United States District Court,
E.D. Texas, Marshall Division.

QUANTUM WORLD CORPORATION,
v.
ATMEL CORPORATION, and IBM.

No. 2:07-CV-24-CE

Jan. 30, 2009.

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MEMORANDUM OPINION AND ORDER

CHARLES EVERINGHAM, United States Magistrate Judge.

I. Introduction

In this case, The Quantum World Corporation ("Quantum") contends that the defendants, Atmel Corporation, Lenovo (United States) Inc., Winbond Electronics Corporation, Winbond Electronics Corporation America, National Semiconductor Corporation, and IBM Corporation (collectively, "defendants") infringe various claims of United States Patents 6,763,364 ("the '364 patent") and 7,096,242 ("the '242 patent"). This opinion resolves the parties' various claim construction disputes. The court will address briefly the technology at issue in the case and then turn to the merits of the claim construction issues.

II. Background of the Technology

The two patents asserted in this case relate to similar subject matter and relate back to an original application, No. 08/388,631 ("the '631 application"), filed in 1995. The '364 patent is a divisional patent of the '631 application and was issued July 13, 2000. The '242 patent is a divisional patent of the '364 patent and was issued August 22, 2006. FN1 Both patents are titled "Random Number Generator and Generation Method" and share the same written disclosure. These patents are directed to a random number generator ("RNG") that generates true binary random sequences. ' 242 Patent, col. 1, ll. 15-17.

FN1. U.S. Patent No. 6,763,364 (filed Oct. 30, 2000); U.S. Patent No. 7,096,242 (filed June 17, 2002).

RNGs are generally divided into two types: true RNGs, which generate numbers from a nondeterministic source, and pseudo-RNGs, which generate numbers from a deterministic source. Id. at col. 1, ll. 24-28. In some circumstances, an algorithm would be an example of a deterministic source. Numbers generated from a deterministic source are not *truly* random because the numbers are predictable given knowledge of the deterministic source, e.g., the algorithm. Id. at col. 2, ll. 20-24. To generate numbers that are truly random, it is necessary to begin with a nondeterministic source. Examples of nondeterministic sources include white noise generated by a resistor, diode, or other electronic device; the time decay between radioactive particle decay; the locations of detected photo-events; or other signal sources that are essentially random because they are based on quantum mechanics or other statistically random process. Id. at col. 2, ll. 27-33. Because most computers today are digital, RNGs that interface with computers generally generate a binary random sequence of ones and zeros, or bits. Id. at col. 2, ll. 1-4. These essentially random numbers generated from a nondeterministic source, however, exhibit some defects because they are generated with macroscopic, real-world devices. Id. at col. 2, ll. 42-47. Two examples of defects in randomness include bias and serial dependence.

In a RNG, the desired generated sequence would contain equal instances of ones and zeros; i.e., the probability (p) of generating a one would be equal to the probability of generating a zero (50% or p(1/0) = 0.5). Bias, or one/zero imbalance, is the tendency of the sequence to contain more ones than zeros, or vice versa; i.e., the probability of generating either a one or a zero is greater than 50% (or p(1/0) > 0.5). *See* '242 Patent, col. 26, ll. 21-25. Additionally, in a RNG, the generation of a one or a zero in a sequence would not influence a particular output in a subsequent position of the sequence. Serial dependence, or correlation, is described in the patent as being a function of time, SD(t), and describes this type of defect. Id. at col. 4, l. 17, col. 26, ll. 2-5. As such, bits generated over time are correlated if the value of later bits are influenced by earlier bits; i.e., if generating a certain bit makes it more or less likely that the RNG will generate a certain bit at a subsequent position, then those two bits are correlated. In an ideal situation, if no bits are correlated, then the serial dependence would be zero for all time, or SD(t) = 0 for all t.

Computers use random number sequences in numerous fields and applications. Examples of such uses include data encryption (e.g., banking industry, trade secrets), random sampling (e.g., polling, market research, medical studies), and games of chance (e.g., lotteries and slot machines). The more preferable random number sequences are the ones that are nondeterministic. Before the present invention, there was no method or device that was both inexpensive and easily adaptable to personal computer use. The present invention sought to solve this problem by providing a device and method for generating truly random numbers quickly and inexpensively, and then interfacing such numbers to a personal computer. Id. at col. 2, l. 61-col. 3, l. 14. Additionally, the present invention sought to limit those randomness deficiencies (e.g., bias and serial dependence) inherent in nondeterministic RNGs. One of these methods is to apply an algorithm based on an "EXCLUSIVE OR" function. Id. at col. 3, ll. 29-31.

In the preferred embodiment, the RNG is composed of an electronic module, a parallel port connecting cable, and a computer. Id. at col. 8, l. 65-col. 9, l. 2; col. 19, ll. 19-29; col. 20, ll. 3-5. The electronic module is further comprised of a circuit and a housing unit. Id. at col. 9, ll. 7-9. The circuit contains a thermal noise generating resistor that is "ultimately the source of the essentially random pulses that produce the random numbers" and certain other components that help to limit randomness defects. Id. at col. 11 ll. 5-9. In a

general sense, the resistor generates white noise that is amplified and sampled to produce a binary sequence. The binary sequence is then sent to the personal computer via a cable.

Claim 1 of the '364 patent is illustrative of the '364 patent as a whole:

A method of producing and utilizing a series of true random numbers, said method composing:

using a hardware device to produce an analog noise signal;

converting said analog noise signal to a binary true random sequence of signals;

interfacing said binary true random sequence of signals to a general purpose personal computer utilizing said interfaced binary true random sequence of signals in said computer.

Claim 1 of the '242 patent is illustrative of the '242 patent as a whole:

A method of producing and utilizing a true random number, said method comprising:

providing an analog random signal;

providing a clock signal;

using said analog random signal and said clock signal to produce a binary true random sequence of signals;

interfacing said binary true random sequence of signals to a general-purpose computer; and

utilizing said binary true random sequence of signals in said general-purpose computer.

Of the various claims of the '364 and '242 patents which Quantum asserts, the parties dispute approximately twenty-six terms and phrases. To simplify matters, Quantum divided the terms into eight major groups. The Court will adopt Quantum's organization as a means to concisely address the claims construction disputes.

III. Discussion

A. General Principles Governing Claim Construction

"A claim in a patent provides the metes and bounds of the right which the patent confers on the patentee to exclude others from making, using or selling the protected invention." Burke, Inc. v. Bruno Indep. Living Aids, Inc., 183 F.3d 1334, 1340 (Fed.Cir.1999). Claim construction is an issue of law for the court to decide. Markman v. Westview Instruments, Inc., 52 F.3d 967, 970-71 (Fed.Cir.1995) (en banc), *aff'd,* 517 U.S. 370, 116 S.Ct. 1384, 134 L.Ed.2d 577 (1996).

To ascertain the meaning of claims, the court looks to three primary sources: the claims, the specification, and the prosecution history. Markman, 52 F.3d at 979. Under the patent law, the specification must contain a written description of the invention that enables one of ordinary skill in the art to make and use the invention. A patent's claims must be read in view of the specification of which they are a part. *Id.* For claim construction purposes, the description may act as a sort of dictionary, which explains the invention and may define terms used in the claims. *Id.* "One purpose for examining the specification is to determine if the

patentee has limited the scope of the claims." Watts v. XL Sys., Inc., 232 F.3d 877, 882 (Fed.Cir.2000).

Nonetheless, it is the function of the claims, not the specification, to set forth the limits of the patentee's claims. Otherwise, there would be no need for claims. SRI Int'l v. Matsushita Elec. Corp., 775 F.2d 1107, 1121 (Fed.Cir.1985) (en banc). The patentee is free to be his own lexicographer, but any special definition given to a word must be clearly set forth in the specification. Intellicall, Inc. v. Phonometrics, 952 F.2d 1384, 1388 (Fed.Cir.1992). And, although the specification may indicate that certain embodiments are preferred, particular embodiments appearing in the specification will not be read into the claims when the claim language is broader than the embodiments. Electro Med. Sys., S.A. v. Cooper Life Scis., Inc., 34 F.3d 1048, 1054 (Fed.Cir.1994).

This court's claim construction decision must be informed by the Federal Circuit's decision in Phillips v. AWH Corp., 415 F.3d 1303 (Fed.Cir.2005) (en banc). In *Phillips,* the court set forth several guideposts that courts should follow when construing claims. In particular, the court reiterated that "the *claims* of a patent define the invention to which the patentee is entitled the right to exclude." *Id*. at 1312 (emphasis added) (quoting Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc., 381 F.3d 1111, 1115 (Fed.Cir.2004)). To that end, the words used in a claim are generally given their ordinary and customary meaning. *Id*. The ordinary and customary meaning of a claim term "is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application." Id. at 1313. This principle of patent law flows naturally from the recognition that inventors are usually persons who are skilled in the field of the invention. The patent is addressed to and intended to be read by others skilled in the particular art. *Id*.

The primacy of claim terms notwithstanding, *Phillips* made clear that "the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification." *Id*. Although the claims themselves may provide guidance as to the meaning of particular terms, those terms are part of "a fully integrated written instrument." *Id*. at 1315 (quoting Markman, 52 F.3d at 978). Thus, the *Phillips* court emphasized the specification as being the primary basis for construing the claims. *Id*. at 1314-17. As the Supreme Court stated long ago, "in case of doubt or ambiguity it is proper in all cases to refer back to the descriptive portions of the specification to aid in solving the doubt or in ascertaining the true intent and meaning of the language employed in the claims." Bates v. Coe, 98 U.S. 31, 38, 25 L.Ed. 68 (1878). In addressing the role of the specification, the *Phillips* court quoted with approval its earlier observations from Renishaw PLC v. Marposs Societa' per Azioni, 158 F.3d 1243, 1250 (Fed.Cir.1998):

Ultimately, the interpretation to be given a term can only be determined and confirmed with a full understanding of what the inventors actually invented and intended to envelop with the claim. The construction that stays true to the claim language and most naturally aligns with the patent's description of the invention will be, in the end, the correct construction.

Consequently, Phillips emphasized the important role the specification plays in the claim construction process.

The prosecution history also continues to play an important role in claim interpretation. The prosecution history helps to demonstrate how the inventor and the PTO understood the patent. Phillips, 415 F.3d at 1317. Because the file history, however, "represents an ongoing negotiation between the PTO and the applicant," it may lack the clarity of the specification and thus be less useful in claim construction

proceedings. *Id*. Nevertheless, the prosecution history is intrinsic evidence. That evidence is relevant to the determination of how the inventor understood the invention and whether the inventor limited the invention during prosecution by narrowing the scope of the claims.

Phillips rejected any claim construction approach that sacrificed the intrinsic record in favor of extrinsic evidence, such as dictionary definitions or expert testimony. The *en banc* court condemned the suggestion made by Tex. Digital Sys., Inc. v. Telegenix, Inc., 308 F.3d 1193 (Fed.Cir.2002), that a court should discern the ordinary meaning of the claim terms (through dictionaries or otherwise) before resorting to the specification for certain limited purposes. *Id*. at 1319-24. The approach suggested by *Tex. Digital*-the assignment of a limited role to the specification-was rejected as inconsistent with decisions holding the specification to be the best guide to the meaning of a disputed term. *Id*. at 1320-21. According to *Phillips,* reliance on dictionary definitions at the expense of the specification had the effect of "focus[ing] the inquiry on the abstract meaning of words rather than on the meaning of the claim terms within the context of the patent." *Id*. at 1321. *Phillips* emphasized that the patent system is based on the proposition that the claims cover only the invented subject matter. *Id*. What is described in the claims flows from the statutory requirement imposed on the patentee to describe and particularly claim what he or she has invented. *Id*. The definitions found in dictionaries, however, often flow from the editors' objective of assembling all of the possible definitions for a word. *Id*. at 1321-22.

Phillips does not preclude all uses of dictionaries in claim construction proceedings. Instead, the court assigned dictionaries a role subordinate to the intrinsic record. In doing so, the court emphasized that claim construction issues are not resolved by any magic formula. The court did not impose any particular sequence of steps for a court to follow when it considers disputed claim language. *Id*. at 1323-25. Rather, *Phillips* held that a court must attach the appropriate weight to the intrinsic sources offered in support of a proposed claim construction, bearing in mind the general rule that the claims measure the scope of the patent grant. The court now turns to a discussion of the disputed claim terms.

B. Specific Terms in Dispute

1. "computer" and Related Terms

Claim term, phrase or clause (first appearance)	**QWC's Proposed Construction**	**Defendants' Proposed Construction**
computer	No construction necessary; plain and ordinary meaning; alternatively:	a programmable machine that is operable to conduct a wide variety of tasks using a variety of applications programs that can be accessed and operated, and not a microprocessor or microcontroller that is operable to conduct only a specific task or a specific set of operations with substantially no ability to conduct other tasks or operations unless it is reprogrammed for another task
('242 patent, claim 22)	a device that consists of one or more associated processing units and peripheral	

	units, that is controlled by internally stored programs, and that can perform substantial computations, including numerous arithmetic operations, or logic operations, without human intervention during a run (note: may be stand alone or may consist of several interconnected units)	
general-purpose computer	No construction necessary; plain and ordinary meaning; alternatively:	a programmable machine that is operable to conduct a wide variety of tasks using a variety of applications programs that can be accessed and operated and not a microprocessor or microcontroller that is operable to conduct only a specific task or a specific set of operations with substantially no ability to conduct other tasks or operations unless it is reprogrammed for another task

('242 patent, claims 1, 5, 6, 7, 8, 12, 13, 14, 15, 16, 18, 19, 20, 21)	A **computer** that is operable to conduct a wide variety of tasks using a variety of applications programs that can be accessed and operated.	
personal computer	No separate construction necessary; plain and ordinary meaning; alternatively:	a programmable machine that is operable to conduct a wide variety of tasks using a variety of applications programs that can be accessed and operated and not a microprocessor or microcontroller that is operable to conduct only a specific task or a specific set of operations with substantially no ability to conduct other tasks or operations unless it is reprogrammed for another task;

('364 patent, claims 2, 3, 7, 8 and '242 patent claims 6, 13, 19)	A **computer** built around a microprocessor for use by an individual	a "personal computer" is a small, singleuser computer based on a microprocessor
general purpose personal computer	No separate construction necessary; plain and ordinary meaning; alternatively:	a programmable machine that is operable to conduct a wide variety of tasks using a variety of applications programs that can be accessed and operated and not a microprocessor or microcontroller that is operable to conduct only a specific task or a specific set of operations with substantially no ability to conduct other

		tasks or operations unless it is reprogrammed for another task;
('363 patent, claim 1)	A **personal computer** that is operable to conduct a wide variety of tasks using a variety of applications programs that can be accessed and operated.	a "personal computer" is a small, singleuser computer based on a microprocessor

The issues regarding these terms are (1) whether the court should include a limitation, as the defendants suggest, indicating that a computer cannot be a microprocessor or microcontroller, and (2) whether all four terms should have the same general construction.

Regarding the defendants' limitation, the defendants argue that the patentee expressly disclaimed embedded microprocessors and microcontrollers. In support, they cite portions of the prosecution history in which the patentee attempts to distinguish the present invention from U.S.

Patent No. 5,841,865 ("the Sudia patent"). *See* Ex. 16-17 of Defs.' Claim Construction Brief. The Sudia patent discusses RNGs that are interfaced to microcontrollers. *See* the Sudia Patent, col. 13, ll. 35-65. In response to the examiner's discussion of the Sudia patent, the patentee declared, "[a]n embedded microprocessor, or microcontroller, taught in Sudia '865, is designed for a specific task to control a particular system. The embedded microcontroller of Sudia '865 is supposed to conduct specifically programmed functions related to encryption and decryption and is not operable to conduct other functions." *See* Ex. 17 of Defs.' Claim Construction Brief.

Claim 1 of the '242 patent contemplates a RNG interfacing with a general-purpose computer. *See* '242 Patent, cl. 1. As indicated by the prosecution history, the present invention does not contemplate a scenario in which the RNG directly interfaces only with a microprocessor that performs only one function and is divorced from a general purpose computer. Indeed, both parties concede that a stand-alone microprocessor is not a computer. The operative fact of the disclaimer contained within the prosecution history is the scope of the capabilities of the microprocessor, not the fact that it is embedded, stand-alone, or otherwise. The disclaimer does not preclude an interface with a microprocessor capable of performing multiple tasks or one that is part of a general-purpose computer.

The court will not typically define a term in the negative, but in light of the parties' stipulation and the discussions contained within the prosecution history, the court will do so in this instance. *See* Hutchins v. Zoll Med. Corp., 492 F.3d 1377, 1381 (Fed.Cir.2007). Such construction falls squarely in line with the court's duty to define the scope of a term, as well as its meaning, when both are contested. *See* O2 Micro Int'l Ltd. v. Beyond Innovation Tech. Co., 521 F.3d 1351 (Fed.Cir.2008).

The second issue is whether all of the "computer" terms have the same meaning. Quantum relies on a claim differentiation argument, while the defendants, again, cite to portions of the prosecution history. *See* Ex. 17-19 of Defs.' Claim Construction Brief. The court concludes that "computer" and "general purpose computer" mean the same thing. In addition, "personal computer" and "general purpose personal computer" should be construed consistently.

Accordingly, the court defines "computer" and "general purpose computer" as follows: **"a programmable machine that is operable to conduct a wide variety of tasks using a variety of applications programs**

that can be accessed and operated. The term does not include a microprocessor or microcontroller that is operable to conduct only a single, specific task."

The court defines "personal computer" and "general purpose personal computer" as follows: **"a computer designed for use by one person at a time, such as a desktop PC or a laptop."**

2. "interface" Terms

Claim term, phrase or clause (first appearance)	**QWC's Proposed Construction**	**Defendants' Proposed Construction**
interfacing	conveying, using software or firmware	No construction proposed
('364 patent, claim 1, '242 patent, claims 1, 25)		
interface	software or firmware that conveys	No construction proposed
('364 patent, claim 3' '242 patent, claims 8, 16)		
interfacing said binary true random directly conveying the binary true sequence of signals to a general purpose personal computer	No separate construction necessary; plain and ordinary meaning	directly conveying the binary true random sequence of signals itself to the data bus of a general purpose personal computer for access by a user program
('364 patent, claim 1; '242 patent, claim 1, 5)		
interfacing said binary true random sequence of signals to a computer ('242 patent, claim 25)	No separate construction necessary; plain and ordinary meaning; alternatively	directly conveying the binary true random sequence of signals itself to the data bus of a general purpose computer for access by a user program
interface for applying said binary true random sequence of signals to said general-purpose computer	No separate construction necessary; plain and ordinary meaning; alternatively:	hardware and software to directly convey the binary true random sequence of signals itself to the data bus of a general purpose personal computer for access by a user program
('242 patent, claims 8, 16)	software or firmware that conveys said binary true random sequence of signals to said general-purpose computer	
true random number generator circuit interface ('364 patent, claim 3)	No separate construction necessary; plain and ordinary meaning; alternatively: software or firmware that conveys information from	hardware and software to directly convey the binary true random sequence of signals itself to the data bus of a general purpose personal computer for access by a user program

conveys information from
a true random number
generator circuit

All of the asserted claims contain limitations relating to "interfacing" the binary true random sequence of signals to a general purpose computer.

There are three central disputes regarding the construction of the above terms. First, the defendants argue that the "interfacing" phrases require "directly conveying ... itself to the data bus." The defendants argue that such limitation conveys to the fact finder the idea that the claims describe conveying the *same* true random sequence referred to earlier in the claim to the data bus, not a physical connection. Quantum argues that it improperly implies that any connection must be physically and directly to the data bus. Although the defendants state this is not intended by their construction, the court agrees with Quantum with respect to "directly." As argued by Quantum, the preferred embodiment does not include a direct connection to the computer's data bus. '364 Patent, col. 1, ll. 50-53; '242 Patent, col. 1, ll. 58-61. Nor does the term require that the same sequence be directly conveyed to the data bus. The imposition of the limitation, "directly" on every instance of interfacing would improperly limit the scope of the claim language.

Turning to the "data bus" limitation, the defendants cite to the specification and the prosecution history for support. As argued by the defendants, the heart of the present invention is providing a computer the ability to access and use binary true random sequences when applications or hardware require it. *See* '242 Patent, Background of the Invention. This is accomplished via the interface between the RNG and the computer. In order for the computer to utilize such sequences, they must be readily available, as on the "data bus." However, a "data bus" is not the only type of bus utilized by a computer to transfer data; for example, computers may also use various other types of buses. Thus, one of ordinary skill in the art in 2002 would understand that the sequence is conveyed to a bus in the computer for use by the computer. *See* '242 Patent, col. 20, ll. 1-3; col. 8, ll. 47-50; col. 24, ll. 57-58; *see also* Ex. 17 to Defs.' Claim Construction Brief at A-1 (stating, "[f]or example, every computer requires a bus that transmits data from one part of the computer to another").

The second disputed issue regards the defendants' imposition of "hardware and software" as a limitation to the phrases using interface as a noun. The claims and embodiments in the specification suggest that an interface may be software, firmware, or hardware. *See* '242 Patent, cl. 5 (stating, "an interface selected from the group consisting of a device driver, a portion of the operating system of said general-purpose computer, a portion of a Windows(TM) operating system, a program stored in the bios memory of said general-purpose computer, a program in firmware, and a TSR program."); col. 20, ll. 24-28; col. 20, l. 3 (describing a connection using a parallel port connecting cable); col. 24, ll. 23-33; col. 24, ll. 55-58 (describing a connection using "connector 510").

Finally, the parties dispute the inclusion of a use limitation. The court cannot find sufficient support in either the claims or the specification to warrant requiring a particular use for the true random binary sequences. Notwithstanding the lack of support, the term suggested, "user program," is undefined and ambiguous. While "user programs" may supply the majority of the demand for the sequences, there is no such support for requiring such limitation in the context of the intrinsic evidence.

The court defines "interfacing said binary true random sequence of signals to a general purpose personal computer" and "interfacing said binary true random sequence of signals to a computer" as follows: **"directly or indirectly conveying the binary true random sequence of signals to a bus in a general purpose**

computer."

The court defines "interface for applying said binary true random sequence of signals to said general-purpose computer" and "true random number generator circuit interface" as follows: **"software, firmware, and/or hardware to directly or indirectly convey the binary true random sequence of signals to a bus in a general purpose personal computer."**

3. "utilizing" Terms

Claim term, phrase or clause (first appearance)	**QWC's Proposed Construction**	**Defendants' Proposed Construction**
QWC: **utilizing said interfaced binary true random sequence of signals in**	No separate construction necessary; plain and ordinary meaning; alternatively: using the **binary true random sequence of signals** that were conveyed using software or firmware in	using the binary true random sequence of signals itself within a user program
Defendants: **utilizing said interfaced binary true random sequence of signals in said computer** ('364 patent, claim 1)		
utilizing said binary true random sequence of signals in said general-purpose computer ('242 patent, claim 1)	No separate construction necessary; plain and ordinary meaning; alternatively: using said binary true random sequence of signals in said generalpurpose computer	using the binary true random sequence of signals itself within a user program
utilizing said binary true random sequence of signals ('242 patent, claims 8, 16, 22)	no separate construction necessary; plain and ordinary meaning; alternatively: using said binary true random sequence of signals	[a computer for] using the binary true random sequence of signals itself within a user program
utilizing said binary true random sequence of signals in said computer ('242 patent, claim 25)	No separate construction necessary; alternatively: using said binary true random sequence of signals in said computer	using the binary true random sequence of signals itself within a user program

The arguments asserted for the inclusion of the "itself within a user program" limitation are the same as argued in conjunction with the "interfacing" limitations. For the reasons discussed above, the court will not limit the terms to the extent suggested by the defendants.

Accordingly, the court adopts Quantum's constructions with the addition that the interface may include hardware, as well as software and firmware.

4. "true random number(s)" Terms

Claim term, phrase or clause (first appearance)	QWC's Proposed Construction	Defendants' Proposed Construction
true random number(s)	number(s) from a nondeterministic source	number(s) generated from a nondeterministic source, not by a deterministic algorithm
('364 patent, claims 1, 3, 4, 7, 8 and in '242 patent, claim 1, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 25)		
true random number generator circuit	an interconnection of electrical elements that forms a random number generator that generates numbers from a nondeterministic source	a nonintegrated circuit that generates numbers from a nondeterministic source, not by a deterministic algorithm
('364 patent, claims 1, 7, 8)		
random number generator circuit	an interconnection of electrical elements that forms a random number generator that generates numbers from a nondeterministic source	a nonintegrated circuit that generates numbers from a nondeterministic source, not by a deterministic algorithm
('242 patent, claims 7, 14, 15, 20, 21)		
Note: The parties agree that "random number generator circuit" and "true random number generator circuit" should be given the same construction but disagree on what that construction is.		

Much like the computer terms, the key issue regarding these terms is whether the court should impose a negative limitation-fundamentally, the question is whether a true random number generated from a nondeterministic source that is acted upon by a deterministic algorithm becomes pseudorandom. For the reasons discussed below, the court concludes that the answer is no.

At the onset, the '242 patent states, "[r]andom number generators may be divided into two types: true random number generators, which *generate* numbers from a nondeterministic source, and pseudorandom number generators, which *generate* numbers from a deterministic algorithm." '242 Patent, col. 1, ll. 24-28 (emphasis added). The patent makes this distinction in the background of the patent. Within this section, the patentee discusses some of the characteristics and drawbacks of the prior art. The context of the above discussion does not definitively declare that the inclusion of or application of a deterministic algorithm transforms true random numbers into pseudorandom numbers. In fact, the entire section as a whole indicates

that the patentee is referring to the *generation* of a random number, not the modification of a random number. Indeed, the court agrees that random numbers generated (or created) by a deterministic algorithm would not be a true random number. Similarly, the court agrees that random numbers generated (or created) by a nondeterministic source (e.g., white noise, radioactive decay) would be a true random number. The portions of the specification that the defendants heavily rely on, when read together, discuss the generation of true random numbers. Additionally, the specification explains that numbers generated from a deterministic algorithm are totally predictable, given knowledge of the algorithm used. '242 Patent, col. 2, ll. 20-24. In this case, assuming the input of truly random numbers to the algorithm is unknown, knowledge of the algorithm would not transform the truly random numbers into pseudorandom numbers. As discussed above, the crux of the inventiveness of the present invention is the ability to convey true random numbers from a nondeterministic source to a general purpose computer. Whether or not the true random numbers are further "improved by digital processing" does not negate the numbers' already true random nature. '242 Patent, col. 2, ll. 15-65. Furthermore, the inclusion of the negative limitation would read out embodiments specifically claimed in the patent. '242 Patent, cls. 11 & 17.

The defendants also cite to various portions of the prosecution history for support. First, the defendants point to the patentee's response to a 35 U.S.C. s. 103(a) rejection. In his response, the patentee addresses the obviousness rejection in light of U.S. Patent No. 4,855,690 ("the Dias patent") and U.S. Patent No. 4,800,590 ("the Vaughn patent"). The defendants are taking the patentee's comments out of context. Absent a clear disavowal of scope during prosecution, the court is unwilling to limit the terms as such. In the prosecution history, the patentee is not disavowing claim scope, he is simply explaining how the Vaughn and Dias patents would not have motivated a person of ordinary skill in the art to combine the given prior. *See* Exs. 14-15 of Pl.'s Claim Construction Brief.

The defendants also cite to portions of the '558 patent prosecution history in support of its "nonintegrated circuit" limitation. The '558 patent is a predecessor to the two patents-in-suit. As indicated above, absent a clear disavowal, the court will not impose the "nonintegrated circuit" limitation.

As such, the court adopts Quantum's constructions.

5. "random sequence" Terms

Claim term, phrase or clause (first appearance)	**QWC's Proposed Construction**	**Defendants' Proposed Construction**
binary true random sequence of signals ('364 patent, claim 1; '242 patent, claims 1, 5, 8, 10, 16, 22, 25)	nondeterministic series of bits	a sequence of signals generated from a nondeterministic source, not by a deterministic algorithm, defined by SD(t)=0 for all t and p(1)=0.50 as N }>>>> (infinity), where N=the number of bits. In practical terms, N cannot be infinite, so a real BRS is instead defined in terms of probability confidence levels.
true random sequence of binary signals		

('242 patent, claim 3)

Note: The parties AGREE that "binary true random sequence of signals" and "true random sequence of binary signals" should be given the same construction but disagree on what that construction is.		
true random sequence of signals	nondeterministic series of signals	a sequence of signals generated from a nondeterministic source, not by a deterministic algorithm, defined by SD(t)=0 for all t and p(1)=0.50 as N } (infinity)>, where N=the number of bits. In practical terms, N cannot be infinite, so a real BRS is instead defined in terms of probability confidence levels.
('364 patent, claim 3)		
converting said analog noise signal to a binary true random sequence of signals ('364 patent, claim 1)	No separate construction necessary; plain and ordinary meaning; alternatively: changing the analog noise signal to a binary true random sequence of signals	creating a digital representation of the analog noise signal, the digital representation being a binary true random sequence of signals

The defendants again argue that the court should impose the negative limitation, "not by a deterministic algorithm" on the above terms. For the reasons discussed with regard to true random number terms, the court declines to impose such a limitation.

The defendants also argue that the above terms should be construed according to their statistical properties. The effects of such a limitation would require a theoretically perfect random number. As indicated in the patent specification, "[e]very real system used to generate random numbers has physical constraints which create imperfections which, without correction, produce an unacceptable level of defect in the BRS statistics." '242 Patent, col. 26, ll. 11-15. Furthermore, the claims cover "reducing randomness defects in said true random sequence of binary signals." '242 Patent, cl. 3. Reducing randomness defects only makes sense if there are imperfections to be reduced.

The portion of the specification cited to by the defendants describes "truly random numbers." As used in the specification, "truly random numbers" appear to be different from "true random numbers," in that the former describes theoretical perfection and the latter describes numbers generated from a nondeterministic source. '242 Patent, col. 26, ll. 8-15.

Accordingly, the court gives each of the above terms their plain and ordinary meaning in light of the previously construed terms.

6. "analog signal" Terms

Claim term, phrase or clause (first appearance)	QWC's Proposed Construction	Defendants' Proposed Construction
analog noise signal(s) ('364 patent, claim 1)	a non deterministic signal with a continuous (as opposed to discrete, i.e. digital) range of values	nondigital, nondeterministic signal consisting entirely of noise
analog random signal(s) ('242 patent, claims 1, 8, 20, 21)		
hardware device to produce an analog noise signal ('364 patent, claim 1)	No separate construction necessary; plain and ordinary meaning; alternatively: Produce-oplain and ordinary meaning physical equipment to produce an analog noise signal	nondeterministic signal generator to produce a nondigital, nondeterministic signal consisting entirely of noise

During the claim construction hearing, Quantum stipulated to the defendants' proposed construction, with the exception of "entirely." Regarding "entirely," the issue is whether the noise signal can be blended with something else. Quantum contends that there is no disclosure of a signal that includes something other than noise, i.e., there is no deterministic aspect. *See* '364 Patent, cl. 12; '242 Patent, col. 2, ll. 27-29; col. 12, ll. 43-44, 34-36, Fig. 3. Quantum argues that the patent contains no express disclaimer of something other than noise. The court agrees with Quantum. The intrinsic evidence suggests that the terms require "noise," but there is no indication that it must be "entirely noise."

As such, the court defines "analog noise signal(s)" as **"nondigital, nondeterministic signal consisting of noise"** and "analog random signal(s)" as **"nondigital, nondeterministic signal."**

The court defines "hardware device to produce an analog noise signal" as **"hardware device to produce a nondigital, nondeterministic signal consisting of noise."**

7. "device driver" Terms

Claim term, phrase or clause (first appearance)	QWC's Proposed Construction	Defendants' Proposed Construction
device driver	the software responsible for managing low-level I/O operations for a particular hardware device. Contains all the	a software component that permits a computer

	device-specific code necessary to communicate with a device and provides a standard interface to the rest of the system	system to communicate with a device
('364 patent, claims 2, 3, 4 and '242 patent, claims 5, 12, 18)		

The issue regarding this term is whether the court should construe the term in such a way as to allow the "device driver" to be a component of an application program. The defendants' proposed construction would define the term as "a software component." In this situation, the patent specification makes a distinction between a "device driver" and other types of interfaces.

The use of a device driver as the interface is a feature of the invention.... *Many other interfaces* with the circuit 100 are possible. For example, the interface may be incorporated into an application program, a program intermediate between operating system programs and applications, such as Windows(TM), a program placed in a bios 1620 on a memory board 1600 (FIG.16), wired into firmware, or designed in any other way that computer peripherals may be interfaced with. Interfaces other than a device driver may also be used. ' 242 Patent, col. 24, ll. 17-33 (emphasis added).

In other passages, however, the specification also suggests that the device driver may be a component of an operating system.

As can be seen from the above, the applications program 1222 communicates with the RNG module 1102 via the device driver. The device driver software 1200 is preferably part of the operating system of the computer and is typically stored on the hard disk 1165. '242 Patent, col. 22, ll. 63-67.

During the claim construction hearing, Quantum stipulated to the defendants' construction so long as the court replaced "permits a computer system" with "provides a standard interface." The court agrees with Quantum's argument regarding the distinction between a device driver and other interfaces, but concludes that its proposed stipulated construction fails to clarify the claim language in light of the previous construction of the interface terms. Additionally, the court agrees with the defendants that nothing in the intrinsic record restricts a "device driver" from being incorporated into an application program.

As such, the court defines "device driver" as **"software that permits a computer system to communicate with a device."**

8. Randomness Quality Terms

Claim term, phrase or clause (first appearance)	**QWC's Proposed Construction**	**Defendants' Proposed Construction**
reducing randomness defects	reducing bias and/or serial dependence	digital processing to improve the randomness of the true

		random sequence of binary signals
('242 patent, claims 3, 10, 16)		
serial dependence as a function time; or SD(t)	the dependence of the value for a binary pulse on the values of the binary pulses adjacent to it in a serial sequence as a function of the time between pulses	serial dependence as a function of delay time
('242 patent, claim 22)		
wherein $\|B_2\|$ <= 0.002 and |SD(t)|0.0004, where $\|B_2\|$is the fractional bias in the 1, 0 probability of said binary true random sequence of signals and SD(t) is the serial dependence as a function time of said binary true random sequence of signals	No separate construction necessary, alternatively:	No separate construction
('242 patent, claim 22)	wherein $\|B_2\|$<=0.002 and |SD(t)|<=0.0004, where B_2 is the fractional bias in the 1, 0 probability of said binary true random sequence of signals and SD(t) is the serial dependence as a function time of said binary true random sequence of signals	
$\|B_2\|$ <= 0.0004 and SD(t) <= $3.2x10^{-7}$	|B2| <= 0.0004 and |SD(t)| <=>>>> $3.2x10^{-7}$	
('242 patent, claim 23)		
producing a binary true random sequence of signals in which $\|B_2\|$ 0.002 and |SD(t)|0.0004, where B_2 is the fractional bias in the 1, 0 probability of said binary true random sequence of signals and SD(t) is the serial dependence as a function time of said binary true random sequence of signals	No separate construction necessary, alternatively:	No separate construction
('242 patent, claim 25)	producing a binary true random sequence of signals in which $\|B_2\|$<= 0.002 and |SD(t)|<=0.0004, where B_2 is the fractional bias in the 1, 0 probability of said binary true random sequence of signals and SD(t) is the serial dependence as a function time of said binary true random sequence of signals	

During the claim construction hearing, Quantum stipulated to the definition of "reducing randomness defects" proposed by the defendants, with the exception of the final phrase, "of the true random sequence of binary signals." The court adopts this construction. Including the phrase, "of the true random sequence of binary signals" would be redundant in the context of the claim language.

The court defines "reducing randomness defects" as **"digital processing to improve randomness."**

The court adopts Quantum's construction of "serial dependence as a function of time; or SD(t)" as its proposed construction originates from an express statement made within the specification. '242 Patent, col. 26, ll. 2-5.

The court adopts Quantum's construction of the remaining terms as each adheres to what one of skill in the art would understand them to mean.

IV. Conclusion

The court adopts the above definitions for those terms in need of construction. The court recognizes that it has not construed all of the terms proposed in the parties' briefing. Nevertheless, the court has attempted to construe all of the terms that the parties addressed in oral argument as the terms that would allow the parties to resolve their disputes. The parties are ordered that they may not refer, directly or indirectly, to each other's claim construction positions in the presence of the jury. Likewise, the parties are ordered to refrain from mentioning any portion of this opinion, other than the actual definitions adopted by the court, in the presence of the jury. Any reference to claim construction proceedings is limited to informing the jury of the definitions adopted by the court.

E.D.Tex.,2009.
Quantum World Corp. v. Atmel Corp.