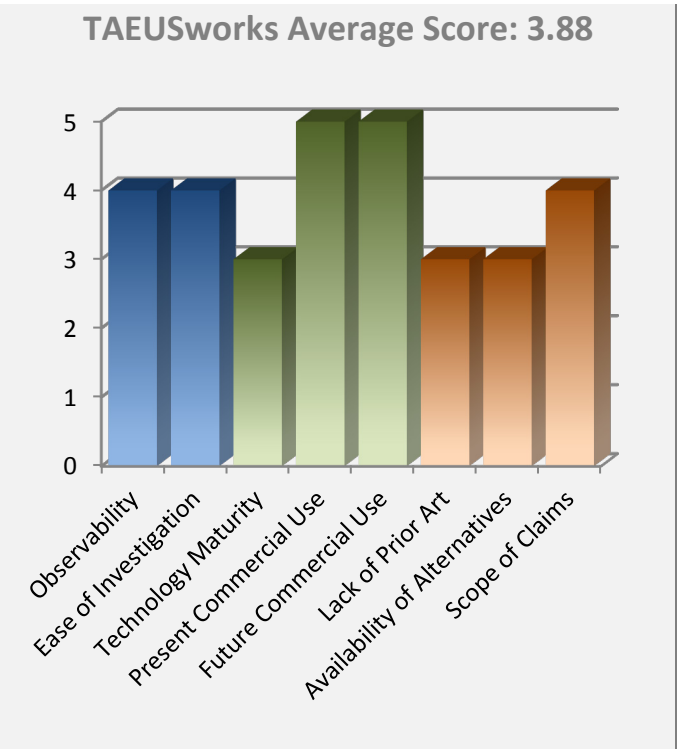

USPN 5,619,525

TAEUSworks Patent Analysis Report

January 11, 2013

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Contents

1. TAEUSworks Patent Evaluation

To predict the patent's potential licensing strength from a technical perspective, TAEUS reviewed and evaluated USPN 5,619,525 following the consistent set of TAEUSworks rules. TAEUSworks provides information on a set of qualitative parameters critical to patent licensing and litigation. The evaluation factors include:

1. Observability
2. Ease of Investigation
3. Lack of Prior Art
4. Availability of Alternatives
5. Technology Life Cycle
6. Present Commercial Use
7. Future Commercial Use
8. Scope of Claims

This assessment yields an overall 1-5 score. TAEUSworks scores are recognized in the intellectual property industry as indicators of a patent's licensing strength. Patents rating above a 3.0 indicate a strong licensing potential. The TAEUSworks Potential Licensee list also indicates strong future licensing potential for this group of patents (note: Exhibit A contains a copy of the TAEUSworks rating criteria).

1.1. USPN 5,619,525

US005619525A

United States Patent [19]
Wiedeman et al.

[11] **Patent Number: 5,619,525**
[45] **Date of Patent: Apr. 8, 1997**

[54] **CLOSED LOOP POWER CONTROL FOR LOW EARTH ORBIT SATELLITE COMMUNICATIONS SYSTEM**

[75] Inventors: **Robert A. Wiedeman**, Los Altos; **Michael J. Sites**, Fremont, both of Calif.

[73] Assignee: **Globalstar L.P.**, San Jose, Calif.

[21] Appl. No.: **467,209**

[22] Filed: **Jun. 6, 1995**

[51] **Int. Cl.**[5] **H04B 15/00**; H04L 27/30; H04K 1/00

[52] **U.S. Cl.** **375/200**; 375/211; 375/221; 455/13.4; 455/52.1; 455/69; 370/316

[58] **Field of Search** 375/200, 201, 375/205, 211, 212, 221, 358; 455/10, 13.4, 52.1, 69; 370/104.1

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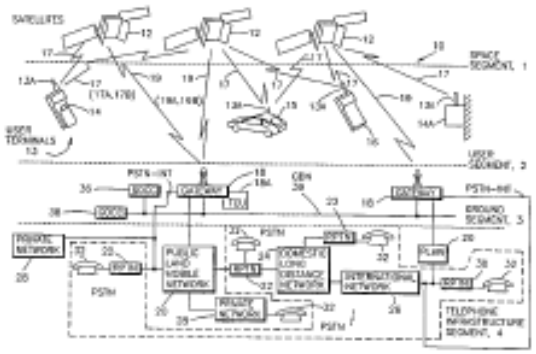
(List continued on next page.)

Primary Examiner—Stephen Chin
Assistant Examiner—Don Vo
Attorney, Agent, or Firm—Perman & Green

[57] **ABSTRACT**

A satellite communication system (**10**) includes at least one satellite communication signal repeater (**12**); at least one ground station (**18**) for transmitting a feeder link comprised of a plurality of communication signals to the at least one satellite communication signal repeater; and a plurality of user terminals (**13**) each receiving one of the communication signals over a user link from the at least one satellite communication signal repeater. The satellite communication system further includes a closed loop power control system (**80**) having a plurality of inner loops (**84**), individual ones of which operate to compensate one of the user links for communication signal impairments occurring at least between the user terminal and the at least one satellite communication repeater, and an outer loop (**82**) which operates to compensate all of the user links for feeder link impairments occurring between the at least one ground station and the at least one satellite communication signal repeater.

29 Claims, 8 Drawing Sheets



1.2. Patent Information

Title	**Closed loop power control for low earth orbit satellite communications system**				**References**	**USPTO**	**Google**
Granted	2/28/2006	**Filed**	7/13/2001	**Priority Date**	7/21/2000	**Appl. No.**	10/632615
Abstract	A satellite communication system (10) includes at least one satellite communication signal repeater (12); at least one ground station (18) for transmitting a feeder link comprised of a plurality of communication signals to the at least one satellite communication signal repeater; and a plurality of user terminals (13) each receiving one of the communication signals over a user link from the at least one satellite communication signal repeater. The satellite communication system further includes a closed loop power control system (80) having a plurality of inner loops (84), individual ones of which operate to compensate one of the user links for communication signal impairments occurring at least between the user terminal and the at least one satellite communication repeater, and an outer loop (82) which operates to compensate all of the user links for feeder link impairments occurring between the at least one ground station and the at least one satellite communication signal repeater.						
Inventor(s)	Schoeneberger, Carl|broughton, Justin|dimitroff, Michael P|mcpartlan, Kevin|hymes, Charles|pisupati, Chandra			**Original Assignee**	Hughes Network Systems, Llc		
Current US Class	375/200, 201, 375/205, 211, 212, 358; 455/10, 13.4, 52.1, 69; 370/104.1			**Current Int'l Class**	HO4B 15/00, H04L 27/30; HO4K 1/00		
Pendency	Issued	**Claim Types**	Method	**Significant Claims**	Claim 1		
Keywords	Satellite Communication, Backbone Connection, Backbone Connection Apparatus			**Key Figures**	Fig. 1		
Forward Citations	171	**Reverse Citations**	28	**Litigation**	No		
Asserted Claim	A method for operating a satellite communication system having at least one satellite and at least one ground station, the satellite communication system further having a plurality of ground receivers, comprising the steps of: transmitting a plurality of uplink signals from the ground station, at least one of the uplink signals being designated as an uplink reference signal, said plurality of uplink signals being transmitted with a first frequency from the ground station to the satellite and experiencing a first amount of attenuation between the ground station and the satellite; receiving the plurality of uplink signals with the satellite and repeating the plurality of uplink signals with a second frequency as a plurality of downlink signals that are transmitted from the satellite to the plurality of ground receivers, the second frequency being less than the first frequency such that the plurality of downlink signals experience a second amount of attenuation between the satellite and						

Title	Closed loop power control for low earth orbit satellite communications system	References	USPTO	Google
	the plurality of ground receivers, the second amount of attenuation being less than the first amount of attenuation, the plurality of downlink signals being transmitted with a power that is a function of the power of the received plurality of uplink signals; receiving at least the reference signal from the plurality of downlink signals with at least one of the ground receivers, the received reference signal being designated as a received downlink reference signal, and determining from the received downlink reference signal the first amount of attenuation that was experienced at least by the uplink reference signal between the ground station and the satellite; and adjusting a transmitted power of the plurality of uplink signals from the ground station in accordance with the determined amount of attenuation so as to substantially compensate for the first amount of attenuation.			

1.3. TAEUSworks Evaluation

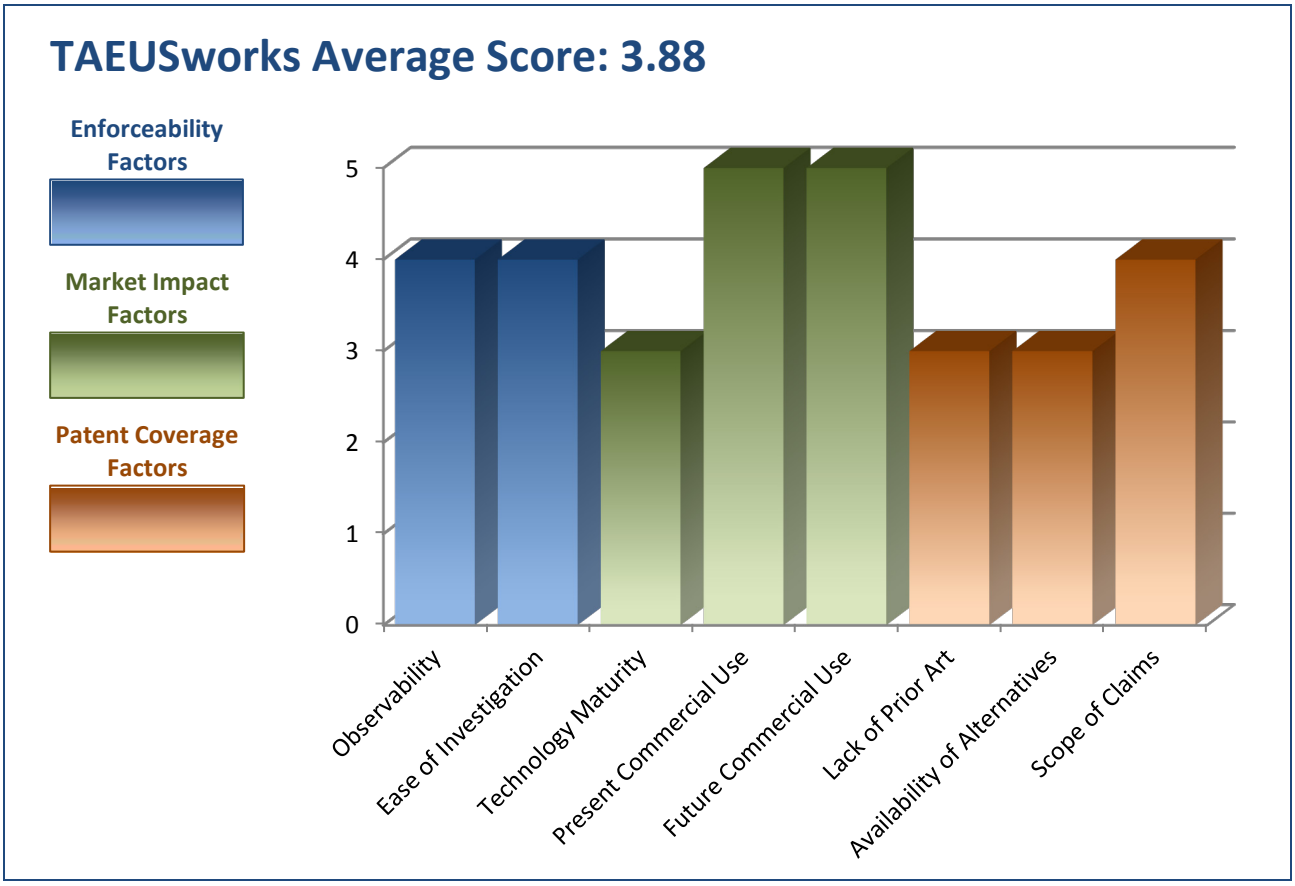


Figure 1. USPN 5,619,525 Evaluation Summary

1.3.1. Factors Relating to Patent Enforceability

Factor	Score	Comments
Observability	4	Reverse engineering will yield positive evidence/conclusion.
Ease of Investigation	4	This technology will be fairly easy to investigate with standard reverse engineering as long as access to the satellite communication signals is available.

1.3.2. Factors Relating to Market Impact

Factor	Score	Comments
Technology Maturity	3	Closed loop power control in satellites communication systems is a mature technology.
Present Commercial Use	5	Adjusting power in real time is essential for satellite communication systems to compensate for atmospheric conditions.
Future Commercial Use	5	Satellite communication systems are pervasive and will continue to be so.

1.3.3. Factors Relating to the Patent Coverage

Factor	Score	Comments
Lack of Prior Art	3	There are many papers published prior to submittal of the patent. Also, other satellite communication systems preceded GlobalStar.
Availability of Alternatives	3	This is a fairly fundamental patent. There may be alternative technologies; however this is how power control works.
Scope of Claims	4	The patent has broad claims specific to satellite communication. The claims are good but tend to narrow towards the end.

1.3.4. Summary and Comments

This patent is strong as it is fundamental to closed loop power control in satellite communications. Closed loop power control is key to quality communications as it provides optimized power for voice and data thereby reducing overall cost of the system (i.e., cost per bit). This keeps the broadcast power attuned to prevailing atmospheric conditions – a fundamental aspect of improved satellite communications.

The following Viasat products are potential users of this technology:

- Surfbeam 2
- Linkstar

1.3.5. Class Activity Report

This graph shows where the target patent fits in relation to other patents in the same class. As can be seen, the target patent was issued much later than many others in the same class. The larger the number of patents issued before the target patent in the same class increases the potential for finding prior art.

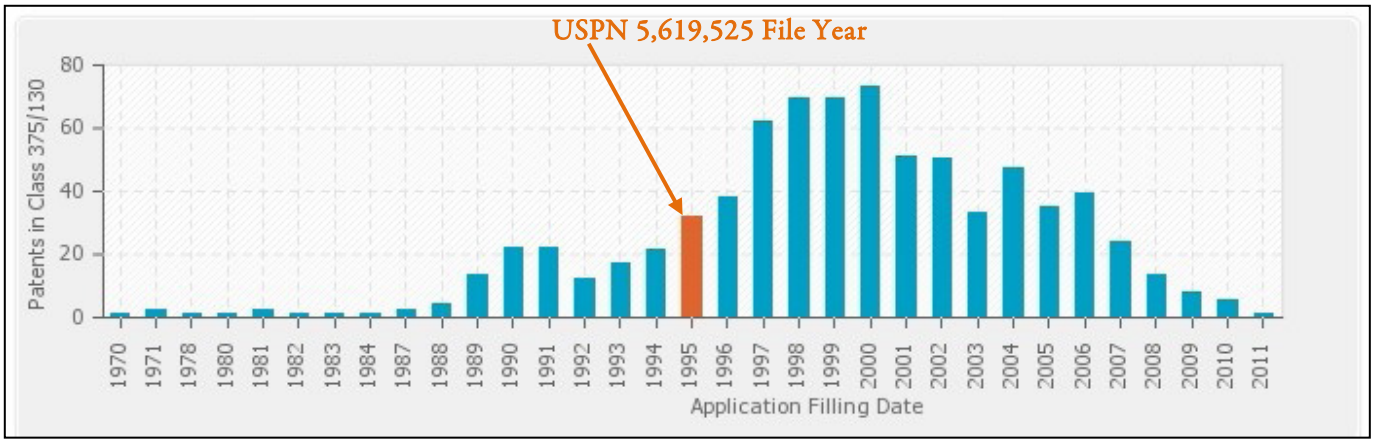
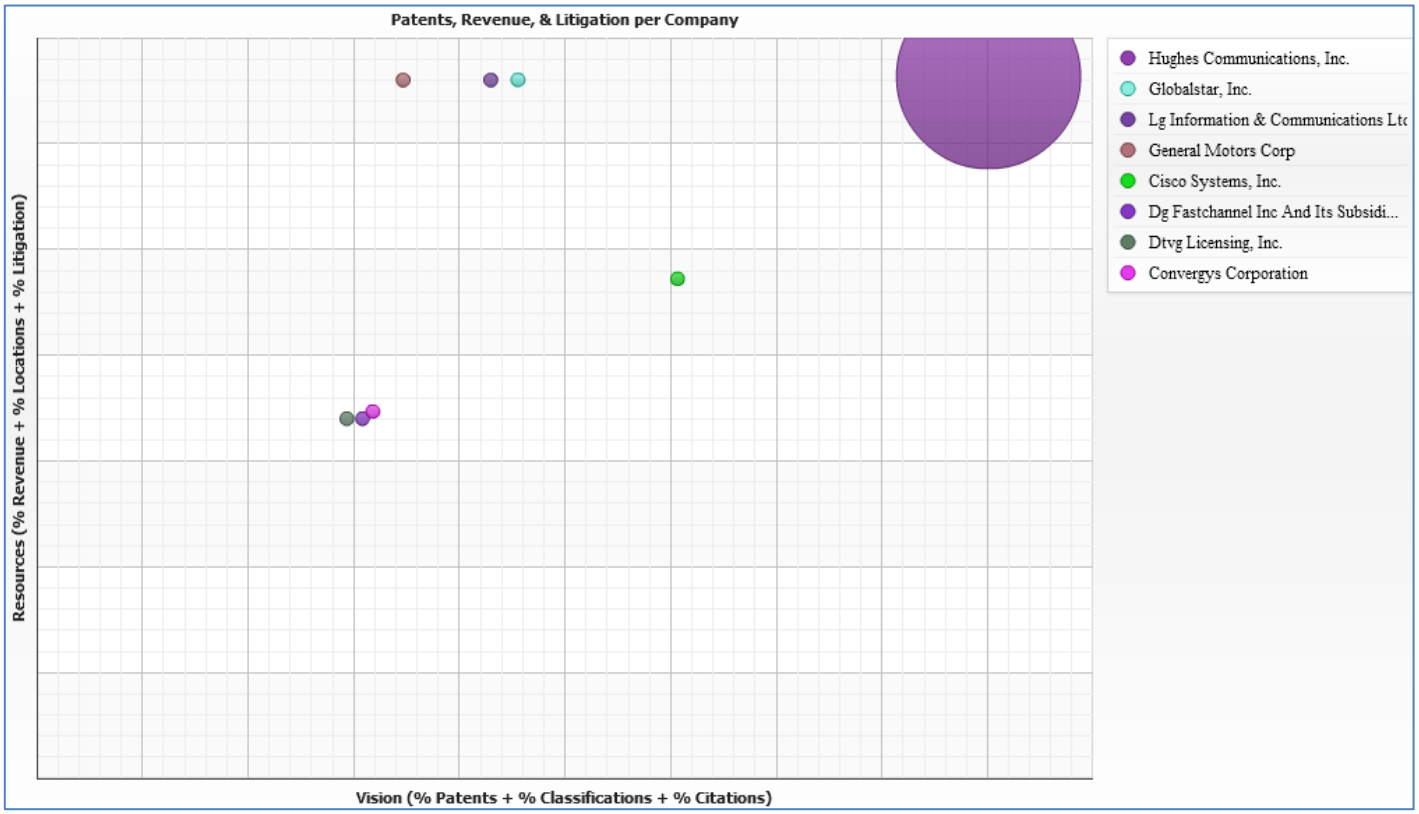


Figure 2. US Patents by Class 375/130

1.3.6. Companies with Patents in Similar IP Classifications



2. Exhibit A: TAEUSworks Evaluation Criteria

2.1. Observability

Observability is the degree to which evidence of the patented technology will exist in the target product. While Observability and Ease of Investigation are often related, they are not the same. Technology that is highly observable on a product may still be quite difficult to investigate, such as requiring the fabrication of custom hardware, or the extraction and analysis of an extensive amount of circuitry from an integrated circuit. Claim limitations that are not present on the final product are not observable. Processes that are internal to a company and require access to proprietary production documents to prove are typically not observable in a product and are therefore very difficult to investigate. A low observability rating may also reflect the inherent difficulty in obtaining product/samples for investigation. The rating is based on the patent review and the reviewer's expertise and background in the art.

Rating	Description	
5	Plainly advertised or incorporated into an industry standard	The claim elements can be matched with an industry standard or part thereof. Alternatively, the manufacturer openly advertises features of the product that are infringing the patent claims.
4	Positive answer can be obtained via reverse engineering.	After obtaining a sample or applying black box testing, the results will demonstrate the use of the claim elements.
3	Negative answer can be concluded via reverse engineering or black box testing.	It is often possible to exclude infringement by black box testing. If an observed behavior cannot be the result of patented technology, the use of the technology can be excluded.
2	Reverse engineering will yield inferential evidence at best.	Reverse engineering can raise some suspicions that a given product infringes on a patent but results may be ambiguous. For example, when a specific behavior or effect is the outcome of the use of the technology, and a similar effect can be caused by alternative methods, it may be possible to infer, but not prove, that the patented technology is use by the target product.
1	Cannot be observed directly even after reverse engineering.	There is no way of proving or inferring from anything that is obtainable in the public domain that the patented technology is being used. An example could be a process patent that specifies conditions in the industry environment that cannot be demonstrated or inferred by investigating the finished product.

2.2. Ease of Investigation

The Ease of Investigation rating deals with the type, difficulty and expense of work required to determine if a product is using the patented technology. While Ease of Investigation and Observability are often related, they are not the same. Technology that is highly observable on a product may still be quite difficult to investigate. A low rating in Ease of Investigation will typically translate to a relatively high cost for obtaining positive evidence of possible infringement, but in certain cases this may not be true. In particular, it is sometimes much easier to obtain negative results (show that the technology is not being used) than to obtain positive results (prove that it is being used). In these cases, the cost of proving use can often be disseminated across a fairly large number of targets, so that on a per-target basis the overall cost remains relatively low. TAEUS specializes in finding the most cost effective method for investigation of specific targets, so that even a patent that would be difficult to investigate in general can often be investigated effectively through "black box" testing.

Rating	Description	
5	Technical literature review will be likely to yield a conclusion	The information is advertised or provided in data sheets, user's manuals or service manuals by the manufacturer, or the patented technology is clearly visible without requiring reverse engineering efforts.
4	Relatively simple reverse engineering, testing, or review of technical literature and/or standards provides inferential evidence	Reverse engineering is required, but only in its simplest form. For example, a warning LED to indicate the improper insertion of expansion cards may not be visible on the outside of the equipment.
3	Standard reverse engineering or black box testing techniques required	It is possible to show the use of the claimed technology using standard reverse engineering techniques. "Standard" reverse engineering in this case could comprise functional analysis of signaling pathways via logic analyzer or oscilloscope, or a detailed mechanical analysis of a given design that requires substantial teardown of the product to be investigated.
2	Complex reverse engineering required (e.g. circuit extraction, custom test equipment, or very sophisticated analysis techniques)	Reverse engineering is still possible, but it will require nonstandard equipment or techniques that may have to be developed in order to demonstrate technical similarity. In most cases, the process is time-consuming and encompasses extensive forensic analysis of multiple aspects of the product to provide proof or inferential evidence that the technology is used.
1	Extremely complex or can only be analyzed with access to target's proprietary data	Even though a violation of a patent may be highly observable, the difficulty of investigation makes the project almost unfeasible unless the target market is extremely large to justify high investigation costs.

2.3. Technology Maturity

This factor indicates where the patented technology lies in the overall life cycle of products that are likely to use the invention. This factor can be used to target specific companies for licensing based upon your licensing strategy and knowledge of the target's product strategy. For example, early implementers are more likely to use embryonic technology, while fast followers are more likely to use growth or mature technology. Low-cost manufacturers are more likely to be using mature or aging technology. This factor reflects the changes in a patent's inherent technical value as related technology evolves. This rating often relates to patent strategy in general – a patent on technology in its early stages of development is often a strong candidate for follow-on patents in the same general area, and is more likely to be a better candidate for synergistic (carrot) licensing, while mature and aging technology is usually a better candidate for assertive (stick) licensing. This is particularly true if the patent is relatively old (i.e. will expire soon) and the rest of the world is just starting to "catch up" to the technology it discloses. The rating is based on the actual patent review and the reviewer's expertise and background in the art.

Rating	Description	
5	The technology is embryonic	The technology is unlikely to be incorporated into current applications, but future use is possible. This situation could be found in cutting edge technology development areas.
4	The technology is in the growth stage	Incorporation is possible in current and future products. Examples could be fuel cell technology, nanotechnology, biomechanical devices, and/or genotyped drug delivery systems that are just emerging.
3	The technology is mature - possible use in current applications, and may be used in the near future	Examples could be telecommunication systems, personal and handheld computers, etc.
2	The technology is aging	The technology is phasing out. It is possibly in current use, but is unlikely to be used in new products. For example, vacuum tubes in electronic devices are still available, but in low production numbers and mostly in niche products.
1	The technology is obsolete	The technology is highly unlikely to be used in current products. This would typically pertain to technology having a life cycle much shorter that the term of the patent. An example of obsolete technology is the use of punch cards instead of electronic data storage.

2.4. Present Commercial Use

The Present Commercial Use factor shows the reviewer's best estimate of the industry's actual current use of the technology. This rating is related to Alternatives, but the two are not synonymous. Technology with a large number of alternatives may still be used extremely widely if it provides enough advantage over those alternatives. Likewise, technology may have few alternatives, but address a relatively small market, or the cost to implement the technology in a product is prohibitive.

Rating	Description	
5	Pervasive Use	The technology is implemented in an industry standard for a broad range of products, or is otherwise widely deployed in products. Examples would include patents that pertain to the digital encoding or decoding of audio and video, cellular and wireless telecommunications and networking.
4	Fairly Common	The technology is commonly used in a variety of products, but is not necessarily fundamental to a given area of technology.
3	Very Specialized	Use of the technology is known, but distribution of products using it is confined to niche markets.
2	Possible	It is not known whether the patented technology is used in the current market place but there is a reasonable possibility that an extensive search will identify users of the technology.
1	Not Likely	The patented technology is either difficult to implement or has a wide variety of better alternatives. Although there is a chance that the patented technology may be used, more elegant and effective solutions dominate the market.

2.5. Future Commercial Use

The Future Commercial Use factor shows the reviewer's best estimate of the industry's potential future use of the technology. This reflects many of the same factors as the current use of the technology, and adds consideration of such factors as likely growth of this particular market as well as the rate at which alternative technologies are likely to be developed.

Rating	Description	
5	Pervasive Use	The technology will be an essential factor for future mainstream products because of its obvious advantages over earlier technologies that are phasing out. An example is LEDs used for automobile taillights.
4	Fairly Common	The technology offers enough advantages to become a major factor in a variety of areas. One example would be the RFID tag technology used for inventory monitoring. Bar coding and other inventory control methods will continue to exist, but the technology will gain a substantial market share.
3	Likely to be Specialized	The technology will be used, but the distribution will not become widespread during the lifespan of the patent. One example is the positional monitoring of the virtual reality P5 Glove. While this technology is slowly catching on in the computer gaming world, it is not expected to reach wide distribution in the near future.
2	Possible	The patent describes a technology that may be advantageous but may require major redesign of mainstream products or acceptance of what are considered today non-standard methods by consumers. There is still a good possibility that the patented technology will be used in niche products Whether or not the technology becomes more widely used depends on many economic and demographic trends that are too complex to be considered in this evaluation.
1	Not Likely	Because of inherent limitations in the patented technology, it is very unlikely that others will use the patented approach.

2.6. Lack of Prior Art

This factor gives the reviewer's best estimate of the likelihood of prior art based on the patent review and the reviewer's expertise and background in the art. This rating is not the result of a formal prior art search.

Rating	Description	
5	Very unlikely to have prior art	The invention is novel and unique and the priority date of the patent is early enough to precede any publication on the subject matter. This situation primarily occurs in cases where the priority date of the patent is old, the patented invention is a breakthrough technology that was never envisioned by others, and the patent pushes the technology to a higher level.
4	Unlikely to have prior art	The patent is novel and unique and appears not to be jeopardized by prior art. This usually occurs when the patent improves upon a technical system by replacing the original technology. There is still a possibility to find equivalent technology in technical publications even if the nomenclature at the time of publication was different.
3	Possible prior art	The patent is unique, but the claims are broad enough with a relatively late priority date. This makes the patent potentially vulnerable to prior art, in that somebody else might have invented the same or an equivalent technology. There may also be public knowledge of the invention based on sales anywhere in the world.
2	Strong possibility of prior art	The patented technology is main stream and the claims are overly broad. There is a very high likelihood that any extensive search will turn up equivalent technology preceding the priority date of the patent.
1	Known prior art	The reviewer is aware of potentially invalidating prior art without having to do further research. In this case, the invention is usually a simple improvement of a technical system; the patent is riding on the current technology trend and does not offer truly novel technology. Often, sales of equivalent technology precede the priority date, or the invention would be obvious to anybody based on standard publications.

2.7. Availability of Alternatives

This factor indicates the ability of the possible infringer to use alternative technologies to achieve the desired objective. The rating is based on the patent review and the reviewer's expertise and background in the art. This is also called the "design around" factor, that is, how difficult it would be to "design around" the patented technology to avoid infringement.

Rating	Description	
5	Alternatives are impossible	The invention covers the only possible technical solution to a problem. An example would be the transistor or other fundamental invention.
4	Alternatives are unknown	The patent covers the generally accepted solution for a technical problem. Significant R&D efforts would likely be required to provide an alternative. No other possibilities are known but there may be methods to work around the invention.
3	Possible, but very difficult to implement.	Alternatives would require substantial R&D costs, retooling costs, increased product cost, or significant compromises on product performance. For example, a heart computer tomography can be triggered by an acousto-mechanical signal that is derived from the heartbeat and monitored in the thoracic area. A work-around could use the pulse signals in the fingers, but because of the propagation delays and greater variance compared to the actual heart movements, this technology requires compensatory mechanisms and may still not be as accurate, or may be more costly to manufacture, and therefore do not provide the same level of competitive advantage to the product.
2	Possible, but moderately difficult to implement.	In this case, it may or may not be cost effective to attempt to design around the patented technology. In the case of heart computer tomography, the patent might cover the mechanical movements of the thoracic region to trigger the x-ray. A moderately difficult to implement approach could be an EKG as trigger, which is more expensive and technologically more sophisticated, but which also may yield better results. Some product redesign may be required, but this may be more cost effective than licensing the patent.
1	Alternatives are readily available.	Very little cost or effort is associated with implementing a non-infringing alternative. This occurs if the patent claims are very narrow, or if the patent is a minor improvement that offers little advantage in the marketplace. For example, a patent claiming structure having a substrate glued to its back would, from a technical perspective, be weak; it is irrelevant whether the substrate is glued to the back or to the front of the structure.

2.8. Scope of Claims

The Strength of Claims licensability factor is based on the language, scope, and technical merits of the claims. While the other rating factors relate primarily to the technology covered by the patent, this factor relates to the degree to which the patent claims actually provide coverage of that technology. For example, some patents are narrowed substantially during prosecution so the body of the patent discloses a number of possible implementations, but only a small number of these are actually covered by the claims. In this case, the patent itself may provide information on how to use fundamentally similar technology without infringing any claims. Evaluation of this factor takes into account the types of claims in the patent to assess the breadth of scope of the claims, and assess the technical strength of the claims from the perspective of a person of ordinary skill in the art.

Rating	Description	
5	Claims are extremely broad and fundamental to the technology	The patent claims describe what may be called the principle of operation for the new invention without going into detailed descriptions that would pose limitation on the applicability and assertion of the claims. It is likely that the patented technology will apply across a broad range of products.
4	Good claims. Broad applicability	The claim language centers on the patented technology or device but the claims are broad enough to not limit the assertability to the specific technology area or product. The claims may have limitations that narrow the breadth and scope of coverage.
3	Good claims, but may have restrictions or references that limit the scope of applicability	The claim language focuses on the invention, but the novelty aspect of the invention is the solution to a detailed problem. In this case, the claim language may be strong, but the applicability may be restricted to a specific area of technology.
2	Relatively specific/narrow claims	The claim language is complex and contains many limitations that narrow down the focus to very specific aspects of the technology.
1	Very complex, narrow, unclear, and/or specific.	Very difficult to enforce. This category encompasses a number of different possibilities characterized by overly long claims with too many and very specific elements, and/or claims that are very convoluted and ambiguous. A hypothetical example would be a wine with exact 12.5 % Vol. Ethanol content during its shelf life. Because of the continuous fermentation in the bottle, the alcohol levels will change over time and therefore the narrowness of the limitation would make a patent unenforceable.