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Re: Comments on non-obviousness standards
    Comments on software patents

United States Patent and Trademark Office
Washington, DC

INTRODUCTION

My name is Philip R. Karn, Jr. I am an electrical and computer engineer with 15 years of professional experience. I hold a BSEE from Cornell University and a MSEE from Carnegie Mellon University. My employers include Bell Telephone Laboratories, Bell Communications Research and Qualcomm. My specialty is packet switched computer networking. I am widely regarded as an expert in TCP/IP, the core protocols of the Internet. I am also a licensed radio amateur (call sign KA9Q), with particular interests in experimental digital communications. My profession and my avocation have always been closely intertwined, to their mutual benefit.

I am writing you in response to your call for public comment on whether the standards for obviousness in the granting of patents ought to be tightened. Although I believe my sentiments to be very widely shared among my colleagues, I am writing strictly on my own behalf. In particular, these comments should not be construed as those of my employers, past or present.

Although I understand the deadline has passed, I am also responding to your earlier request for comments regarding patent protection for computer software and algorithms -- something I oppose very strongly.

THE US PATENT SYSTEM IS TOTALLY OUT OF CONTROL

There seems to be a general consensus among fellow engineers in my field (and even among the patent attorneys with whom I've spoken) that the US patent system is now totally out of control. It is widely perceived as overly complex, arbitrary and unfair, with its primary beneficiaries being 1) the attorneys who practice in the field and 2) unscrupulous and unproductive businessmen who know how to exploit its weaknesses.

Opinions about the patent system range from weary resignation to extreme

cynicism and hostility, the latter commonly expressed by engineers who are simply trying to do their jobs. I have yet to find anyone outside the system itself with a positive opinion. (A typical comment: "The only good thing about patents is that they eventually expire.")

The patent system purports to encourage innovation and the disclosure of inventions for the general benefit of society. But it has degenerated into a legal free-for-all that seriously threatens the vitality of my industry.

The patent system as it currently stands seems to depend almost totally on the good faith of the applicant in disclosing prior art; if the applicant doesn't cite any disqualifying information, the patent is almost automatically granted.

Judging from the patents I read, it certainly seems that very little is obvious or trivial to the average patent examiner. Their searches of prior art are generally limited to the patent literature, and even here I've seen some astonishing lapses.

FEAR, CYNICISM AND DOUBT NOW SURROUND THE PATENT SYSTEM

This is seen most directly in another common attitude, particularly among managers: "Everybody else abuses the patent system, so I have to abuse it too in order to protect myself." They file applications on anything they can get away with. This is not to protect their R&D investments against copying (I've seen patent applications where the total "R&D investment" consists of about 30 minutes of thought) but to have "ammunition" for a counter suit should they be sued for violating another's trivial patent. (I understand this is called "defensive patenting".)

But defensive patenting only works when your opponent also produces a product. It is wholly ineffective against those whose sole business is extortion-by-lawsuit, not the creation and manufacture of useful products.

A related, though more abusive tactic is to patent all of the obvious approaches to solving a particular problem while intending to explore only one of them. The intent, of course, is to prevent one's competitors from exploring any of the alternatives.

Patents are often described, sometimes even by their supporters, as "land mines". The metaphor is very apt; many victims of patents, just like those of land mines, step on them unknowingly.

In some ways, patents are even more insidious than land mines. Most land

mines make themselves quickly known when stepped on, so survivors quickly learn to avoid the area. But patents may not "explode" until long after the victim has gained a false sense of safety and made a significant investment. Sometimes the patent owner does this deliberately, just to maximize the damage to his competitor.

Although some protection can be gained by a patent search, this is an extremely difficult and time-consuming process made all the worse by the extraordinary prevalence of vague, overly broad, obvious and trivial claims that should never have been allowed. And even an exhaustive patent search that turns up negative is no guarantee: there's always the risk that a long-pending patent application, secret during its examination phase, may suddenly issue.

The unavoidable uncertainty about whether one is infringing a valid patent (or may do so in the future) has resulted in a serious chilling effect that strongly discourages the kind of innovation and creativity that the patent system was created to promote. This is particularly true in the software field which is populated by many free-lance (self-employed) programmers who simply cannot afford to defend against a patent infringement suit even when the patent in question is clearly invalid.

Two months ago, the following message appeared on a widely distributed Internet mailing list. The author is highly respected by the community for his many innovations and contributions to Internet technology, particularly in its ability to perform well in the face of incredible growth. I have removed his name as a courtesy.

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Subject: IBM awarded patent on finite state machines
Date: Thu, 30 Jun 94 08:14:46 PDT

I try to avoid reading U.S. patent awards because it seems like
every time I do I have to be tranquilized & restrained.  But
this just came in the mail & it's even worse than usual.  Does
anyone know what planet USPO inspectors come from?  Can we make
them go back there or do we have to wait until they finish
destroying western civilization?

[name deleted]

ps - it seems like the `novelty' in this award is associating a
list of actions with an accepting state rather than a single
action.  I thought this was a good, though obvious, idea in
1961 when I first saw it in Kleene's paper on finite automata.
As I recall, Kleene saw the idea in the 1943 McCulloch & Pitts
paper on modeling neuron activity via FSMs.  So 50 years later
the USPO credits this `remarkable discovery' to IBM.  Arrrgh.
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The original message included another that described US Patent 5,317,757. On its face, this patent appears to cover any use of a finite state machine, particularly in the implementation of computer protocols.

As the author of a software package (written in 1985-86) that may technically infringe its claims, I am naturally concerned about the process that could allow such a patent to be granted.

I have also had the bitter personal experience of publishing an invention with the express intent of placing it into the public domain, only to have it appropriated and patented by a company who filed more than a year after my publication. Who, I have reason to believe, had full prior knowledge of my work. Yes, I made a prior art filing. But no, I haven't filed for a reexamination. For some reason, I'm just not enthusiastic about paying the government $1700 for the privilege of ransoming back my own idea. And that money doesn't even give me the opportunity to argue my case.

And there was the infamous Compton "multimedia" patent. To its credit, the PTO took the rare step of tossing the patent out on reexamination -- but only after intense public pressure.

THE VAST MAJORITY OF PATENTS IN MY FIELD SHOULD NEVER HAVE BEEN GRANTED

These patents cannot be explained as isolated mistakes; they can only be the product of a broken system. A year ago, I gained access to a CD-ROM patent database. I've since read many patents in my field, although I must admit that I often have to fight the same kind of strong reaction described by the author I quoted earlier.

Quite frankly, I have seen very few (if any) patents that truly meet the concepts of usefulness, non-obviousness, and complete disclosure as I understand them.

To the extent that I am able to decipher the obfuscated legal language in which they are written, the vast majority of the patent claims I have read are 1) already well known in the art, 2) trivial variations on known techniques, or 3) "novel" in that no one may have done exactly the same thing before, but consist of straightforward applications of existing techniques that would be quickly found by any other competent engineer given the same problem and constraints.

And a few patents consist mainly of a set of functional specifications for some system, without even describing how the system meets those specifications!

Incredible.

These frivolous patents cause enormous damage to society. First are the obvious direct costs. Patent infringement suits are among the most expensive, complex and protracted of all legal cases. It is not unusual for a single case to last for years, burning many millions of dollars in legal fees on both sides. I've heard estimates of $500,000 per side just to bring a case to trial. My overpriced California house isn't worth even half this amount!

And then there are the indirect costs. How many companies have decided to cave into royalty demands from the owner of an obviously bogus patent rather than assume the risk and cost of fighting it? Even worse, how many companies have foregone bringing a product to market altogether because of exorbitant royalty demands? Does the government even care?

In my field at least, today's patent system reminds me of the drunk driver who always seems to stagger away unhurt from a car wreck, blithely unaware of the enormous damage he leaves in his wake.

No, this is not hyperbole. Consider that very few wrongful death suits involve legal fees and awards as high as some of those in certain recent patent infringement cases -- all because an incompetent patent office granted an absolute 17-year monopoly to someone who did not deserve it. A patent office that, once a patent is granted, is completely "out of the loop" and cannot be held to account for its mistakes.

An alcoholic can take a long step toward a solution by simply admitting he has a problem. I am similarly encouraged by the PTO's call for comments on this issue, as the PTO finally seems to realize that it too has a serious problem.

INCOMPETENT EXAMINERS ARE ONLY PART OF THE PROBLEM

It is tempting to conclude that the solution to the patent system's problems is simply to hire better patent examiners. The Compton multimedia patent could clearly have been blocked by a competent examiner since it covered techniques that are well known to any competent computer programmer.

But this is easier said than done. Part of the PTO's inability to attract and retain competent examiners may be the low pay of a patent examiner (reportedly 1/4 to 1/3 that of an industry engineer). But there are undoubtedly other reasons. Perhaps the most important is that the best engineers are motivated more by the desire for a creative outlet than by a paycheck -- and the patent office affords few opportunities to satisfy this drive. Furthermore,

there is a strong (and in my opinion, well deserved) antipathy among engineers toward the patent system, lawyers and the government in general. This seems especially true for programmers.

I also understand that the patent office puts many patent examiners through law school. One almost wonders how such examiners can be impartial in their decisions, given the fact that the more patents they grant, the more business (i.e., litigation) opportunities they'll have when they eventually go into private practice.

But even the most competent and impartial engineer simply could not do a truly adequate job as a patent examiner in my field. There are just too many specialties to track, too many publications to read, and too much going on at once to remain truly "skilled in the state of the art", especially if one has given up an active engineering career to become a patent examiner.

And even the unusually competent examiner still has to function within a patent system that is stacked solidly in favor of the applicant. It is much harder for an examiner to deny a questionable claim and risk an appeal or full-blown lawsuit than it is to simply grant it, wash one's hands of the affair, and let the courts eventually sort out its validity -- at a substantially greater cost to society.

EXTRAORDINARY PROTECTIONS SHOULD BE RESERVED FOR EXTRAORDINARY INVENTIONS

Patents provide truly extraordinary protection. The 17-year monopoly they confer is absolute; independent reinvention is not a defense. There is no limit to the price that a patent holder can demand for its use. Except when the government is involved, he can refuse outright to license its use at any price, whether the invention is a trivial or major component of the product, and whether the prospective user has a non-infringing work around or must discard his entire investment. And this is true even if the patent holder decides to simply sit on his invention. In the worst case, there is no alternative but to wait a long 17 years for the patent to expire.

Such truly extraordinary powers are clearly ripe for abuse. They should not be granted lightly, or as a matter of "right". Sometimes even a patent holder, especially a small entity, is the victim. The "circle and destroy" practice often ascribed to Japanese companies is one example. This is the practice of immediately filing patents on every conceivable application of someone else's newly patented technology and then "ransoming" them back to the original

inventor, usually in exchange for free rights to his technology.

For there to be any public benefit whatsoever in the grant of a patent, the invention that it covers ought to be equally extraordinary. Unfortunately, extraordinarily few are.

STANDARDS FOR NON-OBVIOUSNESS MUST BE DRASTICALLY TIGHTENED

Few experiences in engineering are as profoundly upsetting and demoralizing as investing substantial resources in creating a product only to discover that you have inadvertently infringed someone else's patent. Even if you worked totally independently, you are not entitled to the result. With the possible exception of parts of the tax code, it is difficult to think of any other US law that engenders more uncertainty, bitterness, fear and loathing than this single aspect of patent law.

The Patent Office must therefore exercise great diligence to ensure that the likelihood of denying someone the rights to his own independent work is kept to a bare minimum. This can only be done by drastically tightening the standards for non-obviousness. Only then can patents serve their original purpose of encouraging innovation, as opposed to acting as destructive weapons of extortion for those whose skills lie in "playing the system".

Patented inventions should be so non-obvious as to have negligible chance of independent reinvention, even by someone with extraordinary skills, at ANY time during the term of the patent.

In other words, monopoly protection for an invention is appropriate only as long as the invention would not have existed otherwise.

Exactly how to implement these tightened standards is, of course, open to debate. At the very least, an examiner should be given greatly expanded authority to deny a claim without risking an appeal designed to wear him down by attrition. Again, a major failing of the present system is that there is little or no incentive for an examiner to deny a claim, and every reason to grant even an invalid one.

The PTO should open up the reexamination process. Anyone should have the opportunity to argue to the PTO in an open forum that a particular patent should not have been granted. If the PTO decides to let the patent stand it should be required to justify its decision in writing. And it should not cost $1700 to initiate such a proceeding -- many individuals simply cannot afford such fees.

Another possibility would be to allow evidence of independent recreation of a patented invention in a reexamination proceeding. If it could be clearly established that the invention was independently recreated (e.g., if it occurred while the patent in question was still pending and therefore still secret), then the patent could be revoked on the grounds of insufficient novelty.

Yet another interesting possibility would be abolish interference, one of the most costly and difficult of all patent proceedings. The mere fact that an invention had been independently created by two or more inventors is strong evidence of its relative obviousness, and the PTO should rule that no patent is warranted. This policy would be far more just than the present "winner takes all" policy that unfairly denies the loser all rights to his own work, even when it was clearly performed independently. The parties would then have the opportunity to compete in the market on an equal basis, giving each an opportunity to pursue his invention differently in an attempt to gain a market advantage. Everyone would benefit from such a policy -- not just the inventor who would otherwise lose in interference, but a public freed from the harm caused by a gratuitous monopoly.

No case more clearly illustrates the injustice of our "winner takes all" patent policy than the invention of the telephone. Was it truly necessary to grant Bell an absolute monopoly over the telephone, when others (specifically Elisha Gray) were clearly doing the same work? One can only wonder how differently history might have been had Gray and others been allowed to compete in those early years. Who knows, maybe the long string of costly and disruptive antitrust actions involving the Bell System could have been avoided had the telephone industry begun with free competition rather than as a sole patent-enforced monopoly.

There is a parallel to the Bell System that did evolve along very different lines: the Internet. I ascribe much of the incredible success of the Internet to the fact that all of its core technology is in the public domain and is available to any small entrepreneur, including individuals such as myself, willing to create a useful product. Many such entities have succeeded handsomely despite the lack of patent protection. Indeed, this would simply not have been possible had the Internet been locked up in existing patents. The voluntary groups that set standards for the Internet recognize this fact, and they now make a point to avoid patented technology whenever possible.

OTHER REFORMS

Although the tightening of non-obviousness standards is the most important single reform that the PTO could make, there are several others that should also be made. I would like to discuss each one briefly.

Patent protection should date from the date of filing, not the date of grant. 17 years is already a very long time, and the years typically added by the examination process make this even worse.

Patent applications should be published immediately upon filing. Not only would this give others advance warning of the claims being made and provide an opportunity to point out prior art, but it would also encourage applicants to limit the scope of their claims to those most likely to be granted. Applicants would have less of an incentive to "see what they can get away with", since the mere act of filing a claim would disqualify it for "backup" trade secret protection in the event it is disallowed as a patent claim.

A patent's term should depend on the "half life" of its field. Patents in rapidly developing fields should have much shorter terms than patents for inventions in mature fields. If this results in the term of the patent being less than the examination period (assuming the "clock" starts at filing), then so be it; this would simply demonstrate that patents are inappropriate for the field in question.

SOFTWARE PATENTS

I would like to turn now to the subject of patents on computer software and algorithms. The problems caused by inappropriately low standards of obviousness are probably nowhere more apparent than with software. But even if this particular problem were fixed, software patents are fatally flawed. They should be banned.

Computer software is the only commodity I can think of that currently qualifies for three separate forms of IPR: patents, copyrights and trade secrets. This is excessive.

Any legal system for the protection of "intellectual property", especially computer software, ought to have the following interrelated properties:

1. The layman (i.e., an inventor or author, as opposed to an attorney who specializes in the field) should find the basic principles of the system to be clear, objective, fair and easy to understand.

2. The total costs of the system should be small. This includes both routine administrative costs and the costs of litigation.

3. The system should discourage litigation except as a last resort; innovation and cooperation should be encouraged.

4. Protection should be directed toward (and limited to) those aspects of a

creation that involve the bulk of the investment of time and money.

5. Protection should be quick and easy to obtain.

6. It should be easy for a layman to determine in advance of creating a product whether or not he will infringe another's work.

7. The system should provide inherent safeguards against abuse, both of the system itself and of the protections it grants.

8. The system should not require a high degree of technical competence on the part of the government agencies and employees who administer it.

Unfortunately, the patent system fails miserably on all counts. This is especially true for computer software and algorithms, but I am quickly coming to the conclusion that things are almost as bad in the other, more traditional fields within the Patent Office's purview.

It is my thesis that trade secret and copyright protection are far more appropriate than patents for software, and I would like to present my reasons, evaluated according to the criteria above in more detail.

1. One patent attorney I know, asked to explain the difference between an "algorithm", which is supposedly not patentable, and a "method", which is, beautifully summed up the utterly arbitrary nature of the patent system:

   "Listen carefully", he said. "The difference is crucial. 'Algorithm' begins with an 'a', while 'method' begins with an 'm'."

   At least in comparison to the patent, the concept of a trade secret is a model of simplicity and elegance. Trade secrets are particularly intuitive: they're secrets disclosed to others only under explicit non-disclosure agreements. "Infringing" a trade secret therefore involves either the violation of a voluntary contract or an overt crime like burglary or wiretapping. The line between infringing and non-infringing conduct is quite clear to most people.

   There are, however, unfortunate exceptions such as the clearly mistaken verdict in the recent *Microsoft vs Stac Electronics* counter suit where the jury ruled that Stac misappropriated Microsoft trade secrets by reverse engineering publicly available object code. Clearly, trade secret protection should be limited to that which is truly kept secret, not that which is derivable from publicly available information.

   The notion of a copyright is also relatively straightforward. It simply

means that one cannot directly copy another's work, as opposed to creating a new work from scratch that may be inspired by another. Here too, the protections of copyright have unfortunately been perverted in recent years to cover more than the actual program itself, notably to the "look and feel" of the program's user interface. In many ways this unfortunate trend is as dangerous as the headlong rush towards software patents.

Excluding "look and feel", there does seem to be a general consensus among the software community to which I belong that copyrights are by far the most appropriate form of protection for published software.

2. As discussed earlier, the patent system is enormously expensive in comparison to copyrights and trademarks, both in the direct costs of patent litigation and in the indirect costs of fear and uncertainty.

   Even the routine costs of the patent system are very high, reflecting the extreme complexity of the system. Application fees, issuance fees, claim fees, maintenance fees, etc, not to mention the legal fees usually required to write a patent in the acceptable language.

3. As expensive as patent litigation is, paradoxically this does not seem to deter litigation -- or more specifically, the threat of it. Many a prospective defendant has given in to royalty demands rather than try to fight even an obviously invalid patent.

   In my experience, it is not at all unusual for patent applications, at least on software, to be based on ideas conceived by the inventor literally within minutes after being given a problem. On the other hand, the implementation of these ideas usually takes far more time and effort, often involving many programmers working for weeks, months or even years. It seems intuitively obvious that protection for such systems should target the substantial investment in their actual implementation, not the trivial investment in the ideas behind it. In software systems, this argues strongly for copyright or trade secret protection for the actual code and against patent protection for the ideas it employs.

4. Even though patents can now be obtained much more easily (far *too* easily) than ever before, they are still much more difficult to obtain than copyrights. It now seems to take about 1.5 to 2 years between application and grant of a computer or communications-related patent, and this is a *very* long time in those fast-moving fields.

5. Yet the solution does **NOT** lie in accelerating the examination process. As discussed earlier, the disturbing rate at which patents are currently

issued for obvious and trivial inventions, and for inventions clearly covered by the prior art outside (and sometimes within) the PTO files argues for a much more rigorous and time-consuming examination process, not a further relaxation of standards.

6. If a patent application cannot be properly reviewed before it is overtaken by a fast-moving field, then the inescapable conclusion is that patent protection is simply inappropriate for the field in question. I submit that this is definitely true for computer software.

7. If it weren't for software patents, a programmer who doesn't deliberately and consciously infringe a copyright or trade secret could sit down and code a program secure in the knowledge that he isn't infringing anyone's intellectual property rights. I can't think of anything that would do more to encourage the independent software industry than the complete abolition of software patents.

   Starting in 1985, in my own time I wrote a TCP/IP software package. It was originally intended for free use in the amateur radio community and has found a considerable following there, but I have also licensed it widely to companies producing low-cost Internet connectivity products. My software is now the standard base for much of the "dialup IP" market, and I take pride in having contributed a small part to the growth and success of the Internet.

   In my software license contracts I routinely indemnify my customers against copyright or trade secret actions because I know that my product does not infringe any such rights -- I wrote it myself from publicly available standards documents. However, because of the great uncertainties involved, I always refuse to indemnify against patent infringement. Not because I knowingly infringe on patents, but because I know full well that at any time, a new patent could issue (or an old patent surface) that covers a programming technique I use in my code. Even if the patent is totally bogus, even if it could eventually be ruled invalid due to obviousness or prior art, there is simply no way that I, as an individual, could possibly afford to defend myself against such an action. Basic legal costs alone would far exceed my total income from my product. They could well exceed my entire net worth. Nor, as we've seen, are my concerns without foundation.

   Another example of how patents hinder rather than facilitate the use of new technology is public key cryptography. It has been suggested that once the government concluded that it could not prevent publication of these algorithms, it would grant private patent rights in the hope of slowing the deployment of this technology. Whether or not this was the

intent, this has surely been the outcome. One company now jealously controls all of the basic public key patents in the US.

Copyrights and trade secrets stand in stark contrast to patents. Although all three mechanisms confer monopolies, those conferred by copyrights and trade secrets are strictly limited to specific computer programs created by their authors. Others wishing to use such programs have the option of independently creating equivalent programs should they be unable to come to terms with the copyright/trade-secret owners.

Although this might appear to encourage duplication of effort, this vitally important option deters the copyright or trade secret holder from abusing his position. Such duplication of effort should be rare in a rational free market since the cost of making another copy of an existing computer program is near zero; any income at all is pure profit. Whoever first creates a useful program has a strong incentive to sell it for a reasonable price to discourage the creation of equivalent competing programs.

8. As discussed earlier at length, the present patent system is wholly incapable of conducting meaningful searches of the prior art.

SOFTWARE PATENTS SHOULD BE ABOLISHED

The ideal reform, at least as far as computer software and algorithms are concerned, would be the total abolition of software patents. That is, if a particular arrangement of hardware that happens to include a computer does not infringe any patents, then neither would that same arrangement of hardware running any arbitrary computer program. The US should return to a policy of protecting computer software solely through copyright and trade secret law.

However, realizing that such a desirable outcome may be unattainable, the reforms mentioned earlier (particularly the tightening of non-obviousness standards and the shortening of the patent term) could do much to minimize the enormous damage now being done by the patent system to the software field.

Thank you for the opportunity to express my views.

Philip R. Karn, Jr.