

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ROHDE & SCHWARZ GMBH & CO., KG,
Petitioner,

v.

TEKTRONIX, INC.,
Patent Owner.

Case IPR2018-00643
Patent 8,675,719 B2

Before JOSIAH C. COCKS, PATRICK M. BOUCHER, and
SCOTT E. BAIN, *Administrative Patent Judges*.

BAIN, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining Some Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

Petitioner, Rohde & Schwarz GMBH & Co., KG (“Petitioner”), filed a Petition requesting an *inter partes* review of claims 1–10 and 12–15 of U.S. Patent No. 8,675,719 (Ex. 1001, “the ’719 patent”). Paper 2 (“Pet.”). Patent Owner, Tektronix, Inc. (“Patent Owner”), filed a Preliminary Response. Paper 6 (“Prelim. Resp.”). In our Decision on Institution (Paper 7, “Dec. on Inst.”), we determined that the information presented in the Petition and Preliminary Response established a reasonable likelihood that Petitioner would prevail in its challenge of claims 1–10 and 12–15 of the ’719 patent as unpatentable under 35 U.S.C. § 103 and, accordingly, we instituted *inter partes* review as to those claims. See 35 U.S.C. § 314(a).

During the course of trial, Patent Owner filed a Patent Owner Response (Paper 21, “PO Resp.”), Petitioner filed a Reply to Patent Owner Response (Paper 26, “Pet. Reply”), and Patent Owner filed a Sur-reply to Petitioner’s Reply (Paper 32, “PO Sur-reply”). A combined hearing for this case and the related case IPR2018-00647 was held on June 19, 2019, and a transcript of the hearing is included in the record. Paper 40.

This decision is a Final Written Decision under 35 U.S.C. § 318(a) as to the patentability of claims 1–10 and 12–15 of the ’719 patent. We have jurisdiction under 35 U.S.C. § 6. For the reasons discussed below, we hold that Petitioner has demonstrated by a preponderance of the evidence that claims 1, 6, 10, and 12 of the ’719 patent are unpatentable under § 102 and claims 2, 3, 7, 9, 13, and 15 are unpatentable under § 103(a). We also hold that Petitioner has not demonstrated by a preponderance of the evidence that claims 4, 5, 8, and 14 of the ’719 patent are unpatentable under § 102 or § 103(a).

A. Related Matters

The '719 patent is involved in a district court case captioned *Tektronix, Inc. v. Rohde & Schwarz USA Inc., et al.*, No. 3:18-cv-00264 (D. Ore.) and in an instituted investigation at the U.S. International Trade Commission, 337-TA-1104. Pet. 1. Also, in addition to this Petition, Petitioner filed another petition challenging the patentability of claims 1–10 and 12–15 of the '719 patent (IPR2018-00647) over additional references. We instituted trial in that matter and, as noted above, we held a combined hearing for this case and IPR2018-00647. In the Final Written Decision in IPR2018-00647, we held that Petitioner did not demonstrate by a preponderance of the evidence that any of the claims were unpatentable over the references cited therein. Petitioner also filed a petition against U.S. Patent No. 8,521,460 (IPR2018-00645), which has the same filing date as the '719 patent and pertains to similar subject matter, but we denied the petition.

B. The '719 Patent

The '719 patent, titled “Multi-Domain Test and Measurement Instrument,” issued March 18, 2014, from U.S. Patent Application No. 12/892,758, filed September 28, 2010. Ex. 1001, [21], [22], [45], [54]. The '719 patent relates to “multi domain” analysis of a signal. According to Patent Owner, prior to the '719 patent, test and measurement instruments were typically designed for signal analysis in only one domain. PO Resp. 4; Ex. 1001, 1:28–33. Namely, an oscilloscope measured a signal in the time domain (e.g., voltage as a function of time), and a spectrum analyzer measured a signal in the frequency domain (e.g., displaying a signal's

frequency spectrum that indicates the power levels of various frequency components). PO Resp. 4–5; Ex. 1001, 1:9–15, 1:35–55.

According to Patent Owner, some oscilloscopes prior to the '719 patent included “limited” multi-domain analysis capability, but Patent Owner explained that such oscilloscopes implement undesirable “tradeoffs” in resolution and deficiencies in sampling rate. PO Resp. 4–5, 15; Ex. 1001, 1:40–47, 1:52–62. For example, Patent Owner asserts, acquiring a signal at its entire frequency range, but over a short time period, permits such oscilloscopes to display a “higher-resolution waveform but only a lower-resolution frequency spectrum.” PO Resp. 4. Conversely, acquiring a narrower frequency range, but over a longer range of time, permits display of a higher-resolution frequency spectrum but lower-resolution waveform. *Id.* at 4–5.

Patent Owner explains that the invention of the '719 patent solves this problem by “devising two different kinds of channels in one instrument,” namely, a time domain channel and a frequency domain channel. *Id.*

According to Patent Owner:

[p]lacing both channels into the same test and measurement instrument, such that the acquisition system receives the differently-conditioned input signals output from each channel, solves the tradeoffs problem associated with performing multi-domain analysis in conventional instruments.

PO Resp. 15–16.

An embodiment of the claimed invention is shown in Figure 1 of the '719 patent, reproduced below.

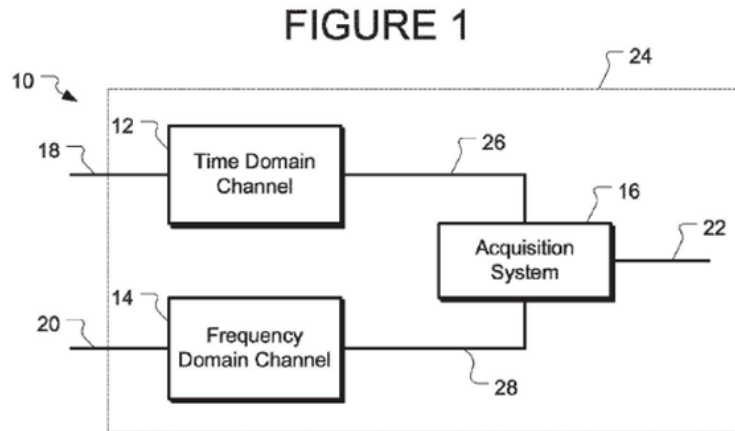


Figure 1 is a block diagram of a “test and measurement instrument [10] having a time domain channel and a frequency domain channel.” Ex. 1001, 2:26–28. In this embodiment, time domain channel 12 is configured to receive a first input signal 18, and frequency domain channel 14 is configured to receive a second input signal 20. *Id.* at 2:65–67. Each of the time domain channel 12 and frequency domain channel 14 may be configured to “process” the respective signals 18 and 20 using a variety of circuitry described in the ’719 patent. *Id.* at 3:7–4:34.¹ The respective outputs of the two channels, i.e., signals 26 and 28, are coupled to “acquisition system” 16, which is “configured to acquire data” from such

¹ For example, the ’719 patent explains that the time domain channel 12 “can include digitizers such as multi-bit analog to digital converters, comparators[,] amplifiers, input protection[,] memories, decimators, or the like[,] attenuators, and other circuitry that cover[s] the entire bandwidth from DC to the maximum frequency.” Ex. 1001, 3:7–24. The frequency domain channel 14 may include “attenuators, filters, amplifiers, or the like that can be optimized for those signals that require frequency-domain representation,” and can include “other components that have different bandwidths, input ranges, noise figures, or the like” such as “amplifiers, mixers, local oscillators, attenuators, filters, switches, or the like.” *Id.* at 3:37–42, 3:60–64.

signals and may also “include a variety of circuitry” such as “digitizers, decimators, filters, memories, or the like.” *Id.* at 4:21–26. Finally, the “acquired data 22” from acquisition system 16 can be made “available for further processing, display, analysis in the respective domain, or the like.” *Id.* at 5:23–27.

C. The Challenged Claims

Petitioner challenges claims 1–10 and 12–15 of the ’719 patent. Independent claims 1 and 12, the sole independent claims, are illustrative and are reproduced below:

1. A test and measurement instrument, comprising:
 - a time domain channel configured to process a first input signal for analysis in a time domain;
 - a frequency domain channel configured to process a second input signal for analysis in a frequency domain; and
 - an acquisition system coupled to the time domain channel and the frequency domain channel and configured to acquire data from the time domain channel and the frequency domain channel,wherein the time domain channel and the frequency domain channel are not used to process the same signal sequentially.

12. A test and measurement instrument, comprising:
a time domain channel configured to process a first input signal for analysis in a time domain;
a frequency domain channel configured to process a second input signal for analysis in a frequency domain; and
a controller coupled to the time domain channel and the frequency domain channel and configured to control acquisition parameters of the time domain channel and the frequency domain channel such that the acquisition parameters of the time domain channel and the frequency domain channel are different.

Ex. 1001, 10:54–65, 12:13–23. Each of dependent claims 2–10 depends directly or indirectly from claim 1. *Id.* at 10:66–12:4. Each of dependent claims 13–15 depends directly from claim 12. *Id.* at 12:24–52.

D. Prior Art References Relied Upon

Petitioner relies upon the prior art set forth in the tables below:

Inventor²	Patent / Pub. No.	Relevant Dates	Exhibit No.
Engelse	US 2003/0039319 A1	published Feb. 27, 2003 filed Aug. 22, 2001	1007
Wimmer	US 4,585,975	issued Apr. 29, 1986 filed Apr. 21, 1983	1008
Doi	US 6,140,809	issued Oct. 31, 2000 filed July 30, 1997	1011

Non-Patent Literature	Exhibit No.
Robert A. Witte, <i>Spectrum & Network Measurements</i> , PRENTICE HALL PTR, 1 ST ED (ISBN-10: 0130308005, ISBN-13: 978:0130308009) Oct. 30, 1992, excerpts from Chapters 1, 5, 7, and 9 (“Witte”)	1009

² For clarity and ease of reference, we only list the first named inventor.

E. Instituted Grounds of Unpatentability

We instituted review of claims 1–10 and 12–15 of the ’719 patent based on the following asserted grounds of unpatentability (“grounds”). Pet. 3, 11–71.

Reference(s)	Basis	Challenged Claims
Engelse	§ 102	1, 4, 6, 8, 10, 12, 14
Engelse and Wimmer	§ 103	2
Engelse	§ 103	3, 4, 5, 13, and 15
Engelse and Doi	§ 103	7
Engelse and Witte	§ 103	9

In support of its asserted grounds of unpatentability, Petitioner relies on the testimony of its expert witness, Dr. Villasenor. See Ex. 1003 (“Villasenor Decl.”); Ex. 1030 (“Villasenor Second Decl.”). In support of its response, Patent Owner relies on the testimony of its expert witness, Dr. Blalock. Ex. 2001 (“Blalock Decl.”); Ex. 2014 (“Blalock Second Decl.”). Both experts were cross-examined. See Ex. 1031 (deposition transcript of Dr. Blalock); Ex. 2018 (deposition transcript of Dr. Villasenor); Ex. 2023 (second deposition transcript of Dr. Villasenor).

II. ANALYSIS

A. Claim Construction

The ’719 patent has not expired. Pet. 3; Ex. 1001. In an *inter partes* review proceeding filed before November 13, 2018, as this proceeding was, claim terms of an unexpired patent are given their broadest reasonable

interpretation in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b) (2016); Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51,340 (Oct. 11, 2018); Pet. 3; PO Resp. 9. Under the broadest reasonable interpretation standard, claim terms are generally given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art, in the context of the entire disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1256–57 (Fed. Cir. 2007). Further, in construing the claims, we look principally to the intrinsic evidence of record, examining the claim language, the written description, and the prosecution history, if in evidence. *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citation omitted).

The parties offer substantially similar descriptions of a person of ordinary skill in the art. Petitioner’s expert, Dr. Villasenor, testifies that a person of ordinary skill in the art has:

at least an undergraduate degree in electrical engineering, computer science, or a related field, and at least two years of experience in systems for performing time and frequency analysis of signals such that the person would have grasped sufficient details regarding the design and operation of test and measurement systems for time domain analysis and frequency domain analysis.

Ex. 1003, ¶ 32. Patent Owner, citing the testimony of Dr. Blalock, asserts that a person of ordinary skill in the art is someone:

hav[ing] at least a bachelor’s degree in electrical engineering and at least 5 years of experience in circuit design with extensive use of a test and measurement instrument for

performing evaluation and troubleshooting as part of the circuit design efforts.

PO Resp. 8 (citing Ex. 2014 (“Blalock Decl.”), ¶¶ 59–60).

Upon considering these respective proposals in view of the record, we adopt the assessment provided in Dr. Villasenor’s testimony, and apply it to our analysis in this Decision. Dr. Villasenor’s assessment takes into account that undergraduate degrees “related” to electrical engineering, such as computer science, may provide significant training regarding test and measurement instruments for time domain and frequency domain analysis, and also that experience in “circuit design” (and particularly five years of experience) is not necessarily required in order to sufficiently understand “details regarding the design and operation” of such instruments, as Dr. Villasenor credibly testifies. We note, however, that our conclusions set forth in this Decision would be the same were we to adopt Patent Owner’s evaluation of the level of ordinary skill in the art.

1. *“test and measurement instrument”*

In the Decision on Institution, we construed “test and measurement instrument” (recited in the preamble of claim 1) as equipment that directly or indirectly measures, indicates, monitors, and/or tests. Dec. on Inst. 12–13. Although our construction was not precisely the same as the one proposed by Patent Owner (and Petitioner did not propose a construction), we reasoned that our construction was consistent with the definition of “measurement instrument” in the technical dictionary relied upon by Patent Owner. *Id.*; Ex. 2003 (Wiley Electrical and Electronics Engineering Dictionary) (“Wiley Dictionary”). We further reasoned that our construction

was consistent with the '719 patent specification, which discloses a variety of embodiments for measuring signal values. Dec. Inst. 12–13.

During the trial in this proceeding, neither party disputed our preliminary construction of test and measurement instrument, and this claim limitation is not in dispute. *See infra*, Sect. II.B.3. We, therefore, adopt our preliminary construction for this Decision.

2. “channel”

The word “channel” is core to the dispute between the parties. It appears throughout the '719 patent specification and in every claim, but it is not expressly defined in the '719 patent. Instead, the two independent claims (i.e., claims 1 and 12) define a “channel” by reciting what particular channels are “configured” to do. Namely, a “time domain channel” is configured to “process a first input signal for analysis in the time domain,” and a “frequency domain channel” is configured to “process a second input signal for analysis in the frequency domain.”³ The parties disagree on whether the word “channel” itself must be defined using specific electronic components, particularly a digitizer, and in the Decision on Institution, we determined that it did not. Dec. on Inst. 9; Pet. 8.

In the Decision on Institution, we construed “channel” to mean “signal path,” which we reasoned was consistent with the dictionary cited by Patent Owner. Dec. on Inst. 9; Ex. 2007 (defining channel as “[a] course through which something may be directed or moved,” “communication

³ Prior to institution of trial, the parties agreed that the recited “channel” limitations are not means-plus-function limitations (nor is any other limitation in the claims). Pet. 3; Prelim. Resp. 17; Dec. on Inst. 8. Neither party changed its position during trial.

route[,]” and “[t]o direct or guide along a desired course”). Again, we noted that neither party identified a clear definition of “channel” in the field of signal processing, and that definitions of “channel” in other fields of technology (such as communications) did not fit in the context of the ’719 patent. Dec. on Inst. 9; Ex. 2007 (e.g., referring to channels in wireless technologies as “frequency bands” for transmitting and receiving signals). We reasoned that our preliminary construction comported with the specification of the ’719 patent, which describes and illustrates (in block form) paths for a signal to propagate through circuit elements. Ex. 1001, 10:18–19. For example, in describing one embodiment, the ’719 patent states “[e]ach *path* [on the signal block diagram, Fig. 8] is configured to receive a *signal* from a local oscillator.” *Id.* (emphasis added).

During the trial, both parties asserted that a single “channel” includes one *or more* signal paths. PO Resp. 11–13; Pet. Reply 3–4. We agree with this assertion. Dependent claim 8, for example, recites the frequency domain “channel” comprising “an in-phase path” and a “quadrature-phase path,” i.e., two paths in the channel. Ex. 1001, 11:40–43; Ex. 2014 ¶ 66–67, 70. We, therefore, do not limit the meaning of “channel” to a single path.

We further observe that “channel” in the context of the ’719 patent represents circuitry that makes up the signal path(s), including (according to the terms of the independent claims) signal processing circuitry. Ex. 1001, 3:5–5:27; *id.* at 10:55–59 (claim 1, reciting that the respective channels are “configured to process” signals). Significantly for this case, the ’719 patent specification describes such circuitry in broad terms and by providing numerous examples (embodiments). The specification provides, for instance, that a time domain “channel[] can include digitizers such as . . .

analog to digital converters, comparators[,] other circuitry [] such as amplifiers, input protection, or other conditioning circuitry, [and] digital processing circuitry, such as memories, decimators, or the like.” Ex. 1001, 3:7–14. Further, a time domain “channel[] can include amplifiers, attenuators, and other circuitry.” *Id.* at 3:22–24. A frequency domain “channel,” according to the specification, “can include attenuators, filters, amplifiers, or the like that can be optimized for those signals that require frequency-domain representation and analysis.” *Id.* at 3:36–41. Moreover, “the frequency domain channel [] can include other components that have different bandwidths, input ranges, noise figures, or the like that would otherwise be used in the time domain channel . . . [t]hat is, amplifiers, mixers, local oscillators, attenuators, filters, switches, or the like.” *Id.* at 3:60–65. The specification provides an example of a frequency domain channel including “an attenuator,” a “filter,” a “mixer,” a “local oscillator,” and an “IF filter.” *Id.* at 4:35–38. In a different embodiment, the specification describes a frequency domain channel including “a digitizer” and a “digital filter.” *Id.* at 4:60–61. As Patent Owner asserts, a “channel . . . conditions the input signal” via circuit components “such as an amplifier, a digitizer, a filter, etc.” PO Resp. 12.

Rather than defining particular “channels” by specific circuit elements, the ’719 patent (and specifically, the independent claims themselves), defines a particular “channel” by what it does. Namely, as recited in claim 1, a “time domain channel” is a channel that is “configured to process a[n] input signal for *analysis in the time domain*.” Ex. 1001, 10:55–56 (emphasis added). A “time domain channel” is “coupled to” an acquisition system and provides data to the acquisition system. *Id.* at 10:59–

62. A “frequency domain channel,” in turn, is a channel that is “configured to process a[n] input signal for *analysis in the frequency domain*.” *Id.* at 10:57–62 (emphasis added). A frequency domain channel, like a time domain channel, is recited in the claims as being “coupled to” the acquisition system and providing data to the acquisition system. *Id.* at 10:57–62 (emphasis added).

In view of the arguments and evidence of record, including the foregoing, we construe the term “channel” as circuitry providing one or more signal paths in which a signal is processed, and we construe “time domain channel” and “frequency domain channel” as described above. We are not persuaded to construe these terms further.⁴ Specifically, we are not persuaded by Patent Owner’s additional arguments that we should construe the word “channel” as:

[signal] paths from input to acquisition, where different paths are part of a shared channel if (i) the acquisition system selectively acquires from one or the other path as being in one channel or (ii) the two paths perform complementary processing for the acquisition system to receive and process together.

PO Resp. 11.

We determine that Patent Owner’s foregoing, additional proposed construction is circular and lacks sufficient support in the specification. The proposed construction relies on the word channel itself (twice), and it is unclear what “being in one channel” or a “shared channel” means without knowing the definition of “channel.” Moreover, as Petitioner argues, these

⁴ We address the parties’ arguments regarding elements in the prior art, and whether such elements constitute “channel[s]” as recited in the claims, in the patentability analysis of Section II, *infra*.

phrases are not described in the '719 patent. Pet. Reply 2. Further, the specification does not explain what it means to “selectively acquire[]” or “perform complementary processing.” Patent Owner argues that Figure 4 of the '719 patent illustrates a single channel consistent with Patent Owner’s proposed definition, but Figure 4 is only one of several embodiments described in the specification. In any event, Figure 4 does not support Patent Owner’s argument because Figure 4 is “an example of the instrument of Figure 3,” which has “a time domain channel *and* frequency domain channel coupled to a single input.” Ex. 1001, 6:36–41, 6:59–7:9 (emphasis added).

For similar reasons, we decline to construe the word “channel” as defining signal path(s) “from input to acquisition,” as Patent Owner argues. Rather, “input” signal and “acquisition system” are separate terms expressly recited in the claims, and the claim language defines the relationship between “channels,” the first and second “input” signals, and the “acquisition system.” *See, e.g.*, Ex. 1001, 10:55–65 (claim 1).

3. “*acquisition system*,” “*acquire*,” and “*acquisition parameters*”

“Acquisition system,” like “channel,” is a core term in the claims that is not expressly defined in the '719 patent, but rather is described by examples of circuitry (embodiments). In the Decision on Institution, we construed “acquisition system” as a system to obtain or receive signals or data, and we construed “acquir[ing]” a signal/data as receiving or obtaining it. Dec. on Inst. 10–11; Ex. 1001, 3:1–3, 4:67, Figs. 1, 3, 5. We rejected Patent Owner’s proposed construction, which required “retaining” a “conditioned” signal, as unclear and not supported by the '719 patent specification. Dec. on Inst. 10–11. Upon consideration of the parties’

further arguments and evidence during trial, we refine our preliminary constructions with the following clarification.

Like a channel, an “acquisition system” represents circuit elements in the ’719 patent. According to the specification, an “acquisition system [] can include a variety of circuitry [such as] digitizers, decimators, filters, memories, or the like.” Ex. 1001, 4:21–23. The ’719 patent discloses that the acquisition system “can” include “acquisition memory,” which implies data storage, but does not state that memory is required. Ex. 1001, 5:31–32. In describing signal “acquisition,” the specification frequently uses the terms “acquire” and “receive” interchangeably. *Compare* 3:16–18, 6:32–34 *with* 4:39, 6:41–48, 9:22–26, 10:18.

During trial, Patent Owner argues (with supporting testimony from its expert, Dr. Blalock) that “acquisition” means to “capture [a signal] to generate a record,” and an “acquisition system captures the conditioned input signal to generate a record.” PO Resp. 22; Ex. 2014 ¶¶ 81–82. Patent Owner asserts that although no “particular duration” of retention is required, “an entire data record must be captured, obtained, held, possessed, stored, etc. for at least some instant.” *Id.* Patent Owner argues that its proposed construction, unlike the Board’s preliminary construction, distinguishes simple circuit elements such as a “filter” that (as Petitioner’s expert acknowledged) cannot alone be an “acquisition system” as recited in the ’719 patent. *Id.* at 21–22 (citing Ex. 2018 at 196). Virtually every conceivable circuit element can “receive” a signal, Patent Owner argues, but that does not make every element an “acquisition system.” *Id.*

Petitioner replies that the Board’s preliminary construction is appropriately broad, because the ’719 patent describes many circuit elements as acquiring, obtaining, or receiving a signal, and does not limit “acquire” or “acquisition system” in the manner proposed by Patent Owner. Pet. Reply 8; *see supra*.

Upon weighing the evidence and arguments in the record, we agree with Patent Owner’s position that an “acquisition system” in the ’719 patent cannot encompass certain simple circuit elements. Our reasoning is based upon other terms in the claims that surround the phrase “acquisition system,” not because of any special meaning of “acquisition” itself (such as particular conditioning) imparted by the ’719 patent or known by one of ordinary skill. Specifically, claim 1 requires that the “acquisition system” be “coupled to the time domain channel and frequency channel” and is “configured to *acquire data*” from those channels. Ex. 1001, 10:59–63 (emphasis added). An acquisition system, therefore, by the terms of claim 1 (and claim 14), acquires data.

Thus, consistent with the disclosures in the ’719 patent, as well as Petitioner’s original proposed construction and the testimony of Dr. Villasenor, Pet. 6, Ex. 1003 ¶¶ 36–39, we clarify that “acquisition system” means circuitry configured to obtain data (e.g., for analysis), and to “acquire” a signal is to obtain the signal (data) . *See also* PO Resp. 22 (“acquired signal” is “obtained” data).

We decline to adopt Patent Owner’s further proposed definition that “acquiring” means “to capture [a signal] to *generate a record*,” because we discern insufficient support in the specification for that definition. PO Resp.

22 (emphasis added). Although the specification mentions “record length[s],” Ex. 1001, 1:58, 4:17, 8:47, the specification does not describe “acquisition” as requiring a record to be generated, and in fact uses “obtain” interchangeably with “acquire.” Ex. 1001, 1:40–43 (“That is, to *obtain* a small frequency step, i.e., a fine resolution in the frequency domain, a long time span is necessary in the time domain [and] [s]imilarly, to *acquire* data for a wide frequency span, a high sample rate is needed.” (emphases added)); *see also id.* at 3:16–18, 6:32–34. Again, we note that other terms recited in the claims of the ’719 patent limit the “acquisition system” only to those systems that are “coupled to” the “time domain channel” and “frequency domain channel,” and are configured to acquire data from those channels. Ex. 1001, 10:59–64 (claim 1), 12:34–44 (claim 14).

Finally, our constructions of “acquisition system” and “acquire” also essentially define “acquisition parameters” (claim 12). Patent Owner asserts, and Petitioner does not dispute, that “parameters” means values determining how a component or process operates. PO Resp. 23. Thus, consistent with our foregoing constructions, “acquisition parameters” means parameters (i.e., values) to determine how data is obtained for processing (e.g., sampling characteristics). In the context of the ’719 patent claims, such data is acquired (obtained) for processing from the time domain channel and frequency domain channel, as discussed above.

Patent Owner further asserts that “acquisition parameters” means only the “sample rate and record length” of data. PO Resp. 36; Ex. 1001, 1:57–58, 4:16. The ’719 patent, however, describes sample rate and record length as “*example[s]*” of acquisition parameters, and states that “other acquisition

parameters can be controlled” and applied to the time domain channel and frequency channel. *Id.* at 8:40–52 (emphasis added). Other “example[s]” of “acquisition parameters” provided in the ’719 patent specification include “filter bandwidths, filter center frequencies, attenuators settings, or the like,” but the specification does not limit such parameters to any of the aforementioned variables. *Id.* The specification further states that “acquisition parameters” can be “controlled to optimize [each] channel for the acquisition of the associated input signal.” *Id.* at 8:53–55.

4. “time align”

Dependent claim 3 recites the “acquisition system is configured to time align an acquisition of the time domain channel with an acquisition of the frequency domain channel.” Ex. 1001, 11:6–10. Petitioner, citing the testimony of Dr. Villasenor, asserts that “time align” means “substantially synchronized in time.” Pet. 6 (citing Ex. 1003 ¶¶ 40–44). Patent Owner, citing the testimony of Dr. Blalock, responds that “time align” means “to associate a portion of a time-dependent signal/data with a portion of another time-dependent signal/data that corresponds to substantially the same time period.” PO Resp. 23 (citing Ex. 2014 ¶ 90). We did not construe “time align” in the Decision on Institution, because at that stage of the proceeding Patent Owner did not dispute Petitioner’s contentions regarding elements appearing only in dependent claims.

The parties’ proposed constructions appear similar, and both proposals indicate that to “time align” requires only “substantial” alignment rather than exact precision. Pet. 6; PO Resp. 23. Petitioner, however, explains that its proposed construction would include a clock, for example, to synchronize the acquisition of signals or samples (data) from two

channels, whereas Patent Owner’s construction refers to “associating” portions of signals (e.g., samples) that, at least implicitly, already have been acquired.⁵ This difference in proposed constructions becomes clearer upon evaluating the entire claim limitation at issue: “the acquisition system [of claim 1] is configured to time align *an acquisition of the time domain channel* with *an acquisition of the frequency domain channel*.” Ex. 1001, 11:8–10 (emphasis added). Thus, “time align” refers to “an acquisition.” The language of claim 3 does not explicitly reveal, however, whether “an acquisition” is the acquired data itself, or the act of acquiring data (e.g., synchronizing acquisition such as by clocking).

Turning to the specification, the ’719 patent explains that “simultaneous analysis in both the time domain and the frequency domain can be difficult” in instruments with multi-domain capability, and that typically, “precision in one domain can be mutually exclusive with precision in the other.” Ex. 1001, 1:55–62. Further, the specification describes a deficiency of using separate instruments (namely, an oscilloscope to measure signals in the time domain and a separate spectrum analyzer to measure signals in the frequency domain) as being that the “measuring instruments are not time-aligned.” *Id.* at 1:30–34. The invention of the ’719 patent provides for “time aligned *analysis*” of events in the time domain and frequency domain. *Id.* at 2:60 (emphasis added). In one embodiment, an acquisition system “can be configured to acquire substantially *time aligned versions* of” outputs from the time domain channel and frequency domain

⁵ In Petitioner’s mapping of claim 3 to Engelse, Petitioner argues that a “master clock” satisfies the “time align” element of claim 3.

channel, respectively. *Id.* at 5:28–30 (emphasis added). The specification also explains that “substantially *time aligned* time and frequency domain *analyses can be performed* without sacrificing the optimization of acquisition for one analysis domain over another.” *Id.* at 5:39–41 (emphasis added).

In another embodiment, the specification provides that “the *same event . . .* can be used *to trigger acquisitions* in both the frequency and time domains, [so] the acquired signals can be time aligned to a higher degree, [for example] as two input channels of an oscilloscope, i.e., substantially [time] aligned on a per sample basis.” *Id.* at 9:1–7 (emphasis added). Thus, in this embodiment, “when examining an event in one domain, the corresponding, substantially contemporaneous signals in another domain can be analyzed.” *Id.* Further, “[a]s used herein, substantially contemporaneous and/or time aligned [sic] can include a time accuracy that is limited by a lowest sample rate of time aligned channels.” *Id.* at 9:7–11.

Taking into consideration the foregoing, and weighing the additional evidence presented by the parties (including expert testimony), we determine that the broadest reasonable construction of “time align” consistent with the specification is Petitioner’s construction, i.e., to “substantially synchronize [i.e., align] in time.” In our view, this construction partly subsumes Patent Owner’s proposed construction of associating signals corresponding to “substantially” the same time periods, but (as discussed above) the ’719

patent does not limit “time align an acquisition” solely to Patent Owner’s interpretation of being an operation upon already-acquired data.⁶

5. “to sample”

Dependent claims 5 and 13 recite channels configured “to sample” at respective first and second sample rates. Petitioner, citing the supporting testimony of Dr. Villasenor and a technical dictionary, defines “to sample” as “a process of obtaining a sequence of instantaneous values of a wave.” Pet. Reply 11; Ex. 1030 ¶¶ 41–53; Ex. 1035. Patent Owner, citing the testimony of Dr. Blalock and a different technical dictionary, proposes that to “sample” means “to turn a time-continuous signal into a signal that is time-discrete or time discontinuous.” PO Resp. 25; Ex. 2014 ¶ 98; Ex. 2020. We did not construe this term in the Decision on Institution, for the same reasons as discussed above regarding “time align.”

Upon weighing all of the evidence bearing on the foregoing term, we adopt a slightly modified version of Petitioner’s proposed construction. Petitioner’s proposed construction is consistent with the evidence in the

⁶ Our construction also retains internal consistency among claims 1, 2, and 3. Claim 2 recites a system configurable “to trigger *an acquisition* of the acquisition system” in response to certain events. “An acquisition” in claim 2, therefore, refers to the act of acquiring data, not to the already-acquired data, and our construction of time-align in claim 3 would preserve that meaning of “an acquisition.” Claim 1 recites an acquisition system configured “to acquire data from” the respective channels. If “time align” in claim 3 meant associating already-acquired signals (data) of the same time period, as Patent Owner’s proposed construction implies, then claim 3 logically would have read “time align [the] *acquired data*” (recited in claim 1) rather than “time align *an acquisition*.”

record, including Patent Owner’s evidence, but is not complete. Namely, in addition to demonstrating that a sample can be an “instantaneous” value of a signal (i.e., a point), as Petitioner’s proposed construction includes, the evidence also demonstrates that a sample may consist of time-discrete portions of signal, as Patent Owner’s proposed construction includes. PO Resp. 24–25; Ex. 2014 ¶ 98; Ex. 2014 ¶ 97; Ex. 1001, 3:5–15, 7:20–30; 7:55–8:56; Ex. 1030 ¶¶ 41–53; Ex. 1035, 503. Accordingly, we construe “to sample” as meaning to “obtain instantaneous value(s) of a wave or time-discrete portions of a wave.”

We are not persuaded to define “sample” further, such as by requiring a digitizer in the definition itself. PO Resp. 25 (citing Ex. 2014 ¶ 97). As Petitioner argues, the inventor of the ’719 patent “knew the term ‘digitizer’” and used it throughout the specification, yet recited “a channel configured to sample,” not a “digitizer,” in claims 5 and 13. Pet. Reply; Ex. 1001, 3:7, 4:22–31, 4:61, 6:50, Figs. 2, 4.

*B. Anticipation by Engelse
(Claims 1, 4, 6, 8, 10, 12 and 14)*

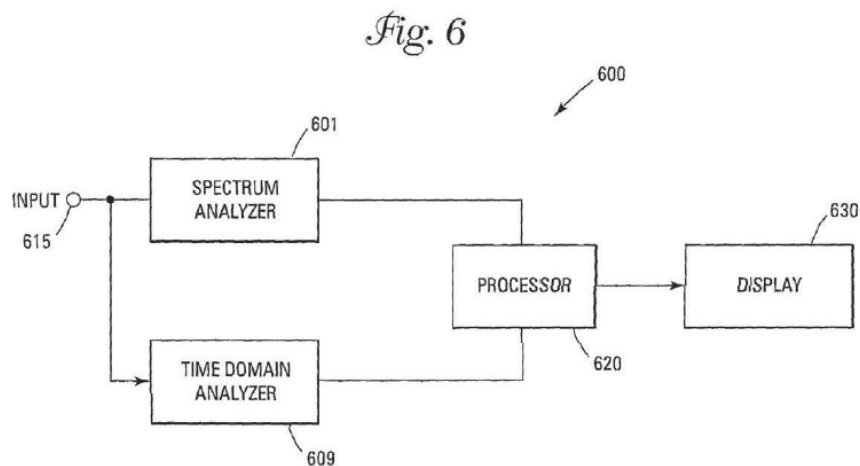
1. Principles of Law

To anticipate a claim under § 102, a prior art reference “must disclose every limitation of the claimed invention, either explicitly or inherently.” *In re Schreiber*, 128 F.3d 1473, 1477 (Fed. Cir. 1997). The absence of a single limitation, even if that limitation would have been obvious from the cited reference, negates anticipation. *Id.*

We analyze this asserted ground of anticipation with the above-identified principles in mind.

2. Overview of Engelse (Ex. 1007)

Engelse, the primary reference Petitioner relies upon throughout the Petition, is directed to a measurement system that performs both “spectrum analysis” and “time domain” analysis of signals. Ex. 1007, Abstract, ¶ 29. The invention addresses the “susceptibility of the cable network to noise in the frequency spectrum commonly used to transport data.” *Id.* at ¶ 3. To permit “monitoring the quality of bandwidth used for upstream communications,” Engelse discloses “[i]ntegrating the spectrum analysis function” with time domain analysis to “enable[] quick reaction to changes in noise on a communication medium to reduce negative impacts on the transport of data over the medium.” *Id.* at ¶¶ 28–29. An embodiment is shown in Engelse Figure 6, reproduced below.



Engelse Figure 6 depicts a block diagram of “signal analyzer 600,” which includes spectrum analyzer 601, time domain analyzer 609, processor 620, and display 630. Ex. 1007 ¶¶ 56–57. Input 615 is a “digital radio frequency (RF) input [] designed to receive an input signal,” and is coupled to spectrum analyzer 601 and time domain analyzer 609. Each analyzer is coupled to processor 620, which in turn is coupled to display 630. *Id.*

Engelse discloses that in “one embodiment,” spectrum analyzer 601 and time domain analyzer 609 “share common components.” *Id.* at ¶ 56. Processor 620 “selectively controls the operation of signal analyzer 600 to select the appropriate signal analysis to be performed.” *Id.* at ¶ 57.

3. *Challenged Claims 1, 4, 6, 8, 10, 12 and 14*
(Anticipation by Engelse)

a. *Claim 1*

Petitioner contends that Engelse discloses every element of claim 1. Pet. 13–23. Patent Owner disputes Petitioner’s contentions, and specifically, argues that (a) Engelse does not disclose two distinct channels, as claim 1 requires, (b) Engelse does not disclose a “time domain channel” as recited in claim 1, because the element in Engelse cited by Petitioner also performs “frequency shifting,” and (c) Engelse does not disclose any “acquisition system” that captures input signals to generate records. PO Resp. 27–33. We address each claim element below, in turn.

Claim 1 [preamble]: “A test and measurement instrument . . .”

Petitioner contends that the “signal analyzer” disclosed in Engelse is a test and measurement instrument, as recited in the claim. Pet. 13 (citing Ex. 1007, Fig. 6, ¶ 55–57; Ex. 1003 ¶ 50). Patent Owner does not dispute Petitioner’s contention regarding this claim element in its Response. PO Resp. 27–33.

As discussed above, we construe “test and measurement instrument” to mean equipment that directly or indirectly measures, indicates, monitors, and/or tests. *See supra* Sect. II.A.1. We are persuaded by Petitioner’s undisputed showing that Engelse discloses such equipment, namely, a

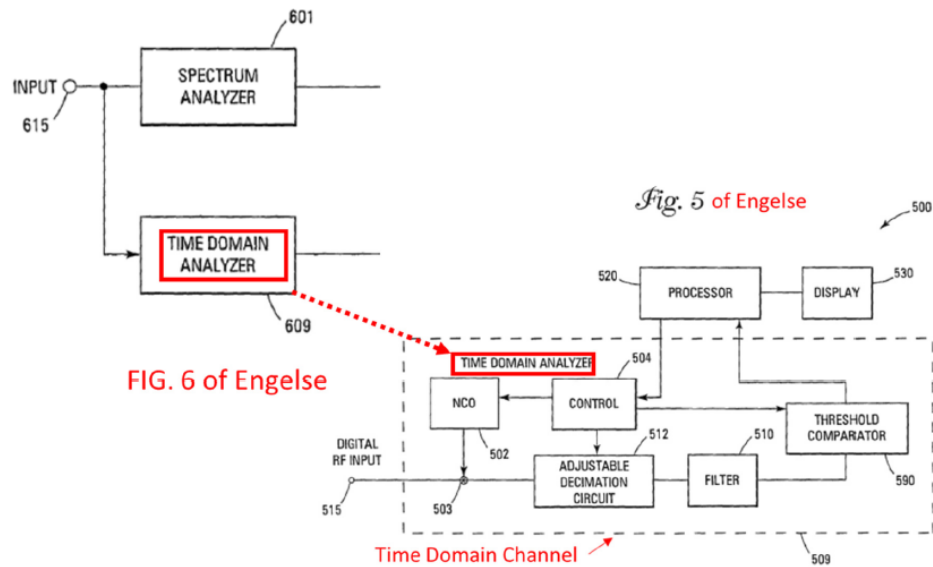
“signal analyzer” for “measuring” signal values in a cable network. Ex. 1007 ¶¶ 6–9. Moreover, Engelse discloses several embodiments that include a “display” for showing outputs, such as a “graph of power available,” to “system operators,” which indicates that these embodiments are instruments, not merely internal circuitry invisible to a user. Ex. 1007 ¶¶ 32, 45, 51. Indeed, several figures in Engelse are strikingly similar to embodiments illustrated in the ’719 patent depicting the claimed “test and measurement instrument.” Ex. 1007, Figs. 1, 5, 6; Ex. 1001, Figs. 1, 3.

Accordingly, we find that Petitioner has demonstrated by a preponderance of the evidence that Engelse discloses the limitation in the preamble of claim 1.

Claim 1[a]: “a time domain channel configured to process a first input signal for analysis in a time domain . . .”

Petitioner contends that Engelse’s disclosure of a “time domain analyzer” coupled to an “input” satisfies claim limitation 1[a]. Pet. 13–14 (citing Ex. 1007 ¶¶ 8–9, 47–49, 56, Figs. 5, 6). Petitioner relies on Engelse Figures 5 and 6, the specification’s disclosures corresponding to these figures, and the supporting testimony of Dr. Villasenor. Ex. 1003 ¶ 51. Petitioner’s annotated versions of Figures 5 and 6 are reproduced below.⁷

⁷ The annotations are Petitioner’s labeling in red, and Figure 6 is excerpted. See *supra*, Sect. II.B.2 (original Figure 6).



Annotated Figure 6 is a block diagram of a signal analyzer, depicting input 615, spectrum analyzer 601, and time domain analyzer 609.

Annotated Figure 5 illustrates further details and components of time domain analyzer 509 (element 609 in Figure 6), including signal processing elements for “analyzing” a signal in the “time domain,” such as a filter 510 and threshold comparator 590. Ex. 1007 ¶¶ 46–54. Petitioner argues that the time domain analyzer of Engelse discloses a “channel” that is configured to “process” an input signal in the time domain. Pet. 14.

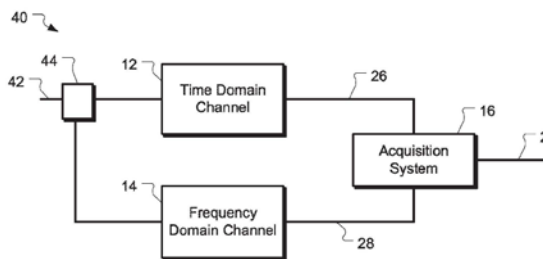
Patent Owner responds that Engelse merely discloses a single “shared channel” containing a time domain analyzer and frequency domain analyzer, and that a processor “selectively controls” either of the two analyzers. PO Resp. 28–29. Patent Owner argues, therefore, that Engelse does not disclose a time domain channel as recited in claim 1.

We are persuaded by Petitioner’s argument and evidence. First, we note that Patent Owner’s argument primarily is based upon its proposed construction of “channel,” in which Patent Owner asserts that “selective

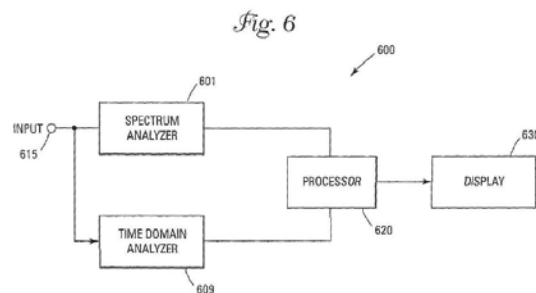
acquisition” creates a single, “shared channel.” *See supra*, Sect. II.A.2. We do not adopt this construction. *Id.* Applying our constructions of “channel” (“circuitry providing one or more signal paths in which a signal is processed”), “time domain channel,” and “frequency domain channel,” *see supra*, Sect. II.A.2, we find that Engelse discloses the recited “time domain channel” in the circuitry and paths as argued and illustrated above by Petitioner.

The time domain analyzer of Engelse Figure 5 discloses circuitry, such as filter 510, decimation circuit 512, and comparator 590, which provides paths for a signal. Ex. 1007 ¶ 53. Engelse discloses that this circuitry also performs signal processing on the signal. *Id.* (decimation circuit 512 selectively “decimat[ing] the down converted signal,” and filter 510 removing “undesirable filter components”). *Id.* As indicated in Figure 5 itself, this processing is for “time domain analy[sis]” of the signal(s). *Id.* at Fig. 5; *see also id.* at ¶¶ 8–9, 47.

Moreover, Figure 3 of the ’719 patent, described as depicting a “time domain channel” (and “frequency domain channel”), illustrates a remarkably similar configuration to the embodiment shown in Figure 6 of Engelse. A side by side comparison of those figures is reproduced below.



'719 patent FIGURE 3



Engelse FIGURE 6

Figure 3 of the '719 patent depicts a block diagram of a test and measurement instrument having time domain channel 12 and frequency domain channel 14, each of which can “be configured to receive the same input signal 42.” Ex. 1001, 6:36–41. A “splitter, switch, selector, or other routing signal device 44” routes the input signal such that it is received either by the time domain channel 12, the frequency domain channel 14, or both channels. *Id.* at 6:42–47. Similarly, Engelse Figure 6 illustrates a block diagram including spectrum analyzer 601, time domain analyzer 609, and “input 615” coupled to both analyzers. *Supra*, Section III.B.2.

Patent Owner contends that the “time domain analyzer” disclosed in Engelse performs “frequency shifting” and therefore cannot be considered a time domain channel. PO Resp. 29–30. Engelse, however, contradicts Patent Owner’s argument. Although a stated purpose of Engelse is to monitor “upstream frequency band,” Engelse also explicitly discloses “circuitry for frequency *and/or time domain analysis*.” Ex. 1007 ¶ 5 (emphasis added). Engelse further discloses selecting a particular signal “*for time domain analysis*.” *Id.* at ¶ 8 (emphasis added). Patent Owner’s argument relies on embodiments of the '719 patent allegedly indicating that, in those particular embodiments, frequency shifting does not occur. PO Resp. 29–30. Patent Owner offers no evidence, however, that all embodiments in the '719 patent perform in that manner and, more importantly, offers no evidence overcoming the express disclosures in Engelse of “time domain analysis” circuitry. *See, e.g.*, Ex. 1007 ¶¶ 5, 9, 14, 29, 53.

Accordingly, we find Petitioner has demonstrated by a preponderance of the evidence that Engelse discloses claim element 1[a].

Claim 1[b]: “a frequency domain channel configured to process a second input signal for analysis in a frequency domain”

Petitioner contends that Engelse discloses the recited “frequency domain channel” in its description of “spectrum analyzer 601” (Figure 6) for frequency domain analysis of a signal, which is coupled to receive “input signal 615” (a second input signal), and Figure 1 (“spectrum analyzer”). Pet. 15–16; Ex. 1007, Fig. 6. Petitioner cites multiple, additional figures in Engelse, and accompanying disclosures in the specification, in support of its argument. Ex. 1007 Figs. 2, 3, 7, ¶¶ 6–8, 31, 55–57. Petitioner also cites testimony from Dr. Villasenor in support of its contentions. Ex. 1003 ¶ 56.

Patent Owner does not dispute Petitioner’s assertions regarding this claim limitation, other than its contention regarding claim element 1[b] (discussed above) that Engelse only discloses a single, combined channel rather than separate channels. PO Resp. 27–29. For the reasons discussed above, we do not agree with Patent Owner’s assertion that Engelse only discloses a single channel. We are persuaded by Petitioner’s further, unrebutted arguments and evidence regarding claim element 1[b]. As disclosed in Engelse, the spectrum analyzer of Figure 1 steps through a selected frequency range to “analyze[] the spectrum of [an] input signal.” Ex. 1007 ¶ 32. We are persuaded that a person of ordinary skill in the art would understand spectrum analysis to constitute processing in the “frequency domain,” as Dr. Villasenor testifies. Ex. 1003 ¶¶ 68–69; Ex. 1007 ¶¶ 31–32. Moreover, as discussed at length in the preceding section, the figures of Engelse (here, Figures 1 and 6) each illustrate signal paths for

a signal on which processing occurs, as required by our claim construction of “channel.”

Accordingly, we find Petitioner has demonstrated by a preponderance of the evidence that Engelse discloses claim element 1[b].

Claim 1[c]: “an acquisition system coupled to the time domain channel and the frequency domain channel and configured to acquire data from the time domain channel and the frequency domain channel”

As discussed above, we construe “acquisition system” to mean circuitry configured to obtain data (for analysis). *See supra* Sect. II.A.3 (claim construction). Petitioner contends that Engelse discloses the recited “acquisition system.” Petitioner relies on Engelse’s disclosure of a “processor 620 and a display 630 [Fig. 6] in addition to memory structures associated with obtaining data inside the spectrum analyzer [Fig. 1] and time domain analyzer [Fig. 5].” Pet. 16; Ex. 1007 ¶¶ 51, 54, 56, Figs. 1, 5, 6. Petitioner also cites the supporting testimony of Dr. Villasenor. Ex. 1003 ¶¶ 64, 65.

Specifically, Petitioner asserts that Engelse discloses “acquiring” data from the time domain channel in an embodiment in which “the output of comparator 590 [Fig. 5] is stored in memory [not shown in Fig. 5] for processing by processor 520,” and in another embodiment in which “display 530 [Fig. 5] provides a graphical representation of the noise in the monitored channel.” Pet. 17; Ex. 1007 ¶¶ 51, 54. Petitioner further asserts that Engelse discloses “acquiring” data from the frequency domain channel in the description accompanying Figure 1, which illustrates processor 120 receiving (via memory 106) output of a decoder circuit within the “spectrum

analyzer,” and providing a display representing that output. Pet. 17; Ex. 1007 ¶¶ 31–32, 35, Fig. 1; Ex. 1003 ¶¶ 68–69.

In other words, Petitioner maps the “acquisition channel” recited in claim 1 to one or more of the following elements in Engelse: (1) processor 120/520/620 shown in Engelse Figure 1 (spectrum analyzer), Figure 5 (time domain analyzer), and Figure 6 (overall block diagram of signal analyzer); (2) display 130/530/630 shown in Engelse Figure 1 (spectrum analyzer), Figure 5 (time domain analyzer), and Figure 6 (overall block diagram) respectively; and (3) “memory” 106 shown within Figure 1 (frequency domain analyzer) and memory described (but not shown) in Figure 5 (time domain analyzer).

Patent Owner responds that none of the elements cited by Petitioner correspond to the claimed “acquisition system.” Patent Owner argues that memory 106 (Fig. 1) is inside the time domain analyzer, that memory described in Figure 5 is inside the frequency domain analyzer, and that because Petitioner maps these respective analyzers to the “channels” recited in the claims, they cannot also be part of the recited “acquisition system.” PO Resp. 32; Ex. 1007 ¶¶ 34–35, Fig. 1; Ex. 1024 ¶ 132. Patent Owner further argues that processor 120/520/620 and display 130/530/630 are not an “acquisition system” because they do not “capture[] input signals from the two analyzers to generate records,” but rather, operate only on data “already acquired” within the respective channels. PO Resp. 32–33; Ex. 2014 ¶¶ 133–34. Finally, Patent Owner argues that the processor in Engelse only “selectively operates” one or the other of the time domain analyzer and frequency domain analyzer, and thus cannot acquire data from both. PO Resp. 34; Ex. 1007 ¶ 57; Ex. 2014 ¶ 137.

Applying our claim construction of “acquisition system,” we are persuaded by Petitioner’s arguments and evidence that the processor-display combination shown in Engelse Figures 1, 5, and 6, and the accompanying descriptions in Engelse cited above, disclose an acquisition system as recited in claim 1. Engelse Figures 1 and 6 (*see supra*) illustrate that “[s]pectrum analyzer 601 is coupled to processor 620 Time domain analyzer 609 is also coupled to processor 620. Processor 620 is coupled to display 630.” Ex. 1007 ¶ 56; Ex. 1003 ¶¶ 64–65. Engelse further discloses acquiring data from the time domain analyzer (609/509). Ex. 1003 ¶¶ 66–67. In one embodiment, “the output of comparator 590 [of time domain analyzer 509] is *stored in a memory for processing* by processor 520.” Ex. 1007 ¶ 54 (emphasis added). The “output of processor 520,” such as a desired noise signal, is displayed on “display 530 coupled to processor 520.” Ex. 1007 ¶ 51. Accordingly, we agree with Petitioner’s contention that the processor is coupled to the time domain channel, and configured to acquire data from the time domain channel.

Engelse also discloses acquiring frequency domain data from the spectrum analyzer (601/101). Ex. 1003 ¶¶ 68–69. “[V]alues related to the measured power of the signal are stored in memory 106 with an indication of the associated frequency for the power measurement.” Ex. 1007 ¶ 31. According to Engelse, “memory 106 is coupled to processor 120” and the output of processor 120 is a graph of power levels.” Ex. 1007 ¶ 32, Fig. 1. “Processor 120 retrieves the power information stored in memory 106 for manipulation and output.” *Id.* at ¶ 35 (emphasis added). Engelse discloses that “[i]n one embodiment the information [in processor 120] is further output to display 130 for review by system operators.” *Id.* at ¶ 32 (“a display

130 ... displays the desired output such as a graph of the system power levels.”); Ex. 1003, ¶¶ 68–69. Accordingly, we are persuaded by Petitioner’s contention that the processor is coupled to the frequency domain channel, and is configured to acquire data from the frequency domain channel.

In sum, we find Engelse Figure 1 illustrates processor 120 coupled to and acquiring data from the spectrum analyzer (frequency domain channel), including the spectrum analyzer’s memory 106. *See supra*. Figure 5 illustrates processor 520 coupled to and acquiring data from the time domain analyzer (time domain channel), including the time domain analyzer’s threshold comparator 590. *See supra*. Figure 6 illustrates these acquisitions at a higher level, showing processor 620 coupled to and acquiring data from both the spectrum analyzer 601 and time domain analyzer 609. *See supra*.

Although Patent Owner contends that memory within the “time domain channel” or “frequency domain channel” cannot also be the claimed “acquisition system,” Patent Owner’s argument does not address the processor. The processor disclosed in Engelse Figures 1, 5, and 6 acquires data from both channels (for further processing, such as processing for display) and, as discussed above, is illustrated as a separate component “coupled to” each channel.

Patent Owner’s other arguments are not persuasive because they rely on Patent Owner’s proposed construction of “acquisition system,” which we have not adopted because it is not supported by the record. *See supra*, Sect. II.A.3. Specifically, the claimed acquisition system is not limited to acquiring data “only once” or the “first” time, and the claim does not require “generating a record.” PO Resp. 13–14. Moreover, whether Engelse only

discloses “selective operation” of the channels is immaterial to claim 1, which only recites that the acquisition system “acquires” data from the channels, and that (as discussed below) the channels do not process the “same signal sequentially.”

For the foregoing reasons, we find Petitioner has demonstrated by a preponderance of the evidence that Engelse discloses claim element 1[c].

Claim 1[d]: “wherein the time domain channel and the frequency domain channel are not used to process the same signal sequentially.”

Petitioner contends that Engelse discloses limitation 1[d] because in Engelse, the “time domain analyzer [i.e., time domain channel] and spectrum analyzer [i.e., frequency domain channel] are not used to process the same input signal in series,” i.e., sequentially. Pet. 18–19; Ex. 1003 ¶¶ 70–81. Petitioner asserts that the phrase “not . . . process the same signal sequentially” was added by Patent Owner during prosecution to distinguish over prior art (the Kato published patent application) in which the signal output from a first signal processing unit was received (sequentially) as input to a second signal processing unit, which further processed the signal. Pet. 18–19.

Petitioner asserts that Engelse “discloses examples with topologies that are consistent with implementations from the ’719 Patent that, in Patent Owner’s own words, allegedly support the amended wherein claims.” *Id.* at 19–20. Referring to Engelse Figure 6, for example, Petitioner asserts the signal from input 615 in Engelse is not first received by the time domain analyzer, processed, and then the same signal subsequently received by the spectrum analyzer and processed. *Id.* at 20; Ex. 1007 ¶¶ 57–58.

Accordingly, Petitioner contends that the fact that input 615 in Engelse is not used as input for one channel, processed, and the result output to a second channel, means that it satisfies the claim limitation. Pet. 21.

Patent Owner does not present evidence or argument rebutting Petitioner's contentions regarding this claim limitation.

We have weighed the evidence bearing on this claim element, and we are persuaded by Petitioner's un rebutted argument and evidence. Accordingly, we find Petitioner has demonstrated by a preponderance of the evidence that Engelse discloses claim element 1[d].

Summary of Claim 1

In summary, upon consideration of the parties' arguments and evidence in the record, we find that Petitioner has demonstrated by a preponderance of the evidence that the subject matter of claim 1 is anticipated by Engelse.

b. Claim 12

Claim 12, the other independent claim in the '719 patent, recites the same preamble, element [a] (time domain channel), and element [b] (frequency domain channel) as claim 1, discussed above. The parties' arguments and our analysis of these elements in claim 1 apply equally to claim 12.

The lone remaining limitation of claim 12 recites the following (in lieu of the "acquisition system" of claim 1):

a *controller* coupled to the time domain channel and the frequency domain channel and configured to *control acquisition parameters* of the time domain channel and the frequency domain channel such that the acquisition parameters of the time domain channel and the frequency domain channel *are different*.

Ex. 1001, 12:13–23 (emphases added).

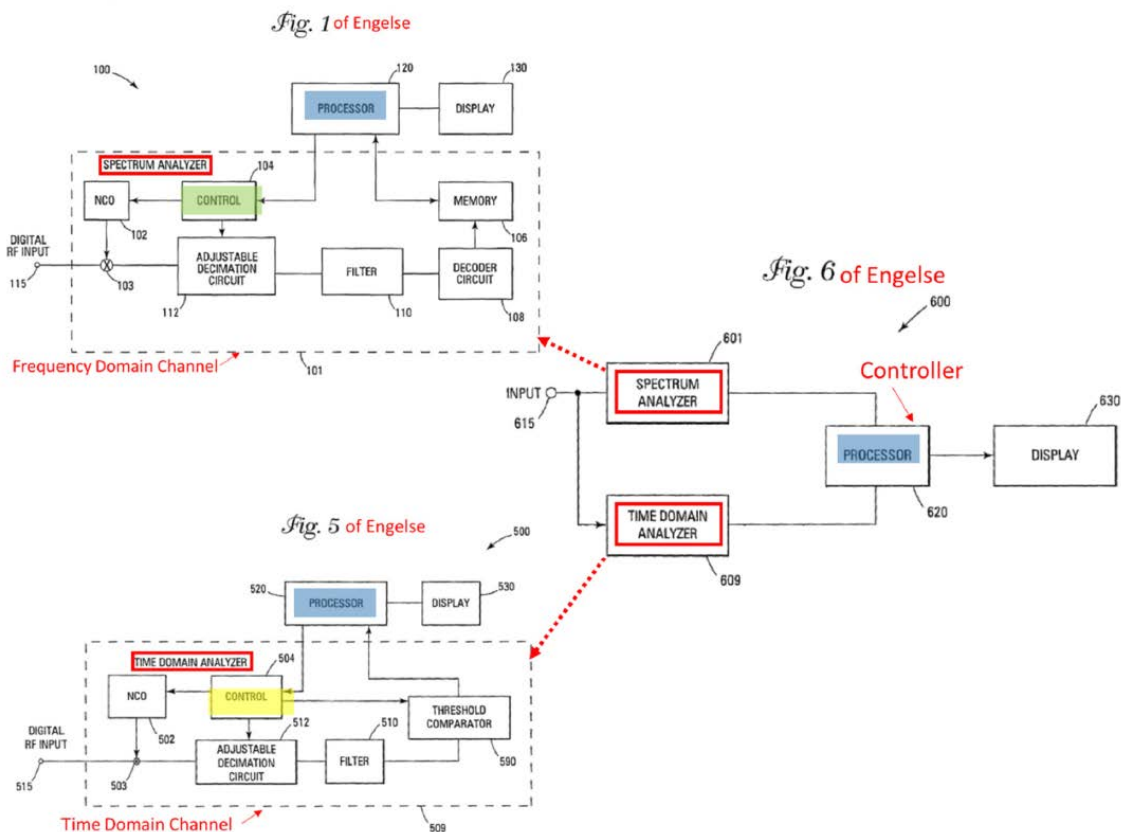
Petitioner contends that Engelse discloses the claimed controller in its description of processor 620 (Figure 6) coupled to time domain analyzer 509/609 (in Figure 5 and Figure 6) and spectrum analyzer 101/601 (in Figure 1 and Figure 6). Ex. 1007, Figs. 1, 5, 6; Ex. 1003 ¶¶ 82–83. Citing the testimony of Dr. Villasenor, Petitioner argues “[p]rocessor 620 selectively *controls the operation* of signal analyzer 600 to select the appropriate signal analysis to be performed.” Ex. 1007 ¶ 0057 (emphasis added); Ex. 1003 ¶¶ 82–83.

Petitioner further asserts that Engelse discloses the processor controlling a time domain analyzer and spectrum analyzer by separately adjusting numerous and different parameters. Pet. 24. For example, Engelse discloses that “processor 620 *provides control signals to time domain analyzer 609* when time domain analysis is to be performed.” *Id.* (emphasis added); Ex. 1007, Fig. 6. According to Petitioner, Engelse Figure 5 illustrates processor 520 driving “a control circuit 504 [which is] coupled to numerically controlled oscillator (NCO) 502,” which, in turn, “drives the operation of mixer 503.” Pet. 24 (citing Ex. 1007 ¶ 50; Ex. 1003 ¶84).

Patent Owner responds that Petitioner improperly relies on the same element in Engelse (the “processor” labeled 120/520/620 in Figures 1, 5, and 6, respectively) for both the “acquisition system” and the “controller” in the

'719 patent claims. PO Resp. 37–38. Patent Owner also argues that Engelse does not disclose controlling “different” acquisition parameters, because Engelse only discloses “selective operation” of either the time domain analyzer or frequency domain analyzer. PO Resp. 35–36. Citing the testimony of Dr. Blalock, Patent Owner argues that one of ordinary skill in the art would have understood selective operation of the analyzers to mean that the control parameters can be (and are) the same, because the analyzers are not operated at the same time. *Id.*; Ex. 2014 ¶ 163.

We are persuaded by Petitioner’s evidence and arguments. We begin by referring to Petitioner’s annotated Figures 1, 5, and 6 of Engelse, reproduced below.



Petitioner's annotated Figures 1, 5, and 6 are block diagrams illustrating Engelse's frequency domain analyzer, time domain analyzer, and signal analyzer, respectively, as previously discussed herein. Figure 5 illustrates processor 520 driving "control circuit 504," which is coupled to numerically controlled oscillator (NCO) 502. Ex. 1007 ¶ 50. NCO 502, in turn, "drives the operation of mixer 503." *Id.* ("Control circuit 504 selectively controls the frequency of the down converted signals from mixer 503 through controlling NCO 502"); *see also* Ex. 1003 ¶84.

Annotated Figure 6 illustrates processor 620 configured to control acquisition parameters of the frequency domain channel 601. Engelse discloses that "processor 620 provides necessary control signals to spectrum analyzer 601 when frequency spectrum analysis is needed." Ex. 1007 ¶¶ 56–57; Ex. 1003 ¶ 85. Annotated Figure 1 illustrates further detail of spectrum analyzer 101/601. According to the disclosure in Engelse, the spectrum analyzer "steps through a selected frequency range in analyzing the spectrum of the input signal." Ex. 1007 ¶ 32. Processor 120 drives "a control circuit 104 coupled to numerically controlled oscillator (NCO) 102," which, in turn, "drives the operation of mixer 103." Ex. 1007 ¶ 0032. As explained in the testimony of Dr. Villasenor:

[c]ontrol circuit 104 selectively controls the frequency of the down converted signals from mixer 103 through controlling NCO 102. Control circuit 104 establishes an initial control value, a number of steps and a step size for the control value provided to NCO 102. Control circuit 104 steps the NCO 102 through a plurality of frequencies of the frequency spectrum of the input signal, thereby allowing measurement of power over a *selected* frequency spectrum.

Ex. 1003 ¶ 86 (emphasis added). We find this testimony of Dr. Villasenor is credible in view of the disclosures of Engelse, as discussed above.

In addition, we find that Petitioner has established by a preponderance of the evidence that Engelse's processor 620 is "configured to control acquisition parameters ... such that the acquisition parameters of the time domain channel and the frequency domain channel *are different*." Ex. 1007 ¶ 12:23 (emphasis added). As discussed in Section II.A.3, we construe "acquisition parameters" to mean parameters (i.e., values) to determine how data is obtained for processing (e.g., sampling characteristics). We find that Engelse discloses that the control signals applied to spectrum analyzer 101 and time-domain analyzer 509 are set to be different. Ex. 1007 ¶¶ 32, 57 (processor 620 providing control signals to spectrum analyzer 601 and time domain analyzer 609), Ex. 1003 ¶ 87. The acquisition parameters of spectrum analyzer 101 include the "*selected* frequency spectrum" over which power is measured. Ex. 1007 ¶ 32 (emphasis added); Ex. 1003 ¶ 88. This operation, in contrast, is not performed by the time domain analyzer 509. Ex. 1007 ¶ 37; Ex. 1003 ¶¶ 88–89. Moreover, the acquisition parameters of the time domain analyzer include a threshold value for threshold comparator 590, which has no counterpart in the spectrum analyzer 101. *See* Ex. 1007 ¶ 48; Ex. 1003 ¶ 89.

Accordingly, we are persuaded by Petitioner that Engelse discloses different configurations and operation of the "time domain analyzer" and "frequency domain analyzer," respectively, such that the acquisition parameters (as controlled by the controller) are different. *See, e.g.*, Ex. 1001 ¶¶ 36, 47. Dr. Villasenor credibly testified that one of ordinary skill would

have understood Engelse as disclosing different control signals sent from the processor (120/520) to the control circuits 104 and 504 to control NCOs 102/502 and mixers 103/503, in order to condition signals in the two channels differently. Pet. Reply 16; Ex. 1007 ¶ 32; Ex. 1030 ¶¶ 67–69; *id.* at ¶ 89 (describing how Engelse discloses different sample rate, frequency range, time period, and bandwidth as to the channels).

We are not persuaded by Patent Owner’s argument regarding “selective operation” of the channels in Engelse, because claim 12 does not preclude selective control or operation of channels, or selective acquisition. Ex. 1001, 12:17–24. Nor does claim 12 require simultaneous or contemporaneous control, operation, or acquisition. *Id.*; *see also* Sect. II.A.3 (claim construction); *supra* at 27 (discussing Figure 3 of the ’719 patent).

We are also not persuaded by Patent Owner’s argument that Petitioner cites the same element in Engelse (the processor) as both the “acquisition system” of claim 1 and the “controller” of claim 12. Claim 12 does not recite an acquisition system. Claim 1 does not recite a controller. To the extent Engelse’s disclosure of a processor satisfies either element in these unrelated claims (we find that it does), Petitioner may rely on Engelse’s processor as the “acquisition system” of claim 1 and the “controller” of claim 12.⁸

⁸ As discussed below, however, for the dependent claims reciting *both* an acquisition and a processor, Patent Owner’s argument is persuasive.

In summary, upon consideration of the parties' arguments and evidence in the record, we find that Petitioner has demonstrated by a preponderance of the evidence that the subject matter of claim 12 is anticipated by Engelse.

c. Dependent claims 4 and 14

Claim 4 depends from claim 1, and further recites:

a controller coupled to the time domain channel and the frequency domain channel and configured to control acquisition parameters of the time domain channel and the frequency domain channel such that the acquisition parameters of the time domain channel and the frequency domain channel are different.

Ex. 1001, 11:11–18.

Petitioner contends that “Engelse discloses a processor (e.g., 620 in FIG. 6)” that “selectively controls the operation of signal analyzer 600,” and therefore discloses the claimed “controller.” Pet. 23; Ex. 1007 ¶ 57, Figs. 1, 5, 6; Ex. 1003 ¶¶ 82–83. Petitioner further contends that the acquisition parameters controlled by “processor 620” are “different” for the spectrum analyzer and time domain analyzer of Engelse, because the spectrum analyzer must be instructed to “step through a selected frequency range,” while the time domain analyzer must be instructed to drive a numerically controlled oscillator and mixer. Pet. 23–24.

We are not persuaded by Petitioner's arguments and evidence regarding claim 4. As Patent Owner argues, Petitioner has asserted (and we find, *supra*) that Engelse's processor (120/520/620) discloses the “acquisition system” limitation of claim 1. Pet. 16–17. Claim 4, however, by virtue of depending from claim 1, requires both an acquisition system and

a controller. Ex. 1001, 11:13–18. The specification describes the acquisition system as “interface[ing] with” and being “coupled to” the controller. *Id.* at 7:52–54, Fig. 5. Thus, although the Engelse processor 120/520/620 may be understood by a person of ordinary skill in the art as disclosing the controller of one claim, *see supra* (claim 12), or disclosing the acquisition system of an unrelated claim, *see supra* (claim 1), we find it does not disclose both of the two different elements in claim 4, i.e., the recited “controller” and “acquisition system.”⁹

Claim 14, which depends from claim 12, recites the same limitations of an “acquisition system” and (by virtue of claim 12) a “controller” coupled to the channels. For the same reasons as claim 4, we are not persuaded by Petitioner’s arguments and evidence regarding claim 14.

In summary, Petitioner has not persuaded us by a preponderance of the evidence that claims 4 and 14 are anticipated by Engelse.

d. Dependent claim 6

Claim 6 depends from claim 1, and further recites “an input port . . . configured to receive an input signal and provide the input signal to the time domain channel and the frequency domain channel.” Ex. 1001, 11:26–31. Petitioner contends that Engelse discloses “input 615 [in Figure

⁹ To the extent Petitioner suggests that a display or display memory in Engelse constitutes part of the recited “acquisition system,” Pet. 16, Petitioner does not appear to argue (and, in any event, does not present persuasive evidence) that a display alone can satisfy that element (or the “controller” of claim 4).

6, *supra*] designed to receive an input signal” comprising “upstream signals” from external “cable modems.” Pet. 27; Ex. 1007 ¶ 55–56. Citing the testimony of Dr. Villasenor, Petitioner argues that a person of ordinary skill in the art would have understood an “input” received from cable modems as being received through an input port. Ex. 1030 ¶ 74. Thus, Petitioner argues, Engelse discloses the claimed “input port” and, as shown in Figure 6, provides the input signal to the respective channels as recited in claim 6. Pet. 27–28; Ex. 1003 ¶¶ 91–92.

Patent Owner responds that although “Engelse discloses a number of input ports throughout the specification . . . input 615 in FIG. 6 is not one of them.” PO Resp. 38; Ex. 2014 ¶ 175. Patent Owner argues, citing the testimony of Dr. Blalock, that not every “input” in Engelse is an “input port,” and specifically, that input 615 is “merely an internal circuit node” or “embedded circuitry.” PO Resp. 38; Ex. 2014 ¶ 174. Referring to Engelse Figure 4, in contrast, Patent Owner observes that Engelse expressly identifies “1 to N” inputs as “input ports.” Patent Owner implies that these input ports 1 to N also do not disclose the port recited in claim 6, because they do not provide the input signal to the time domain channel and frequency domain channel.

We are persuaded by Petitioner’s arguments and evidence, for at least three reasons.

First, as Petitioner argues, Engelse discloses signal analyzer (600), including a time domain channel (609) and frequency domain channel (601), “designed to receive an input” of “upstream signals from DOCSIS compliant, EURO-DOCSIS compliant or other appropriate cable modems.”

Ex. 1007 ¶ 55. *Id.* at ¶ 56. We find credible Dr. Villasenor’s testimony that a person of ordinary skill in the art would have understood a test and measurement instrument receiving signals (even “upstream” signals) from an external device such as a “cable modem” as disclosing an “input port.” See, e.g., Ex. 1003 ¶ 92. Further, Engelse discloses that signal analyzer 600 (Figure 6) provides mechanisms for “monitoring of signals received at input 615,” including the spectrum analyzer and time domain analyzer, which means the input is “provide[d]” to the respective channels, as recited in claim 6. *Id.*; Ex. 1007 ¶¶ 56–57.

Second, the “inputs” described in the ’719 patent (which cumulatively provide support for the term “input port” in the claims) all are substantially identical to the inputs illustrated in Engelse. The phrase “input port” does not appear in the ’719 patent specification, and neither party proposes a claim construction for the term “input port.” The specification only refers to “inputs” and “input signal(s),” namely, “first input signal 18” (Figures 1, 5, 6, and 7), “second input signal 20” (Figures 1, 2, 5, 6, and 7), “input signal 42,” and “digitized signal 120 [which] is input” (Figure 8). Ex. 1001, 2:66–67, 6:45, 10:23. These “inputs” in the ’719 patent are shown, for example, in Figures 1 and 3 of the ’719 patent, reproduced below:

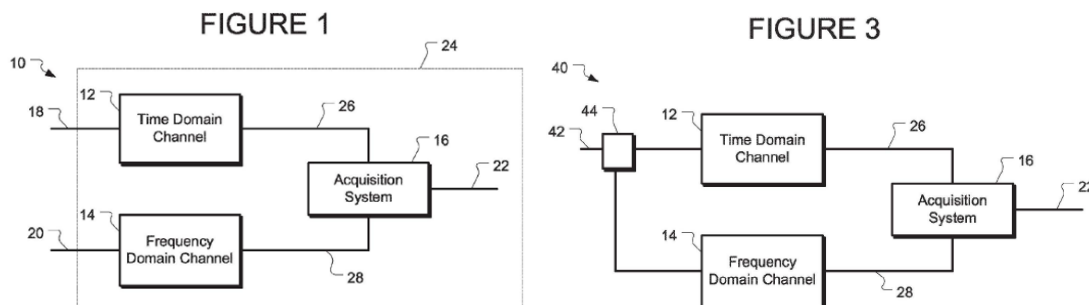


Figure 1 is a block diagram of a “test and measurement instrument [10]” of the ’719 patent, including “first input signal 18” and “second input signal 20,” which are “coupled to the time domain channel 12 and the frequency domain channel 14,” respectively. Ex. 1001, 2:62–3:4. Figure 3 is a block diagram of another “test and measurement instrument [10]” of the ’719 patent, including “time domain channel 12 and [] frequency domain channel 14 . . . each [of which can] be configured to *receive the same input signal 42.*” *Id.* at 6:36–41 (emphasis added). Figure 3 further illustrates, between the beginning of input signal 42 and the respective channels, a “splitter, switch, selector, or other signal routing device.” *Id.* at 6:42–45 (emphasis added).

Patent Owner argues that Engelse does not disclose an input *port* (including in any of the figures) and that the “circle” corresponding to input 615 in Figure 6 is merely a node. PO Resp. 38. Patent Owner’s argument, however, ignores that the disclosures of “inputs” in Engelse are substantially the same as the *only* disclosures and illustrations of inputs throughout the ’719 patent, as shown in the examples above. Engelse Figure 6 is reproduced below (*see also, supra*).

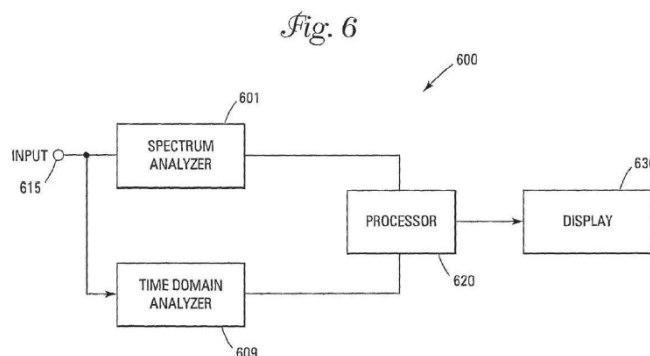


Figure 6 illustrates signal analyzer 600, including “input 615 designed to receive an input signal,” spectrum analyzer 601, time domain analyzer 609, processor 620, and display 630. Control signals may provided to “select” the appropriate analyzer for signal processing. *Id.* at ¶ 57.

Thus, Patent Owner’s contentions regarding diagram labeling (PO Resp. 2, 26, 39) are unhelpful to its position, because Engelse Figure 6 (and particularly input 615) discloses a nearly identical configuration to the ’719 patent Figure 3, and no other embodiment in the ’719 patent discloses a distinct “input port.”

Third, Patent Owner acknowledges that Engelse discloses “input ports” in Figure 4. PO Resp. 38–39; Ex. 2014 ¶¶ 175–76. Figure 4 is reproduced below.

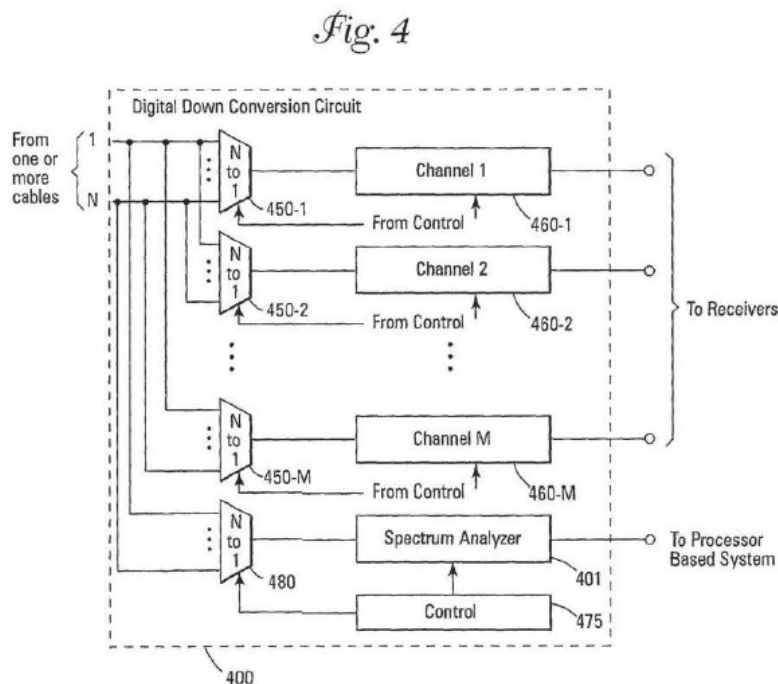


Figure 4 illustrates a “digital down conversion circuit” 400 including one or more “input ports 1 to N.” Ex. 1007 ¶ 41–42. The inputs are multiplexed

(450-1 to 450-M, 480) and provided to various “channels,” including “spectrum analyzer 401,” which Engelse discloses may be “signal analyzer 600” in one embodiment. *Id.* at ¶¶ 42–43.¹⁰

Patent Owner implies that Figure 4 does not disclose an input port as recited claim 6, because “multiplexers” between input ports 1 to N and spectrum analyzer 401 (e.g., signal analyzer 600), not the input port(s), “provide” the input directly to the time domain channel and frequency domain channel of signal analyzer 600. PO Resp. 39–40. For the reasons discussed above, however, we find no support in the record for this position. Specifically, the disclosures in the ’719 patent indicate that the only elements that could be understood as describing “input ports” in the ’719 patent can include further circuitry between receiving the input signal and providing it to the channels. Figure 3 of the ’719 patent illustrates such circuitry, i.e., a “splitter, switch, selector, *or other signal routing device.*” *See supra* (emphasis added).¹¹

In summary, we find that Petitioner has demonstrated by a preponderance of the evidence that Engelse discloses all of the elements of claim 6, and thus claim 6 is anticipated by Engelse.

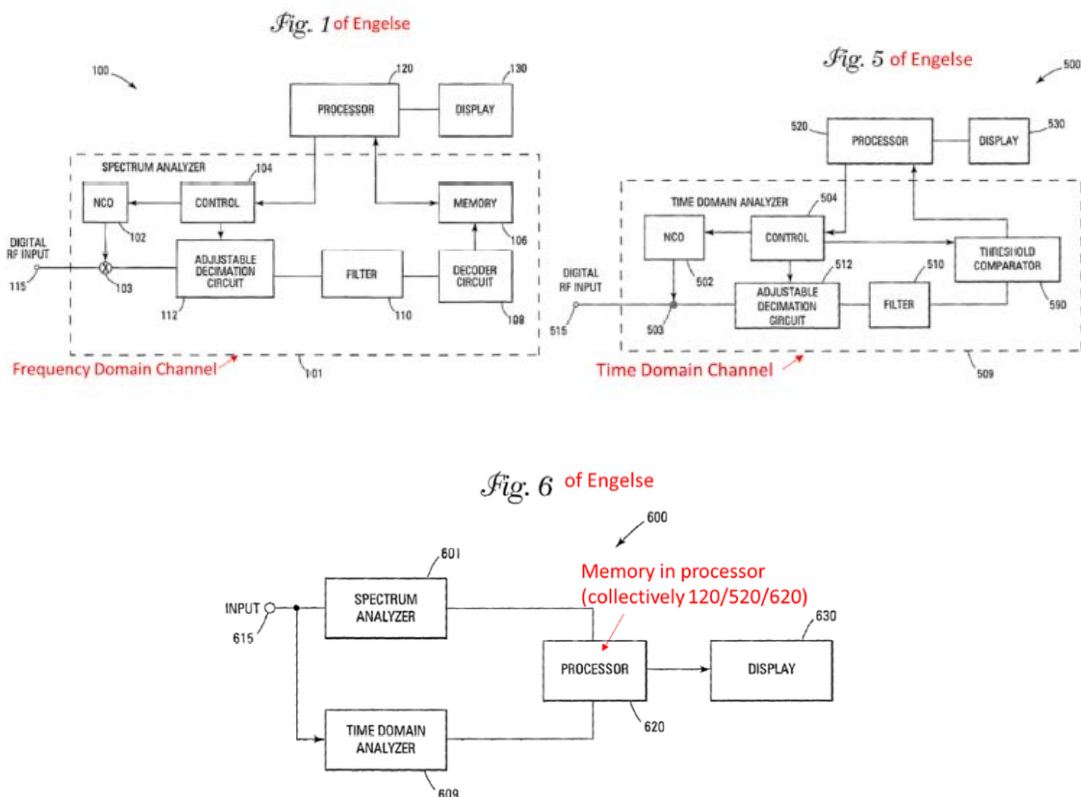
¹⁰ Figure 4’s illustration of “channels” alongside spectrum analyzer 401 (e.g., signal analyzer 600) does not, in our view, contradict our findings that signal analyzer 601 includes two channels *within* it, and is consistent with our claim construction of “channel.” *See supra*, Sect. II.A.2 (“channel”); Sect. II.B.3.a (claim 1).

¹¹ Petitioner, in IPR2018-00647, noted potential anomalies between use of the word “input” in claim 1 and its dependent claim 6, but neither party argued this issue, and we discern claim 6 to be sufficiently clear to decide the issues argued in this proceeding.

e. Dependent claim 8

Claim 8 depends from claim 1, and further recites “an *acquisition memory*,” wherein the “frequency domain channel further comprises: an *in-phase path* coupled to the acquisition memory; and a *quadrature-phase path* coupled to the acquisition memory;” and “the time domain channel is coupled to the acquisition memory.” Ex. 1001, 11:35–45 (emphasis added).

Petitioner contends that Engelse discloses the claimed “acquisition memory” in its description of “memory 106” (Engelse Figure 1), “memory in threshold comparator 590” (Figure 5), and “memory in processor” 120/520/620. Pet. 29–31; Ex. 1007 ¶¶ 31, 38, 52, Figs. 1, 2, 5, 6; *see also id.* at ¶ 54 (“output of comparator 590 is stored in *a memory* for processing by processor 520”). Petitioner illustrates its position with annotated versions of Engelse Figures 1, 5, and 6, reproduced below:



As previously discussed, Engelse Figures 1, 5, and 6 are block diagrams of a spectrum analyzer, time domain analyzer, and signal analyzer (including the spectrum analyzer and time domain analyzer), respectively. Petitioner contends that Engelse discloses the claimed “in-phase path” and “quadrature-phase path,” each “coupled to the acquisition memory,” in its description of spectrum analyzer 101 calculating power at each desired frequency based on the I (in-phase) and Q (quadrature) components:

[d]ecoder circuit 108 then receives the output of filter 110 and measures the power of the output signal. Basically the output of decoder circuit 108 is a power level at a particular frequency. . . . Software controls the measurement and calculation of power by decoder circuit 108. For example, . . . decoder circuit 108 uses the following equation to calculate the power of the signal at a desired frequency:

$$\text{Power} = \sqrt{I^2 + Q^2}$$

The I and Q components each have a certain magnitude. The output of the decoder circuit 108 is power at a particular frequency and is input into memory 106. . . . The related power information of the filtered signal is stored in memory 106 for processing by processor 120.

Ex. 1007 ¶ 33–34. Petitioner relies on the testimony of Dr. Villasenor in support of its contentions. Ex. 1003 ¶¶ 93–94.

For the following reasons, we are not persuaded by Petitioner’s arguments and evidence. Specifically, we are not persuaded that the foregoing disclosures in Engelse satisfy claim 8’s limitation that both an “in-phase path” and “quadrature-phase path” are “coupled to the acquisition memory.”

As Patent Owner argues, even if one of ordinary skill in the art would have understood Engelse's description of "I and Q *components*" as signal *paths*, the foregoing passages in Engelse only disclose that a single value, "power at *a* particular frequency," is "output" from decoder circuit 108 and "stored in memory 106 for processing by processor 120." Ex. 1007 ¶ 34 (emphasis added); *see also id.* at ¶ 33 (equation using I and Q components yields a single power value). Thus, we find the foregoing passages in Engelse do not disclose *both* an "in-phase path" and "quadrature-phase path" are "coupled to" the memory 106 and processor 120. Although Petitioner also relies on other elements in Figures 1 and 6 (in addition to memory 106 and processor 120) as disclosing "acquisition memory," Petitioner does not allege or demonstrate that such elements are coupled to the in-phase path and quadrature-phase path.

We, therefore, are not persuaded by a preponderance of the evidence that claim 8 is anticipated by Engelse.

f. Dependent claim 10

Claim 10 depends from claim 1, and further recites the time domain channel and frequency channel as having a "first frequency range" and "second frequency range," respectively, wherein the "first frequency range is different from the second frequency range." Ex. 1001, 11:53–12:5. Petitioner contends that Engelse discloses these limitations in its figures and accompanying descriptions of "selected" frequency ranges as applied to spectrum analyzer 101/501/601 and time domain analyzer 509/609. Pet. 33–34. Petitioner relies on the testimony of Dr. Villasenor in support of its contentions. *Id.*; Ex. 1003 ¶¶ 98–100.

Patent Owner does not contest or rebut Petitioner's evidence and argument regarding claim 10, beyond its argument that Engelse does not disclose the elements of base claim 1, *see supra*. As discussed above, Petitioner has persuaded us that Engelse discloses each of the elements of claim 1.

We have reviewed the evidence regarding the additional elements recited in claim 10, and we are persuaded by Petitioner's un rebutted contentions and evidence that Engelse discloses each additional element. Accordingly, we are persuaded that claim 10 is anticipated by Engelse.

g. Summary: Anticipation by Engelse

In summary, we find that Petitioner has demonstrated by a preponderance of the evidence that claims 1, 6, 10, and 12 are anticipated by Engelse. Petitioner has not demonstrated by a preponderance of the evidence that claims 4, 8, and 14 are anticipated by Engelse.

*C. Obviousness over Engelse and Wimmer
(Claim 2)*

1. Principles of Law

A claim is unpatentable under § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in

the art;¹² and (4) when in evidence, objective indicia of non-obviousness (i.e., secondary considerations). *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). We analyze the remaining asserted grounds with the above-identified principles in mind.¹³

*2. Challenged Claim 2
(Obviousness over Engelse and Wimmer)*

Claim 2 depends from claim 1, and further recites:

a trigger system coupled to the time domain channel and the frequency domain channel, and configurable to trigger an acquisition of the acquisition system in response to at least one of an event from the time domain channel and an event from the frequency domain channel.

Ex. 1001, 11:1–5.

Petitioner contends that claim 2 would have been obvious over the combined teachings of Engelse and Wimmer. Pet. 62–67. Petitioner asserts that Engelse teaches an instrument for measuring noise, i.e., “system 500” (Figure 5) allows a “service provider to examine noise in channels that are not being used to determine if they are usable.” Pet. 40; Ex. 1007 ¶ 46. Petitioner contends that Engelse further teaches using a “threshold comparator” to compare a filter output with a threshold “over successive time intervals,” and thereby provide an “estimate or measurement of noise *at a particular time.*” Pet. 40–41 (emphasis added); Ex. 1007 ¶ 49. This

¹² See *supra*, Sect. II.A (finding level of ordinary skill in the art).

¹³ The parties do not address objective indicia of non-obviousness, which accordingly do not form part of our analysis.

estimate, Petitioner asserts, helps determine whether channels are usable. Ex. 1007 ¶ 46; Ex. 1003 ¶ 114.

Citing Dr. Villasenor's testimony and Engelse's disclosures, Petitioner further contends that a person of ordinary skill would have recognized the need and advantages to "*selectively*" enable the foregoing estimations, "so that a field service person or the system itself can then perform further analysis on the data to inspect the effect of noise." Pet. 41 (emphasis added); Ex. 1003 ¶ 115; Ex. 1007 ¶ 46. To do so, Petitioner contends a person of ordinary skill would have utilized a "trigger system," which Dr. Villasenor testifies was well known in the art and "commonly used prior to" and at the "time of the purported invention." Ex. 1003 ¶ 116. One such trigger system is disclosed in Wimmer, which describes a "general trigger configuration that uses the output of a threshold comparator to trigger an acquisition" of a signal. Pet. 42; Ex. 1008, 1:27–32, 2:4, 3:31, Fig. 1; Ex. 1003 ¶ 116. Petitioner asserts it would have been obvious to a person of ordinary skill to apply the general teachings of a trigger system in Wimmer, to the filter output in Engelse's analyzer (Figure 5), because "Engelse already discloses using such output for threshold comparison." Pet. 42–43; Ex. 1007 ¶ 53. Petitioner contends that this combination teaches or suggests the trigger system recited in claim 2. Pet. 40–43.

Patent Owner, relying on the testimony of Dr. Blalock, responds that although Wimmer discloses a trigger system, it does not disclose data "acquisition" as recited in claim 2. PO Resp. 45; Ex. 2014 ¶ 140. In addition, Patent Owner asserts that the trigger of Wimmer is "incompatible with" Engelse's threshold comparator circuit because Wimmer discloses an analog input, whereas the output from the filter in Engelse Figure 5 is a

“digitized signal.” PO Resp. 46. Patent Owner argues that a person of ordinary skill would not have understood the specific triggering capabilities in Wimmer (“Boolean functions” and “edge detection”) as being applicable or useful in Engelse’s system. PO Resp. 49–50; Ex. 2014 ¶¶ 150–53; Ex. 1008, 2:40–59.

We are persuaded by Petitioner’s arguments and evidence, and find Dr. Villasenor’s testimony credible and consistent with the disclosures in Engelse and Wimmer. As Petitioner argues, Engelse teaches threshold comparator 590 and a comparator that is part of the processor 520 to compare symbol periods. Ex. 1007 ¶ 52. Engelse further discloses:

threshold comparator 590 includes a memory for recording information about the noise for a plurality of successive symbol periods. Processor 520 reads this information and determines the estimate of the noise level of the channel based on a percentage of the symbol periods that the output of filter 510 exceeded or fell below a set threshold.

Ex. 1007 ¶ 52.

Petitioner articulates sufficient reasoning, with rational underpinning, to effect the combination of Engelse and Wimmer that it proposes. That is, we are persuaded by Petitioner’s contention that implementing a trigger system in the foregoing instrument for estimating noise would have been obvious to a person of ordinary skill. Specifically, when “the noise level of the channel based on a percentage of the symbol periods that the output of filter 510 exceeded or fell below a set threshold,” an “output of the comparator in the processor 520 would be used to trigger an acquisition of a noise signal.” Pet. Reply 21. As Petitioner asserts, Wimmer describes that “this output of the comparator would be sent to a trigger system that would

trigger an acquisition of the noise signal that the processor 520 receives.”
Id. (citing Ex. 1007 ¶ 51).

Petitioner’s assertions are supported by the teachings in Wimmer (and Engelse), as well as the credible testimony of Dr. Villasenor, including his un rebutted testimony that trigger systems were “commonly used prior to and around the time of the purported invention, as documented extensively for decades.” Ex. ¶¶ 86–98; Ex. 1031, 131–138. Petitioner also presented un rebutted evidence that using comparators on *digital* signals was well known by one of ordinary skill at the time of the invention. Ex. 1040, Figs. 5, 6C; Ex. 1030 ¶ 98.

Patent Owner’s response regarding Wimmer’s omission of an “acquisition system” is unpersuasive because, contrary to Patent Owner’s arguments, Petitioner relies on the combined teachings of Engelse and Wimmer (and specifically, Engelse’s disclosure of an acquisition system, *see supra*, Sect. II.B.3.a (claim 1)) for the “acquisition system.” Similarly, we are not persuaded by Patent Owner’s argument that Wimmer’s comparator (element 60) cannot be bodily incorporated into Engelse’s system. Petitioner’s contention of unpatentability relies on Wimmer for the general teaching that a comparator is used as a circuit trigger, not bodily incorporation of the particular circuit structure of Wimmer into the particular circuit structure of Engelse. Ex. 1008, 1:27–32, 2:43:31, Fig. 1; Ex. 1003 ¶116; Ex. 1030, ¶ 85.

We, therefore, find that Petitioner has demonstrated by a preponderance of the evidence that the subject matter of claim 2 would have been obvious over the combined teachings of Engelse and Wimmer.

*D. Obviousness over Engelse
(Claims 3, 4, 5, 13, and 15)*

a. Dependent claim 3

Claim 3 depends from claim 1, and further recites “the acquisition system is configured to time align an acquisition of the time domain channel with an acquisition of the frequency domain channel.” Ex. 1001, 11:8–10 (emphasis added). We construe “time align” to mean “substantially synchronize in time.” *See supra*, Sect. II.A.4 (claim construction).

Petitioner contends that Engelse teaches clock signals that substantially synchronize (in time) the acquisition of data in the time domain channel (i.e., time domain analyzer 509/609 in Figures 5 and 6) and frequency domain channel (i.e., frequency domain analyzer 101/601 in Figures 1 and 6), as recited in claim 3. Pet. 45–46. Relying on the testimony of Dr. Villasenor, Petitioner explains that multiple embodiments of Engelse describe clocking of inputs for the purpose of synchronizing (time aligning) signal acquisition, including clocks in the oscillator of Figure 10 (Ex. 1007 ¶¶ 68–69), the mixer of Figure 11 (Ex. 1007 ¶¶ 72–73), the decimator of Figures 12 and 13 (Ex. 1007 ¶¶ 76–79) and multiple filters (Ex. 1007 ¶¶ 31, 65, 83, Fig. 15). Ex. 1003 ¶¶ 121–25. Petitioner contends that Engelse further discloses a clock in Figure 8 (“CLK1”) that is “used as a master clock” that, along with “[c]lock *alignment logic* [], brings the six individual clock domains into a single core clock domain” and therefore synchronizes them. Ex. 1007 ¶ 61 (emphasis added).

In light of these teachings of Engelse, Dr. Villasenor testifies that, even though Engelse does not expressly disclose a clock applied to signal

analyzer 600, and thus does not expressly disclose synchronizing an acquisition of the channels therein, “a person of ordinary skill would [have] readily appreciate[d] that the successful operations of [those] components rely on a common clock signal.” Ex. 1003 ¶ 125. Dr. Villasenor notes that Engelse itself teaches as much. *Id.*

Patent Owner, relying in part on the testimony of Dr. Blalock, responds that applying a clock to Engelse’s Figure 6 would still result in “offset” between the acquired signals which “would need to be tracked.” PO Resp. 52; Ex. 2014 ¶¶ 157–58. Patent Owner contends that with an offset, the acquisitions are not “time aligned.” PO Resp. 52. Patent Owner also argues that Petitioner’s proffered rationale for combining the references is nothing more than “circular reasoning and classic impermissible hindsight.” PO Resp. 51.

We are persuaded by Petitioner’s arguments and evidence, including the testimony of Dr. Villasenor that it would have been obvious to modify Engelse to clock the acquisitions in signal analyzer 600. First, we observe that our construction of “time align [an acquisition]” does not preclude having some offset of the acquired signals. It only requires that acquisition is “substantially synchronized” in time. Thus, Patent Owner’s argument that signal “offset” from clocking in Engelse is unpersuasive.

Next, as Dr. Villasenor testifies, Engelse already discloses multiple components that take advantage of clocking for synchronizing operation. *See, e.g.*, Ex. 1007 ¶¶ 72–73 (“Mixer 1100 loads the sine and cosine values into registers 1110 and 1112, respectively, *on every clock cycle*”). We find Dr. Villasenor’s testimony credible and consistent with the teachings of Engelse. Although Patent Owner argues (with supporting testimony from

Dr. Blalock) that modifying Engelse to include clocking of the time domain analyzer and frequency domain analyzer would be “impermissible hindsight,” we observe that, consistent with Dr. Villasenor’s testimony, Engelse teaches the advantages of clocking throughout many embodiments. *See supra*.

In addition, as Dr. Villasenor testifies, Engelse discloses that “both channels,” i.e., the time domain analyzer and the frequency domain analyzer, already “incorporate components that run on clock signals and hence operate synchronously.” Ex. 1003 ¶ 123–24. Thus, Dr. Villasenor explains, although “Engelse does not expressly describe a clock *inside its signal analyzer 600*, a [person of ordinary skill] would [have] readily appreciate[d] that the successful operations” of components *within the time domain analyzer and frequency domain analyzer* “rely on a common clock signal.” *Id.* at ¶ 125 (emphasis added). Patent Owner does not provide any evidence that defeats or undermines this testimony.

In sum, we find that Petitioner has demonstrated by a preponderance of the evidence that Engelse teaches or suggests every element of claim 3, and that one of ordinary skill in the art would have modified Engelse in the manner asserted by Petitioner. Accordingly, claim 3 is unpatentable over Engelse.

b. Dependent claims 4 and 5

Petitioner’s argument regarding unpatentability of claim 4 (which depends from claim 1) relies upon its contentions regarding anticipation of claim 4, and specifically, that Engelse discloses both a “time acquisition system” and a “controller.” *See supra*, Sect. II.B.3.c (claim 4). Petitioner

does not change or elaborate upon its argument regarding the controller or acquisition system, but argues that even if Engelse does not disclose the “acquisition parameters” additionally recited in claim 4, they would have at least been obvious to a person of ordinary skill. Pet. 49–51.

For the reasons discussed previously, however, *see supra*, Section II.B.3.c, we are not persuaded by Petitioner’s arguments and evidence regarding the “controller” and “acquisition system” of claim 4, and Petitioner’s argument on these terms is not advanced by its elaboration (as to claim 4) on “acquisition parameters.” For the same reasons, we are not persuaded by Petitioner’s arguments regarding claim 5, which depends from claim 4 and therefore includes all of its limitations.

Accordingly, we find that Petitioner has not persuaded us by a preponderance of the evidence that claims 4 and 5 are unpatentable over Engelse.

c. Dependent claim 13

Claim 13 depends from claim 12 and further recites:

the time domain channel is configured to sample at a first sample rate; the frequency domain channel is configured to sample at a second sample rate; and the controller is configured to set the *first sample rate and the second sample rate to be different*.

Ex. 1001, 12:24–31 (emphasis added).

Relying on the testimony of Dr. Villasenor, Petitioner contends that Engelse teaches its time domain analyzer (Figure 5) is configured to sample at a first sample rate, its frequency domain analyzer (Figure 1) is configured to sample at a second sample rate, and that Engelse’s processor 120/520/620

is configured for “different” sampling rates. Pet. 53–57. Petitioner asserts that Engelse discloses “several components from time domain analyzer 509 that are adjustable by the user for selective decimation,” which “determines the sample rate at which time domain analysis is performed. Pet. 51; Ex. 1007 ¶ 47. Petitioner further explains that Engelse’s frequency domain analyzer “step[s] through a plurality of frequencies of the frequency spectrum” in the spectrum analyzer, “selectively” decimates the signal, and applies a filter, all of which would (as would be understood by a person of ordinary skill) produce a sampling rate that is distinct from the time domain analyzer’s sampling rate. Pet. 54; Ex. 1007 ¶¶ 32, 90–96; Ex. 1003 ¶¶ 134–35. Selective decimation in the time domain channel (or frequency domain channel), Petitioner argues, means that the sample rates are “different,” as recited in claim 13.

Patent Owner responds that Engelse teaches only “one (already digitized) signal” to signal analyzer 600, and thus it “would not be possible [] in Engelse to set the sample rates to be different” in the time domain analyzer and signal domain analyzer. PO Resp. 53; Ex. 2014 ¶ 171. Patent Owner further contends that the signals provided to the time domain and frequency domain analyzers are “already-sampled” and thus neither analyzer is “configured to sample” as recited in the claim. PO Resp. 53. The embodiment of Engelse relied upon by Petitioner does not, according to Patent Owner, “include a digitizer [for sampling] because the input signal is [already] a digitized representation of upstream signals from . . . cable modems.” *Id.*

We are persuaded by Petitioner’s arguments and evidence. As Petitioner argues, claim 13 does not recite a “digitizer,” but rather, channels “configured to sample.” Pet. 23; *see also supra*, Sect. II.A.5 (claim construction). In our claim construction analysis, we explained that “to sample” means to obtain instantaneous value(s) of a wave or time-discrete portions of a wave. Applying that construction to claim 13, we find that the time domain analyzer and frequency domain analyzer of Engelse are configured to “sample” signals as recited in claim 13, such as by decimating signals in decimation circuits 112 and 512, respectively. Ex. 1007 ¶¶ 33, 38, 47, 53. As Dr. Villasenor testifies, decimation circuits were “well-known in the art for modifying the sampling rate of a signal,” i.e., “resampling.” Ex. 1030 ¶¶ 103–105 (citing Ex. 1034, 8:38–41). Claim 13, as we have construed it, does not preclude that the recited “sampling” can be resampling such as by decimation of signals.

Moreover, Engelse also teaches an “analog to digital converter [ADC] within the system.” Ex. 1007, ¶ 29. Dr. Villasenor testifies that a person of ordinary skill would have understood that an ADC applied to the time domain analyzer and frequency domain analyzer of Engelse “extend[s] the channels” such that the combination of analog to digital conversion with decimation yields “sampling” within the channels of the respective input signals, at particular sample rates. Ex. 1030 ¶ 106; Ex. 1007 ¶¶ 58–60, Fig. 8. For the reasons discussed above, these selectively determined sample rates are “different,” as recited in claim 13.

Accordingly, Petitioner has persuaded us by a preponderance of the evidence that Engelse teaches or suggests every element of claim 13, and that claim 13 therefore is unpatentable over Engelse.

d. Dependent claim 15

Claim 15 depends from independent claim 12, and further recites the channels having “first” and “second” bandwidths, which the controller is configured to set as “different.” Ex. 1001, 12:45–52. Relying on the testimony of Dr. Villasenor, Petitioner asserts that Engelse’s description of a time domain analyzer and spectrum domain analyzer, as shown in Figures 1 and 5 (and further described in Engelse) teaches or suggests the limitations of claim 15. Pet. 58–61; Ex. 1007 ¶¶ 32, 47, 53, Figs. 1, 5; Ex. 1003 ¶¶ 143–47.

Patent Owner does not contest or rebut Petitioner’s evidence and argument regarding claim 15, beyond its argument that Engelse does not disclose the elements of base claim 12. As discussed above, Petitioner has persuaded us that Engelse discloses each of the elements of claim 12.

We have reviewed the evidence regarding the additional elements recited in claim 15, and we are persuaded by Petitioner’s un rebutted contentions and evidence that Engelse teaches or suggests the elements of claim 15. Accordingly, Petitioner has demonstrated that the subject matter of claim 15 would have been obvious over the teachings of Engelse.

E. Obviousness over Engelse and Doi (Claim 7)

Claim 7 depends from claim 6 (which depends from claim 1), and further recites the “time domain channel and the frequency domain channel

are configured to process the input signal contemporaneously.” Ex. 1001, 11:32–35.

Petitioner argues that claim 7 would have been obvious over the combined teachings of Engelse and Doi. Pet. 62–67. Petitioner contends that Doi, “in the same field of test and measurement instruments,” teaches “contemporaneous processing of an input television signal from both the time domain and frequency domain,” thereby “advantageously revealing time domain (a television picture) and frequency domain (a spectrum waveform) signals at the same time.” Pet. 64; Ex. 1011, 3:8–12, 3:14–21, 4:29–31, Fig. 3B. Petitioner argues, relying on the testimony of Dr. Villasenor, that a person of ordinary skill in the art would have understood the advantages of contemporaneous processing taught in Doi would be equally beneficial in other test and measurement instruments that perform both time domain analysis and frequency domain analysis, namely, the instrument of Engelse. Ex. 1003 ¶ 107–109, 152; Ex. 1007 ¶¶ 5, 50–57.

Patent Owner responds that Doi is “not relevant to Engelse” because a television picture is not the same as a noise signal. PO Resp. 54–55. According to Patent Owner, Doi does not “provide any motivation or benefit of viewing a noise signal in the time domain and frequency domain at the same time.” *Id.* at 55.

We are persuaded by Petitioner’s arguments and evidence. Engelse discloses the “need . . . for improvements in monitoring the quality of bandwidth *to allow quick reaction to changes in noise*,” and that “[i]ntegrating the spectrum analysis function” with time domain function would “enable[] [such] quick reaction to changes in noise.” Ex. 1007 ¶ 29 (emphasis added); Ex. 1003 ¶¶ 148–49. As Dr. Villasenor testifies, a person

of ordinary skill in the art would have recognized that Doi provides such “integration” of signal processing functions, which allows for extremely quick (contemporaneous) comparison and monitoring of signals, as would be desired in Engelse. Ex. 1030 ¶ 110–112; *see also* Ex. 1003 ¶¶ 151–53. Moreover, Doi (like Engelse) is directed to a spectrum analyzer. Ex. 1011, 1:5. We are persuaded that a person of ordinary skill seeking to improve signal monitoring and allow quick reaction to signal changes would have looked to signal monitoring in other systems, such as that described in Doi, regardless of whether Doi focused mainly on applying those teachings to television signals rather than cable network signals. Pet. Reply 25; Ex. 1030 ¶¶ 110–112.

In sum, we find Dr. Villasenor’s testimony to be credible, and consistent with and supported by the disclosures in Engelse and Doi. That testimony adequately supports, and provides rational underpinning for, Petitioner’s contention that one of skill in the art would combine Engelse and Doi, as Petitioner proposes.

Patent Owner does not offer further argument or evidence, beyond its argument against the combination of references. We are persuaded by Petitioner’s un rebutted contentions applying the teachings of Engelse and Doi to the elements of claim 7. Accordingly, we find Petitioner has demonstrated by a preponderance of the evidence that the subject matter of claim 7 would have been obvious over the combined teachings of Engelse and Doi.

F. Obviousness over Engelse and Witte (Claim 9)

Claim 9 depends from claim 1, and further recites “a housing; wherein the time domain channel, the frequency domain channel, and the acquisition

system are substantially encapsulated in the housing.” Ex. 1001, 11:46–51. Petitioner asserts that Witte teaches or suggests the “housing” recited in claim 9, and that the combination of Witte and Engelse teaches or suggests every element of claim 9. Pet. 67–69; Ex. 1003 ¶¶ 154–55; Ex. 1009.

Witte is a textbook on test and measurement instruments, and describes a “spectrum analyzer” encapsulated in a housing, as reproduced in Figure 1-7 below.

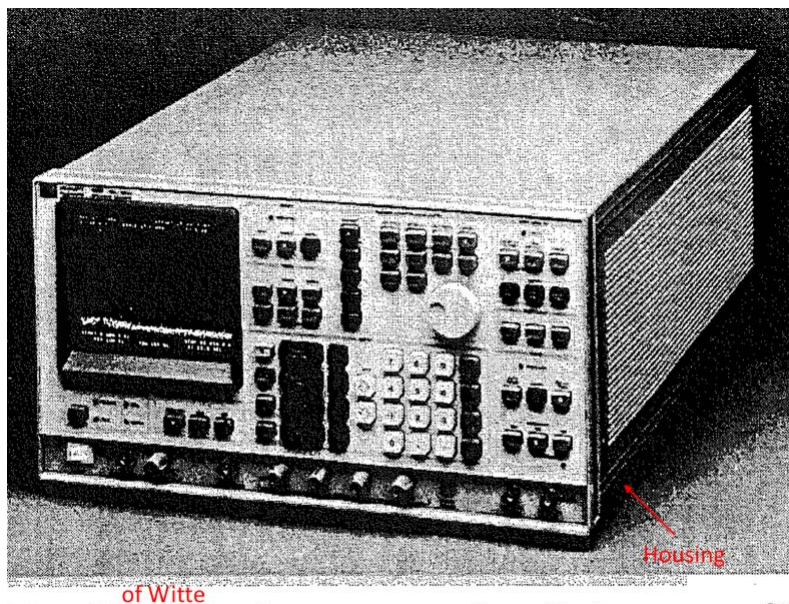


Figure 1-7. A high-performance spectrum analyzer with a frequency range of 20 Hz to 40 MHz (HP3585B). Photo courtesy of Hewlett-Packard Company.

Figure 1-7 illustrates a “high-performance spectrum analyzer with a frequency range of 20 Hz to 40 MHz (HP3585B).” Petitioner, relying on the testimony of Dr. Engelse, asserts that Witte teaches “examples of a common housing that substantially encapsulates electronic components,” in order to:

- (i) provide a compact enclosure for the different modules; (ii) provide convenient user interface to select functions to perform and channels to monitor; and (iii) form an exterior shell as a shield to unwanted interference while inspecting noise in a cable network—the objective of Engelse.

Pet. 68 (citing Ex. 1009, Fig. 1-7; Ex. 1003 ¶ 157).

Patent Owner responds that although Witte teaches a housing, one of ordinary skill in the art would not have combined Engelse and Witte. PO Resp. 55–59. Relying on the testimony of Dr. Blalock, Patent Owner contends that Petitioner’s rationale for the combination “ignores the purpose of embedding the circuitry inside Engelse’s communication system,” and that Witte is “exactly the type of ‘conventional’ spectrum analyzer” that Engelse identifies as “expensive” and disadvantageous. PO Resp. 56; Ex. 1007 ¶ 3.

We are persuaded by Petitioner’s arguments and evidence. As noted above, the parties do not dispute that Witte teaches a “housing” for a test and measurement instrument. Further, we have found that Engelse discloses the time domain channel, frequency domain channel, and acquisition elements recited in claim 9. *See supra*, Sect. II.B.3.a (claim 1). The remaining issue, therefore, is whether Petitioner has demonstrated a sufficient rationale that one of ordinary skill in the art would have combined the teachings of Engelse with those of Witte. We find that Petitioner has done so.

Engelse teaches that a “problem with the cable industry is the susceptibility of the cable network to noise in the frequency spectrum used to transport data.” Ex. 1003 ¶ 154–55. Due to this noise, “service providers must monitor the band and make adjustments as necessary.” *Id.* Engelse, thus, is directed significantly to the problem of monitoring (and adjusting for) noise. In light of this stated purpose of Engelse, we find credible Dr. Villasenor’s testimony that a person of ordinary skill would have recognized that a housing providing “enclosure” for test and measurement circuitry

would have been “particularly beneficial to the objective of Engelse,” namely, inspecting noise. Pet. 69 (citing Ex. 1003 ¶ 158); Ex. 1007 ¶ 29.

Dr. Villasenor describes several advantages of enclosing circuitry in a housing, including “shielding measurements from interference.” Ex. 1030 ¶ 113; Ex. 1003 ¶ 158. Patent Owner relies on Dr. Blalock’s testimony in rebutting Petitioner’s assertions, contending that Engelse solely is concerned with “embedded circuitry” and, therefore, that there would have been no motivation for a person of ordinary skill to enclose Engelse’s circuitry with housing to a “portable” instrument. PO Resp. 56–58; Ex. 2014 ¶¶ 203–208. We agree that portability does not appear to be a concern expressly disclosed in Engelse. We are persuaded by Petitioner’s argument and evidence, however, that even for “embedded circuitry” (and Engelse does not expressly require all embodiments to be embedded), a person of ordinary skill would have recognized the shielding advantages in utilizing a housing, particularly given Engelse’s stated purpose of noise monitoring. Ex. 1030 ¶ 113–115; Ex. 1007 ¶ 4.

Additionally, even if Engelse teaches “embedded circuitry,” it also discloses that such circuitry comprises a “test and measurement instrument” for signal analysis, just as Witte teaches a test and measurement instrument for signal analysis. *See supra*, Sect. II.B.3.a (claim 1, “test and measurement instrument”). As Petitioner argues, embedding a test and measurement instrument does not preclude it from being encapsulated (or “substantially capsulated, as claim 9 recites) in housing. Pet. Reply 27; Ex. 1030 ¶¶ 116–119. Indeed, Engelse discloses embodiments that include a “display” and “creating a graph” for a “cable operator,” which we find to be consistent with Dr. Villasenor’s testimony that a person of ordinary skill would

understand the advantages of providing a housing for these embodiments.
Ex. 1007 ¶¶ 45, 51.

For the foregoing reasons, we find Petitioner has demonstrated by a preponderance of the evidence that the subject matter of claim 9 would have been obvious over the combined teachings of Engelse and Witte.

III.CONCLUSION

The table below summarizes our conclusions as to the challenged claims.

Reference(s)	Basis	Claims	Claims Shown Unpatentable	Claims Not Shown Unpatentable
Engelse	§ 102	1, 4, 6, 8, 10, 12, 14	1, 6, 10, and 12	4, 8, and 14
Engelse and Wimmer	§ 103	2	2	
Engelse	§ 103	3, 4, 5, 13, and 15	3, 13, and 15	4 and 5
Engelse and Doi	§ 103	7	7	
Engelse and Witte	§ 103	9	9	
Overall Outcome		1–10 and 12–15	1–3, 6, 7, 9, 10, 12, 13 and 15	4, 5, 8, and 14

IV. ORDER

In consideration of the foregoing, it is
ORDERED that claims 1–3, 6, 7, 9, 10, 12, 13, and 15 of the '719 patent are held to be unpatentable;

FURTHER ORDERED that Petitioner has not proved by a preponderance of the evidence that claims 4, 5, 8, and 14 of the '719 patent are unpatentable;

FURTHER ORDERED that, because this is a Final Written Decision, parties to this proceeding seeking judicial review of our decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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For PETITIONER:

Walter Renner
Roberto DeVoto
Christopher Marchese
FISH & RICHARDSON P.C.
axf-ptab@fr.com
devoto@fr.com
marchese@fr.com

For PATENT OWNER:

Michael Oblon
Matthew Johnson
Douglas Pearson
JONES DAY
moblon@jonesday.com
mwjohnson@jonesday.com
dhpearson@jonesday.com