it has to be in a field of technology;
- (2) it has to be an invention and not be directed in its entirety to unpatentable subject matter;
- (3) it has to be novel over the prior art (European counterpart of 35 U.S.C § 102); and
- (4) it has to involve an inventive step over the prior art (European counterpart of 35 U.S.C § 103).

These requirements are tested in the above order and only if all requirements are met by a patent claim, its subject matter is considered patentable.

In order to test requirement (1), whether a patent claim is in a field of technology, the entire subject matter defined in a patent claim is considered. If any a single technical element is recited, or the patent claim necessarily requires the use of at least one

¹ Specifically, this explanation applies for signatories of the European Patent Convention.

² Although I go into some detail here, it is not my intention to describe every potentially relevant European doctrine, but rather to provide an overview of the EPC Article 52 requirements.

technical element, the claimed subject matter is considered to be in a field of technology. For example, if a claim recites a computer or necessarily requires the use of a computer, this is sufficient for it to be considered in a field of technology and pass the first test.

The EPC does not positively define what constitutes an invention (requirement (2)) but includes a list of excluded subject matter, in Art. 52 (2), that therefore does not constitute an invention by definition. For example, programs for computers, methods for doing business, and presentation of information are not regarded as “inventions” under Art. 52 (2).³ However, the EPC only excludes claims from patentability under this requirement if *every* element recites unpatentable subject matter. This is only the case if none of the features of the claim is either: (i) a technical feature, *i.e.*, not excluded from patentability; or (ii) at least contributes to solving a technical problem with technical means.

For example, patent claims directed to improvements in mobile communications such as patents relating to the 4G and 5G standards often entirely relate to software features. However, since they contribute to solving technical problems, such as improving data transfer with electromagnetic waves sent over air interfaces, they are not excluded from patentability. In a similar manner, patent claims relating to improvements in video coding, such as patents relating to the H.264 standard, are also often implemented in software. Nevertheless, they are also not excluded from patentability as they contribute to solving problems relating to the compression and transmission of video. Another example of a claim that is embodied solely in software would be a computer implemented method for calculating the speed of an aircraft from sensor values. Since the claim relates to processing an external technical signal (the sensor value) and contributes to solving a technical problem (calculating the speed of the aircraft), such a claim would not be excluded from patentability.

Whether or not a patent claim is novel (requirement (3)), is determined in a relatively bright-line test under EPC rules. A patent claim is novel if at least one of its features (including those features not directed to patentable subject matter or not being in a field of technology) has not been disclosed previously in a single prior art reference or prior use.

Finally, requirement (4) determines whether a patent claim involves an inventive step over the prior art. Here, only those features of a patent claim that at least contribute to solving a technical problem with technical means are considered. Features are disregarded if they both: (i) solely relate to unpatentable subject matter (such as features relating to a business method or a program for a computer); and (ii) do not contribute to solving a technical problem alongside at least one technical feature. In other words, features can only contribute to an inventive step if they enabled a patent claim to satisfy requirement (2). Hence, for every feature in a claim, one considers

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Although the European approach characterizes subject matter that passes requirement (2) as an “invention,” this does not end the patentability inquiry. For example, an “invention” under requirement (2) does not necessarily satisfy the “inventive step” standard of requirement (4).

whether the feature relates to generally patentable (*i.e.*, technical) subject matter. If so, the feature is considered for inventive step. If not, one also considers whether the feature contributes to solving a technical problem. If so, the feature is considered. If neither consideration has been satisfied, the feature is disregarded from the inventive step analysis.

For example, software guiding a user through another software application by highlighting the buttons the user needs to click may not represent an inventive step, particularly where: (i) it would not involve any technical means (changing the appearance of a user interface according to a predetermined order is a common software task); and (ii) would not solve a technical problem (guiding the user potentially being considered a mental act). Note that this hypothetical claim does not improve how the computer works or otherwise solve another technical problem, and it only uses generic, known software means. Under these assumptions, these features would not be considered for requirement (4). And, since the memory is already known, the entire claim would lack an inventive step.

As compared to the requirements under the current Section 101 case law, the European approach does not mingle prior art analysis with the initial steps to determine whether the claim satisfies the broad subject matter requirements of the first two steps. Instead, under requirements (1) and (2), the nature of the claim elements is used to remove those patents that refer *solely* to subject matter that is either: (i) non-technical; (ii) or deemed not patentable by the EPC.

Although no patent system is perfect, these principles have contributed, on the whole, to fair balancing of interests among market participants.

The European model also illustrates why the proposed expansion of Section 112(f) is unnecessary and likely harmful, and other provisions like Section 112(a) are better suited to regulate concerns about claims that exceed scope appropriate in light of the disclosure. Notably, there is no provision like Section 112(f) in European patent law. I discuss these issues in response to Question 4a.

c. Is a claim that describes a method for hedging against the financial risk of price fluctuations—like the one at issue in the *Bilski* case—in a “field of technology”? What if the claim requires performing the method on a computer?

The European concept of looking for a technical solution to a technical problem can provide a helpful lens for examining issues like these. For example, it may not be appropriate to patent a method that only executes a new form of pure financial transaction on a computer, without any corresponding technical solution to a technical problem. The method may merit protection, however, if it provides a technical solution to a technical problem, such as performing required calculations more efficiently on the computer, or solves some other technical problem.

d. What changes to the draft, if any, do you recommend to make the “field of technology” requirement more clear?

Nokia does not propose specific modifications at this time, but is open to changes consistent with these comments. The term “field of technology” appears unlikely to do significant harm to patent eligibility law if interpreted reasonably and in favor of eligibility.

3. Sen. Tillis and Sen. Coons have made clear that genes as they exist in the human body would not be patent eligible under their proposal.

Are there other things that Congress should make clear are not patent eligible? There are already statutes that prevent patents on tax strategies and human organisms. Are there other categories that should be excluded?

Nokia is not proposing any other excluded categories at this time. Because exclusion of software patents has been advocated by some parties, from time to time, Nokia notes that it would be strongly opposed to any exclusion that would hinder software innovation.⁴

4. I have heard complaints that courts do not consistently enforce Section 112 with respect to claims for inventions in the high tech space.

a. Are these valid complaints?

Section 112(f) adds significant uncertainty to claim scope and has led to very large percentages of patents being held invalid or not infringed, and so it should not be expanded. Careful enforcement of other provisions, including Section 112(a) and others, should increase consistency and protect against overly broad claims. I will address each issue in turn.

Section 112(f). In practice, Section 112(f) has introduced uncertainty into claim construction and validity, such that these claims tend to perform poorly, on average, when patent owners seek to establish infringement and defend validity. Please see my initial testimony on this issue. In addition, Nokia has undertaken a review of 697 Federal Circuit (“CAFC”) decisions from the CAFC’s creation through June, 2019. This data confirmed Nokia’s understanding that means-plus-function (“MPF”) claims⁵ tend to suffer from uncertainty and difficulties establishing infringement and validity. The problems were accentuated for MPF claims in the software area. Notably:

- Since 2000, 78.2% of MPF Federal Circuit written decisions (on infringement or validity) have been adverse to the patent, and 85.5% of Federal Circuit

⁴ See also *supra*, n1.

⁵ These include claims under either pre-AIA 35 U.S.C. § 112 ¶ 6, or 35 U.S.C. § 112(f).

written decisions regarding software MPF claims have been adverse to the patent. And, as noted below, this has become significantly higher over time.

- *None* of the 25 Federal Circuit software means plus function decisions that reached a conclusion in a written opinion on validity or infringement from Jan 1, 2014 to present has found a software means-plus-function claim to be valid and infringed (100% adversity for software patents). Moreover, between 2014 and the June 2019, even when considering all technologies, 95.1% of means-plus-function Federal Circuit written decisions reaching a conclusion on invalidity or infringement have been adverse to the patent (either ruling the patent invalid or not infringed). During the same time period, “regular” (*i.e.*, non-means-plus-function) claims faced adverse Federal Circuit written decisions (invalid or not infringed) about 56-66%⁶ of the time.

European laws show that a 112(f)-style provision is not needed for a well-functioning patent system. European countries have no equivalent to Section 112(f), and have had no need for it because other rules are allowed to address issues of claim overbreadth. “Means plus function” claims/features in Europe are, in general, construed broadly to cover any means that can perform the stated function, while other rules protect against overly broad claims. Provided that at least one example of the feature is given in the patent description, such features (referred to as functional features) are allowable if the skilled person would appreciate that other means could be used for the same function. Functional features provide the patentee with a broader scope of protection where limiting the claim to specific, disclosed structures would unduly limit the protection that an applicant can achieve. For example, introducing a “fastening means” instead of a “rivet,” where a skilled person would know that a screw can also be used, is commonly accepted in Europe. The “fastening means” element then covers all conceivable fastening elements, even those not yet available at the time of filing. For all acceptable claim types (whether “means” claims or otherwise), claim construction is primarily guided by the patent description and figures as required by Art. 69 EPC. The file history as well as other statements by the patent owner outside the patent descriptions are only rarely considered.

This general and broad approach (relative to Section 112(f)) has worked well for decades alongside provisions that, as with our Sections 102, 103, and 112(a), ensure that claims do not exceed the scope of what is supported by the application’s disclosure and are sufficiently distinct from the prior art. Broad claims are not restricted or prohibited in a manner like our means-plus-function doctrine, while other provisions are intended to prevent overly broad claiming.

For example, enforcement of the European rules analogous to our Section 112(a) requirements tends to strictly require that claim elements be supported by the

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Because of the comparatively large number of non-means-plus-function written opinions, a statistical sample was analyzed to create a reasonable confidence interval.

disclosure. Overly broad claims also invite prior art challenges under the novelty/inventive step requirements. This approach has advantages by eliminating both: (i) potential claim construction uncertainties that come from identifying corresponding structure under Section 112(f); and (ii) vague and subjective questions that can arise under current Section 101 case law, for example, in disputes over what constitute an “abstract idea.” The European approach seeks a comparatively objective solution under rules for supporting disclosure, novelty, and inventive step.

Furthermore, under European rules, amendments of patent claims are only allowed to cover subject matter that is directly and unambiguously disclosed in the original application documents. This requirement is enforced strictly by the European Patent Office and its Boards of Appeal as well as national institutions such as the German Patent and Trademark Office, the German Federal Patent Court and the German Federal Supreme Court. This prevents patentees from seeking protection for subject matter they did not originally invent by attempting to covering overly broad subject matter in hindsight. A generalization of a specific embodiment to a generic teaching is only allowed under exceptional circumstances. For example, where the patentee has originally only described a rivet in her application document, and not filed original claims for a generic fastening means, it may be difficult to amend the application to recite a generic fastening means. This approach seeks to prevent the creation, during patent prosecution, of overly broad claims that are drafted to cover future developments not appropriate for coverage in light of the original disclosure. In a similar manner, amending a claim using an isolated element taken out of a specific embodiment is only allowed where: (i) it is evident for the skilled person that the feature is not related or inextricably linked to the other features of that embodiment; and (ii) the overall disclosure justifies the generalizing isolation of the feature and its introduction into the claim. For example, where an application initially recites an electric vehicle with a battery and four wheels (thus implicating battery powered cars), it may not be possible to later add a claim for an electric vehicle with a battery and at least two wheels (thus also implicating battery powered scooters). As can be seen from these rough examples, a cautious approach to limiting amendments can prevent patentees from seeking protection for subject matter they did not originally invent.

The strict approach to amending patent applications applied under European rules encourages applicants to describe their invention both in broad terms and in specific examples, as later generalizations may otherwise be difficult to achieve in light of the written support requirements. This encourages more certainty for third parties seeking to understand what may be claimed based on the original filing. Defendants in patent infringement actions may also seek to challenge claims that they believe are not adequately supported by the disclosure.

Section 112(a) and others. Rather than constraining applicants and introducing more uncertainty into the system by complicating claim construction with wider application of Section 112(f), our system already contains provisions to protect against overly broad claims, regardless of the particular claim format chosen. These include:

- the written description and enablement requirements of Section 112(a);
- the definiteness requirement of Section 112(b);⁷ and
- the novelty and nonobviousness requirements of Sections 102 and 103.

These already provide sufficient tools to protect against overly broad or ambiguous claims. Nokia welcomes a robust discussion about how to ensure that these requirements are properly enforced but does not currently see a need to amend them.

b. Do the proposed changes to Section 112 adequately address those complaints and limit the scope of claims to what was actually invented?

No. The proposed changes to Section 112(f) would be a dangerous overcorrection, and may cause harms that outweigh the benefits of Section 101 reform in multiple fields of technology. Forcing broader application of Section 112(f) would result in more reliance on an uncertain and deferred process of importing limitations from the specification, thus reducing clarity about claim scope. This is especially true in the field of software patents; Nokia’s review has found that since the beginning of 2014, *every* Federal Circuit decision that reached a final decision in a written opinion regarding infringement or validity of a software means-plus-function claim held the claim either invalid or not infringed (100% adversity). Moreover, between 2014 and the June 2019, even when considering all technologies, 95.1% of means plus function Federal Circuit written decisions reaching a conclusion on invalidity or infringement have been adverse to the patent (either ruling the patent invalid or not infringed).

c. Are you concerned that the proposed changes will make it too easy for competitors to design around patent claims that use functional language?

Yes. Please see my initial testimony and comments in response to Question 4a regarding the proposed expansion of Section 112(f), including the data regarding a much higher rate of noninfringement determinations for MPF claims.

5. There is an intense debate going on right now about what to do about the high cost of prescription drugs. One concern is that pharmaceutical companies are gaming the patent system by extending their patent terms through additional patents on minor changes to their drugs. My understanding is that the doctrine of obviousness-type double patenting is designed to prevent this very thing.

The Federal Circuit has explained that obviousness-type double patenting “is grounded in the text of the Patent Act” and specifically cited Section 101 for support.

Would the proposed changes to Section 101 and the additional provision abrogating

⁷ Although indefiniteness is not the same as overbreadth, I include it because indefiniteness doctrine serves a related function in ensuring that claim scope is defined appropriately.

cases establishing judicial exceptions to Section 101 do away with the doctrine of obviousness-type double patenting? If so, should the doctrine of obvious-type double patenting be codified?

To the extent that the proposal might be interpreted as abrogating the law of non-statutory double patenting, a/k/a obviousness-type double patenting (OTDP), Nokia is open to clarifications in order to maintain it. A simpler alternative to codifying the state of OTDP law might be to provide language clarifying that the proposed changes would not do away with OTDP.

6. In its *Oil States* decision, the Supreme Court explicitly avoided answering the question of whether a patent is property for purposes of the Due Process Clause or the Takings Clause.

What are the Due Process and Takings implications of changing Section 101 and applying it retroactively to already-issued patents?

To the extent that the proposed changes reduce obstacles to patentability under current Section 101 law, those changes should not reduce patent owners' rights. Thus, there do not appear to be Due Process or Takings Clause issue with those aspects of the proposal.

Revising Section 112(f) to broaden application of means-plus-function doctrine, however, could narrow claims retroactively and thus reduce patent owners' rights. This could raise Due Process or Takings Clause issues and further underlines why the proposed expansion of Section 112(f) should be avoided.