

UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

Charter Communications, Inc. and Plume Design, Inc.,
Petitioner

v.

Adaptive Spectrum and Signal Alignment, Inc.
Patent Owner.

IPR2025-00087
Patent No. 11,477,108

**PETITION FOR *INTER PARTES* REVIEW OF
CLAIMS 1-20 OF U.S. PATENT 11,477,108**

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1001	U.S. Patent No. 11,477,108 (the “’108 patent”)
1002	Prosecution history of U.S. Patent No. 11,477,108 (“108FH”)
1003	Declaration of Henry Houh, Ph.D. (“Houh Decl.”)
1004	U.S. Patent App. Pub. 2016/0294669 to Chow (“Chow-669”)
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1006	U.S. Patent App. Pub. 2008/0049776 to Wiley (“Wiley”)
1007	U.S. Patent No. 6,625,169 to Tofano (“Tofano”)
1008	Excerpts from Tanenbaum, A., et al., “Computer Networks – Fifth Edition”, ISBN 0-13-212695-8 ISBN-10: 0-13-212695-8 TK5105.5.T36 2011 004.6--dc22 2010034366
1009	Copyright Office, Public Record regarding Ex-1008
1010	Prosecution history of U.S. Patent Application No. 15/182,513 (“513FH”)
1011	Prosecution history of U.S. Patent Application No. 16/432,364 (“364FH”)
1012	U.S. Patent No. 10,333,819 (the “’819 patent”)
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1014	<i>Adaptive Spectrum and Signal Alignment, Inc. v. Charter Communications, Inc.</i> , No. 2:24-cv-00124 (E.D. Tex.), Docket Control Order
1015	Docket Navigator – Time to Milestones for the Eastern District of Texas and District of Colorado

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1016	<i>Curriculum Vitae</i> , Henry H. Houh, Ph.D.

TABLE OF AUTHORITIES

Cases

<i>Advanced Bionics, LLC v. Med-El Elektromedizinische Geräte GmbH,</i> IPR2019-01469, Paper 6 (Feb. 13, 2020).....	24
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I. Introduction

Petitioner hereby seeks *inter partes* review of claims 1-20 (the “Challenged Claims”) of U.S. Patent No. 11,477,108 (Ex-1001, the “’108 patent”).

II. Mandatory Notices Under 37 C.F.R. §42.8

A. Real Party-in-Interest Under 37 C.F.R. §42.8(b)(1)

Charter Communications, Inc. (“Charter”) and Plume Design, Inc. (“Plume”) are the real parties-in-interest.

B. Related Matters Under 37 C.F.R. §42.8(b)(2)

The ’108 patent is currently the subject of pending litigation: *Adaptive Spectrum and Signal Alignment, Inc. v. Charter Communications, Inc. et al*, Case No. 2:24-cv-00124-JRG-RSP (E.D. Tex.) (the “ASSIA Litigation”). (Ex-1013.) Petitioner is not aware of other matters involving the ’108 patent that would affect, or be affected by, a decision in this IPR proceeding.

C. Lead and Back-up Counsel Under 37 C.F.R. §42.8(b)(3) and Service Information under 37 C.F.R. §42.8(b)(4)

Petitioner designates the following lead and back-up counsel:

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Service on Petitioner may be made by mail or hand delivery to: Greenberg Traurig, LLP, 1144 15th St., Suite 3300, Denver, CO 80202. Petitioner also consents to and prefers electronic service by emailing Charter-ASSIA-IPRs@gtlaw.com and counsel of record.

III. Word Count

Petitioner certifies this Petition is 13,528 words, as counted by the word-processing program (Microsoft Word for Office 365) used to generate this Petition (excluding the table of contents, table of authorities, mandatory notices, certificate of service, and this certificate). This Petition complies with the 14,000 word limit (37 C.F.R. §42.24(a)(1)(i)).

IV. IPR Eligibility and Fees

Petitioner certifies under 37 C.F.R. §42.104(a) that the '108 patent is available for IPR and Petitioner is not barred or estopped from requesting cancellation of the Challenged Claims on the grounds identified below.

Ground	'108 Patent Claim	Basis
Ground 1	1-20	Anticipated by Chow-669 (Ex-1004)
Ground 2	1-20	Rendered obvious by Werner (Ex-1005) in view of Wiley (Ex-1006)

The IPR Petition fee and any necessary additional fees may be charged to Deposit Account No. 50-2638.

V. The '108 Patent

A. General Overview

The '108 patent generally relates to a management device that collects information from a local area network (“LAN”), analyzes it, and identifies an “operational condition” within a wide area network (“WAN”). (*See, e.g.*, Ex-1001 at claim 1, 7:63-8:20.) The specification further notes that although “failures may be exhibited and available from the LAN, many such failures may nevertheless be attributable to operational conditions (e.g., configurations, faults, congestion, etc.) within the WAN.” (Ex-1001 at 9:15-18; *see* Ex-1003-Houh at ¶¶32-36.)

B. Prosecution History

This section discusses the prosecution history of the related applications identified on the face of the '108 patent and concludes with a discussion of the prosecution history of the '108 patent.¹

1. Application No. 13/995,900

The earliest-filed related application identified on the face of the '108 patent is application no. 13/995,900. (Ex-1001 at (63).) Prosecution of this application did not include discussion of the prior art at issue in this Petition.

2. Application No. 15/182,513

U.S. Patent App. Pub. 2016/0294669 to Chow (“Chow-669”) was published from Application No. 15/182,513 (the “’513 application”). The ’513 application was filed with one claim, which was rejected for being anticipated by Son (US2003/0145082) and on §101/§112 grounds. (Ex-1010-513FH at 48; 73-77.) The applicant added claims 2-20 and argued that Son failed to anticipate. (*Id.* at 107-11.)

Another non-final rejection followed based on obviousness-type double patenting and §101 grounds. (*Id.* at 124-31.) The examiner argued the claims were directed to abstract ideas and generic network elements including LAN and WAN interfaces. (*Id.* at 128-29.)

¹ The prosecution history exhibits omit immaterial items (e.g., foreign references) to decrease their size/length.

The applicant responded with perfunctory claim amendments and §101 arguments. (*Id.* at 166-74.) The examiner was unconvinced, and an advisory action followed. (*Id.* at 179-80.) The applicant responded with an RCE and §101 arguments. (*Id.* at 185-98.)

Another non-final rejection followed rejecting claims on double patenting and §101, §102, and §112 grounds, citing Werner (Ex-1005). (*Id.* at 214-19.)

The applicant responded by amending the claims and filing a terminal disclaimer. (*Id.* at 249-60.) The applicant also added the limitation “the operation condition is within the LAN identified based at least on collected WAN information or within the WAN identified based at least on collected LAN information” (*id.* at 250-51) which applicant argued was not disclosed by Werner:

“Warner [sic] only discloses in [0026] that ‘Based upon parameters specified by a user, customer, and/or WAN service provider, analyzer 1460 can automatically monitor, inspect, gather, analyze, store, report, render, and/or respond to information regarding packet traffic conveyed on LAN 1600, from LAN 1600 to WAN 1700, and/or from WAN 1700 to LAN 1600...’ However, Warner [sic] is silent on identifying an operation condition with the LAN based at least on collected WAN information or an operation condition in the WAN based at least on collected LAN information.” (*Id.* at 258.)

A final rejection followed. (*Id.* at 273-82.)

The applicant responded by adding the concept of “communication layers” to the claims. (*Id.* at 312.) The applicant argued that paragraph 0077 of the application shows that “[t]he above cited embodiment explicitly shows that the collected information from LAN is from application layer and the networking layer, while the settings on the DSL system (WAN) are at the physical layer, which is different from the layers from the LAN.”² (*Id.* at 320.)

A notice of allowance followed. (*Id.* at 340-49.) The application subsequently issued as U.S. Patent No. 10,333,819 (the “’819 patent”).

3. Application No. 16/432,364

Application No. 16/432,364 (the “’364 application”) was filed with 8 claims. (Ex-1011-364FH at 13-15.) Prosecution was minimal—the examiner did not issue any art rejections. (Ex-1011-364FH at 135-43.) The applicant filed a terminal disclaimer and addressed a §112 rejection. (*Id.* at 193-95.) A notice of allowance and examiner’s amendment followed, and U.S. Patent 10,757,003 (the “’003 patent”) issued. (*Id.* at 205-08.)

4. The ’108 Patent

The ’108 patent issued from application no. 16/926,696 (the “’696 application”), filed July 11, 2020. The application included 20 original claims. (Ex-

² Emphasis added herein unless otherwise noted.

1002-108FH at 64-69.) Importantly, a first Application Data Sheet (“ADS”) identifies the ’696 application as a continuation of the ’513 application, and a second ADS made the same priority claim. (*Id.* at 76-84, 92-93.)

The original claims were rejected solely based on obviousness-type double patenting. (*Id.* at 115-22.) Here, the examiner’s action stated that Werner³ failed to “teach or make obvious ‘identifying one or more operational conditions within the WAN in a different communication layer from the one or more communication layers on the LAN by analyzing at least the collected LAN information....’” (*Id.* at 121.) The examiner’s Werner analysis was at best incomplete, as Werner discloses networks that are routinely characterized via reference to communication layers. (*E.g.*, Ex-1003-Houh at ¶¶32-43, 56-80.) The applicant subsequently filed a terminal disclaimer (*id.* at 158-66), a notice of allowance followed (*id.* at 174), and the patent issued. (*Id.* at 211.)

³ The examiner misidentified Werner as US2019/0245278, which Petitioner believes was a typographical error as Werner was correctly identified during prosecution of other applications. (*See* §V.B.)

C. The '108 Patent is Only Entitled to an Effective Filing Date of July 11, 2020

Ground 1 relies on Chow-669. Chow-669 (published on October 6, 2016) is prior art because the '108 was not effectively filed before July 11, 2020.⁴

The applicant filed two ADSs during prosecution of the '696 application that led to the '108 patent, both of which identified the '696 application first as a continuation of the '513 application and second as a continuation of the '364 application. (Ex-1002-108FH at 78-79, 92-93.) Excerpts showing the incorrect priority chain are provided below:

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78. When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending	Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Continuation of	15182513	2016-06-14
Application Data Sheet 37 CFR 1.76			
Attorney Docket Number		20145-049USC2	
Application Number			
Title of Invention			
SYSTEMS AND METHODS FOR JOINTLY OPTIMIZING WAN AND LAN NETWORK COMMUNICATIONS			

Prior Application Status	Pending	Remove			
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
	Continuation of	16432364	2019-06-05		
Prior Application Status	Pending	Remove			
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
16432364	Continuation of	15182513	2016-06-04		
Prior Application Status	Patented	Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15182513	Continuation of	13995900	2014-07-08	10333819	2019-06-25
Prior Application Status	Patented	Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13995900	a 371 of international	PCTUS11021003	2011-01-12	9369370	2016-06-04
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.					

Ex-1002-108FH at 78-79

Priority chain is broken because the '108 patent cannot be:

1. A continuation of the '513 application, which was never co-pending
2. Simultaneously a continuation and grandchild of the '513 application patent

Related U.S. Application Data

(63) Continuation of application No. 15/182,513, filed on Jun. 14, 2016, now Pat. No. 10,333,819, and a (Continued)

Related U.S. Application Data

continuation of application No. 16/432,364, filed on Jun. 5, 2019, now Pat. No. 10,757,003, which is a continuation of application No. 15/182,513, filed on Jun. 4, 2016, now Pat. No. 10,333,819, which is a continuation of application No. 13/995,900, filed as application No. PCT/US2011/021003 on Jan. 12, 2011, now Pat. No. 9,369,370.

Ex-1001 at (63)

⁴ Ground 2 applies even if the '108 patent is entitled to the January 12, 2011 filing date of PCT/US2011/021003. (Ex-1001, (63).)

(See Ex-1002-108FH at 92-93 (repeating the same erroneous ADS).) The '108 patent cannot be a continuation of the '513 application because the '513 application issued in June 2019 before the '696 application was filed, i.e., the two applications were never co-pending. (Ex-1012-819 patent at (21), (45).) *Immersion Corp. v. HTC Corp.*, 826 F.3d 1357, 1363-64 (Fed. Cir. 2016). In the ASSIA Litigation, Patent Owner has acknowledged that the face of the '108 patent lists an incorrect priority claim to the '513 application. (ASSIA Litigation, Dkt. 41 at 29.)

Here, the incorrect priority chain means the '108 patent is not entitled to a priority date before its actual filing date of July 11, 2020, rendering the Chow-669 publication prior art under the law surrounding 35 U.S.C. §120 and Rule 1.78. Specifically, in *Droplets, Inc. v. E*TRADE Bank*, 887 F.3d 1309, 1315-16 (Fed. Cir. 2018) the parties disputed whether a patent-in-suit (the "'115 patent") could claim priority through several continuations to a provisional application filed on September 14, 1999. *Id.* at 1312. The court explained: "Priority claims are governed by statute. To claim the benefit of an earlier filing date in the United States...the statute requires that the patent application 'contain a specific reference to the earlier filed application' to which it purports to claim priority." *Id.* at 1315 (citing 35 U.S.C. §120). The court continued:

For the specific reference to have effect, the statute provides that the application must be copending with the first-filed application or a

later-filed application ‘similarly entitled’ to the benefit of the first application’s filing date.

Droplets, 887 F.3d at 1315 (emphasis added).

The PTO has a regulation for implementing §120, as set forth in 37 C.F.R. §1.78. *Droplets*, 887 F.3d at 1315.⁵ That regulation requires a specific reference to earlier-filed applications including, *inter alia*, “the relationship of the applications (i.e. whether the later-filed application is a continuation, divisional, or continuation-in-part of the prior filed nonprovisional application or international application).” *Id.* The specific reference also “must be included in an application data sheet..., or the specification must contain or be amended to contain such reference in the first sentence(s) following the title.” *Id.* at 1315-16. The version of the regulation applicable to the ’108 patent precludes the specification option—the “specific reference” must be in the ADS for applications filed after September 16, 2012. 37 C.F.R. §§1.78(a)(3), (d)(2), and (h); MPEP 211.02 (“For applications filed on or after September 16, 2012, the specific reference to the prior application must be included in an application data sheet”).

⁵ The *Droplets* court addressed an older (2009) version of §1.78 that was in effect when the patent-at-issue in that proceeding was actually filed. *Id.*

Droplets also shows that §120 is not merely a “technical provision” relative to which mistakes can be tolerated: “Although §120 might appear to be a technical provision, courts have long-recognized that it embodies an important public policy, and thus have required strict adherence to its requirements.” *Id.* at 1316 (internal marks/citations omitted); *Droplets*, 877 F.3d at 1317 (“Section 120 places the burden on the patent owner to provide a clear, unbroken chain of priority.”).

The facts are simple. The ’108 patent’s priority chain erroneously attempts to claim priority as a continuation to the ’513 application without co-pendency. Even if the correct priority chain is embedded somewhere in the ADS and in the patent separate from the error, the error in claiming priority to the ’513 application at the time of filing renders the priority claim defective. For example, in *Apple Inc. v. e-Watch, Inc.*, IPR2015-00414, Paper 34 (June 22, 2016), the Board noted that 37 C.F.R. §1.78 requires a specific reference to each prior-filed application in the priority chain indicating the relationship of the applications. *Id.* at 10. Apple argued that the patentee mis-identified the ’509 application as a divisional of the ’073 application, which meant that the ’509 application failed to make the “specific reference” required by 35 U.S.C. §120 and 37 C.F.R. §1.78. *Id.* at 11; *see id.* at 11 n.9 (noting that Apple’s argument included the argument that the ’509 application could not be a divisional of the ’073 application, with which it was not copending). The Board agreed with Apple, explaining that the “specific reference” required by

the statute and rule refers to “*all* applications, including intermediate applications, going back to the earliest application for which the applicant claims priority is required.” *Id.* at 12; *see id.* at 14 (“Accurately stating the relationship between the applications in the chain of priority gives the public adequate notice of the claim to the earlier filing date”). The Board also noted that, like here, the patentee was aware of the error in the priority chain, and the patentee “could have sought a certificate of correction or reissue of the [patent-in-suit], but did not do so. ... [T]he failure to ‘specifically reference’ the ’073 application by correctly identifying its relationship to the ’509 application means the [patent-in-suit] is not entitled to claim the benefit of the filing date of the ’073 application.” *Id.* at 15. The Board addressed and rejected several additional arguments raised by the patentee before concluding:

“[T]he ’509 application is not a divisional application of the earlier-filed ’073 application. From the perspective of the public, the stated relationship is incorrect and it would not be reasonable to expect the ‘reasonable person of ordinary skill’ to appreciate the mistake was made or what the result of the mistake would be. At a minimum, any investigation would require a review of each of the ’509, ’470, and ’073 applications. We are not persuaded that the ‘reasonable person’ would even attempt the investigation. The burden is on the applicant so that such efforts are not required by the public. We are not persuaded that the ‘reasonable person of ordinary skill in the art’ would have cobbled together the various documents relied upon by the Patent Owner in order to establish the correct chain of priority.

On this record, we do not find that the ‘reasonable person of ordinary skill in the art’ possesses the skills of a registered patent agent or a patent examiner.”

Id. at 18-19 (internal citations omitted). Ultimately, despite finding that the patentee had not strategically attempted to extend its patent term, the Board was unpersuaded that the ’509 application made a “sufficiently ‘specific reference’ to the ’073 application under 35 U.S.C. §120 or accurately ‘indicated the relationship of the applications,’ as required by 37 C.F.R. § 1.78(a)(2)(i) (pre-AIA). Thus the ’509 application fails to claim priority to the earlier filed ’073 application.” *Id.* at 21.

The *Apple* analysis applies here. The ’108 patent fails to recite a clear, unbroken chain of priority, and instead purports to be a continuation of the ’513 application despite the absence of co-pendency. (Ex-1001 at (63); Ex-1002-FH at 78-79, 92-93.) Patentee’s failure to provide a clear priority chain means the ’108 patent is not entitled to claim priority to the ’513 application. *Apple*, IPR2015-00414, Paper 34 at 21. Accordingly, the ’108 patent is only entitled to its actual filing date of July 11, 2020 rendering its publication (Ex-1004, Chow-669) prior art.⁶

⁶ Chow-669 published October 6, 2016. (Ex-1004 at (45).) As such, even if the ’108 patent is entitled to benefit from the filing date of the latest-filed, second-listed application in the priority chain, application no. 16/432,364 filed on June 5, 2019

D. The Challenged Claims

Petitioner challenges claims 1-20; claims 1, 8, and 15 are independent.

VI. Person of Ordinary Skill in the Art (“POSITA”)

A POSITA would have had at least a bachelor’s degree in electrical engineering, or a related field, with at least two years of experience in the field(s) of computer networking/telecommunications, including experience with transmission optimization techniques as well as DSL, cable, and/or wireless networks. Additional education could compensate for less practical experience and vice versa. This POSITA definition applies irrespective of the priority date of the ’108 patent. (Ex-1003-Houh at ¶¶19-25.)

VII. Claim Construction

Petitioner does not believe any claim constructions are required and interprets the claims per their ordinary and customary meanings. 37 C.F.R. §41.100(b). To be clear, Petitioner is not suggesting that there are no disputes regarding claim scope, including with respect to §112 issues. Rather, the invalidity Grounds raised herein render obvious the Challenged Claims under any reasonable interpretation of the claims, and thus the Board need not issue any formal constructions. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017).

(issued as U.S. Patent No. 10,757,003), Chow-669 is still prior art as it published more than one year before June 5, 2019. *See* AIA §102(a)-(b).

Below, Petitioner addresses several potentially-ambiguous aspects of the Challenged Claims.

A. “communication layers”

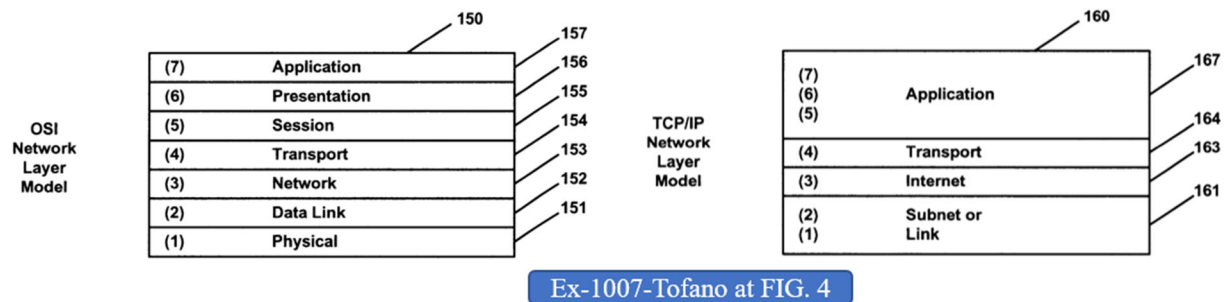
The Challenged Claims include limitations regarding “communication layers.” A POSITA would have recognized that such layers are related to the models in which they are defined. (Ex-1003-Houh at ¶¶37-39, 56-80.) The specification states:

“One example...is two layers of the Open Systems Interconnection model (OSI model). The OSI model is a commonly used model describing the different data processing layers, in digital communication systems. The communication layers could also correspond to other communication protocols or layers such as TCP/IP which might not directly correspond to one of the layers of the OSI model.” (Ex-1001 at 16:64-17:4.)

The OSI model was admittedly “commonly used,” and a POSITA would have known that the TCP/IP model was also conventional. (*See* §VIII (discussing Ex-1006-Wiley, Ex-1007-Tofano, Ex-1008-Tanenbaum).) The ’108 patent specification never defines the layers of these models, i.e., it expects a POSITA to be familiar with the conventional layers of the OSI and TPC/IP models. MPEP §2163 (“What is conventional or well known to one of ordinary skill in the art need not be disclosed in detail”); *Aver Information Inc. v. Pathway Innovations and Tech., Inc.*, IPR2017-02108, Paper 31 at 44 (March 6, 2019) (“[T]he ’751 patent provides no circuitry,

software, or other disclosure of how to perform the video processing functionality that is claimed. This supports Petitioner’s argument that these techniques were well known....”) To facilitate efficient review, Petitioner identifies the layers of these well-known models below.

The 7-layer OSI model and the loose correspondence of the OSI layers to the TCP/IP model’s layers are shown below:



(Ex-1007-Tofano at FIG. 4 (label added); *see id.* at 11:29-12:22; Ex-1006-Wiley at 0004, 0266, FIG. 31.) The Tanenbaum Computer Networks textbook discloses the same layers of the two models and describes the role each layer plays in conventional networks. (*See, e.g.*, Ex-1008-Tanenbaum at 41-48; *see* §§VIII.D-E.)

As Dr. Houh explains, the OSI and TCP/IP layers are used to help conceptualize the functions and concepts required at each layer, and provide a shorthand label to convey those functions and concepts. (Ex-1003-Houh at ¶¶56-80.) For example, the OSI “*Network*” and TCP/IP “*Internet*” layers typically specify how packets are routed from a source to a destination. (*Id.* at ¶¶58-60, 67, 72, 77.) In contrast, the OSI “*Data Link*” and TCP/IP “*Link*” layers generally specify how to

translate bits into data frames having a known structure and how to access a shared medium. (*Id.* at ¶¶58-60, 66, 71, 78.) The OSI “*Physical*” layer captures concepts related to the actual transmission of bits, for example the transmission frequency used and how to modulate data onto a channel. (*Id.* at ¶¶65, 79; *see* Ex-1008-Tanenbaum at 41-48.)

B. “identifying[, at the management device,] one or more operational conditions within the WAN in a different communication layer from the one or more communication layers on the LAN”

Claims 1, 8 and 15 recite “in a different communication layer.” The plain meaning of this phrase is clear from the plain language of limitations 1.4 and 1.5:

- [1.4] *collecting* LAN information from one or more communication layers on the LAN; and
- [1.5] *identifying* one or more operational conditions within the WAN in a different communication layer from the one or more communication layers on the LAN by analyzing at least the collected LAN information.

(Ex-1001 at claim 1.) This limitation means that the “different communication layer” of limitation 1.5 must be different from “the one or more communication layers on the LAN” from which the LAN information was collected in limitation 1.4.

Using the seven OSI layers for illustrative purposes, if LAN information is collected at the Physical, Data Link, and Network layers, then a “different” layer could be any of the remaining layers (Transport, Session, Presentation, or

Application). (Ex-1003-Houh at ¶¶81-85.) However, if LAN information is collected from each of the seven layers, then the “different communication layer” limitation cannot be met because there are no remaining layers that could be “different” from the seven OSI layers (“the one or more communication layers on the LAN”). (*Id.* at ¶85.)

VIII. Prior Art Overview

A. Chow-669 (Ex-1004)

Chow-669 is U.S. Patent App. Pub. 2016/0294669 to Chow, published October 6, 2016. Chow-669 is prior art under AIA §102(a)(1) for the reasons discussed above in §V.C. Chow-669 shares a common specification with the ’108 patent. (§§V, VIII.A.) Accordingly, Chow-669 includes the same written description as and anticipates the claims of the ’108 patent as shown below. (Ex-1003-Houh at ¶¶45-46.)

B. Werner (Ex-1005)

Werner is U.S. Patent App. Pub. 2006/0164978 to Werner, published July 27, 2006. Werner is prior art under at least pre-AIA §102(b). Werner is in the same field of endeavor as the ’108 patent. (Ex-1003-Houh at ¶¶47-50.)

Werner discloses a network in which an “information device 1400” has an “analyzer 1460” and collects packet information via a packet sniffer or similar mechanism from a “router 1300” within a LAN 1600. (Ex-1005-Werner at FIG. 1,

0025.) The collected information is associated with operational conditions on WAN 1700, then steps are taken to optimize WAN performance. (*Id.* at 0025-33.)

C. Wiley (Ex-1006)

Wiley is U.S. Patent App. Pub. 2008/0049776, published February 28, 2008. Wiley is prior art under at least pre-AIA §102(b). Wiley is in the same field of endeavor as the '108 patent. (Ex-1003-Houh at ¶¶51-55.)

Wiley discloses networks that utilizes performance information packets (“PIPs”). PIPs are used to obtain performance information associated with the data packet network. (Ex-1006-Wiley at 0103-04.) PIPs “may be communicated over Layer 2 of the OSI model and the network performance information may be determined in Layer 2” to identify operational conditions occurring in other layers and facilitate change that address such conditions. (*Id.* at 0116, 0271-78.)

Wiley also describes the OSI model consistent with the description provided above. (Ex-1006-Wiley at 0004, 0266, FIG. 31.)

D. Tofano (Ex-1007)

Tofano is U.S. Patent 6,625,169, issued September 23, 2003. Tofano is prior art under at least pre-AIA §102(b).

Tofano describes the conventional OSI and TCP/IP models and illustrates the correspondence between the layers in both models. (Ex-1007-Tofano at FIG. 4; §VII.A; *see* Ex-1003-Houh at ¶¶56-60.)

E. Tanenbaum (Ex-1008)

Tanenbaum is the 5th Edition of *Computer Networks* by Tanenbaum et al., which was published and publicly accessible by September 27, 2010. (Ex-1009.)

Tanenbaum is prior art under at least pre-AIA §102(a).

Tanenbaum describes the conventional OSI and TCP/IP models. (*E.g.*, Ex-1008-Tanenbaum at 41-48; *see* Ex-1003-Houh at ¶¶56-58, 61-80.)

IX. Discretionary Denial is Unwarranted

A. The Board Should Not Exercise its Discretion Under §314(a) to Deny Institution

The Challenged Claims are asserted in the ASSIA Litigation; Plume is not a party to that litigation. The non-dispositive factors set forth in *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (Mar. 20, 2020) weigh against exercising discretion to deny institution.

Factor 1: Whether the court granted a stay or evidence exists that one may be granted if the proceeding is instituted. Charter has not moved for a stay in the ASSIA Litigation; therefore, Factor 1 is neutral. *See Sotera Wireless, Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12 at 14 (Dec. 1, 2020); *Sand Revolution II, LLC v. Continental Intermodal Grp. Trucking LLC*, IPR2019-01393, Paper 24 (June 16, 2020). As noted in Factor 4, Petitioner stipulates it will not pursue any references relied on in the Grounds of this Petition in the ASSIA Litigation.

Factor 2: Proximity of the court’s trial date to the Board’s projected statutory deadline for a final written decision. The ASSIA Litigation is in its early stages and, at the time of filing this Petition, Plaintiff has only served infringement contentions and Charter’s motion to transfer the co-pending litigation to the District of Colorado is pending. The parties have not served discovery responses or taken depositions unrelated to venue issues, nor begun claim construction. A *Markman* hearing is set for March 19, 2025 and trial is currently set for September 22, 2025. (Ex-1014.) However, the Eastern District of Texas’ median time-to-trial for patent cases is 727 days, which would result in a trial date of February 17, 2026. (Ex-1015.) If the case is transferred to Colorado, the median time-to-trial for patent cases in that Court is 1,125 days (expected trial date of March 22, 2027). (*Id.*) The projected statutory deadline for a final written decision is around April, 2026. Thus, given the pending venue decision which may affect case deadlines and based on the Courts’ median time-to-trial, this factor is neutral.

Factor 3: Investment in the parallel proceedings by the court and the parties. This factor weighs against discretionary denial. The district court case is in its early stages and the claim construction hearing will not occur until March 2025. (Ex-1014.) Indeed, the most fact-intensive work (fact and expert discovery), substantive issues (e.g., claim construction), and dispositive decisions (summary judgment and trial) have not yet begun in the co-pending litigation. *See, e.g., Juniper*

Networks, Inc. v. Huawei Digit. Techs. (Cheng Du) Co., IPR2020-01130, Paper 13 at 13 (Jan. 22, 2021); *Sand Revolution II*, IPR2019-01393, Paper 24 at 11. The district court has expended minimal resources.

Where, as here, “the evidence shows that the petitioner filed the petition expeditiously, such as promptly after becoming aware of the claims being asserted, this fact has weighed against exercising discretion to deny institution.” *Fintiv, Inc.*, IPR2020-00019, Paper 11 at 10-11. Charter has not yet served invalidity contentions and received amended infringement contentions in early October 2024, while Plume is not a party to the ASSIA Litigation. Thus, Petitioner was “reasonably diligen[t]” in filing this Petition under Factor 3 which weighs against exercising discretion. *Apple Inc. v. Jawbone Innovations, LLC*, IPR2022-01084, Paper 9 at 18-19 (Dec. 16, 2022) (concluding factor 3 weighs against discretionary denial where petitioner waited four months to file the Petition after being served with infringement contentions containing the asserted claims); *cf. Comcast Cable Commc’ns, LLC v. Touchstream Techs., Inc.*, IPR2024-00324, Paper 13 at 11-12 (July 24, 2024) (determining that waiting 7 months after learning of asserted claims is too long of a delay in filing the Petition, but still instituting on other grounds).

Factor 4: Overlap between issues raised in the petition and the parallel proceeding. This factor weighs against discretionary denial. If this Petition is

instituted, Petitioner⁷ will not pursue the invalidity references relied on in the Grounds of this Petition in the litigation. *See Sand Revolution II, LLC*, IPR2019-01393, Paper 24.

Factor 5: Whether the petitioner and the defendant in the parallel proceedings are the same party. Charter is the defendant in the ASSIA Litigation, while Plume is not a party. Thus, this factor weighs against discretionary denial or is at most neutral. *Cisco Sys., Inc. v. Ramot at Tel Aviv Univ. Ltd.*, IPR2020- 00122, Paper 15 at 10 (May 15, 2020) (APJ Crumbley, dissenting) (“[This factor] only becomes relevant when the district court defendant and the petitioner before the Board are unrelated, in which case it weighs against denial of institution. In cases such as the one at hand, where the parties are the same, the factor is neutral. To hold otherwise—that the factor weighs in favor of denial if the parties are the same—would, in effect, tip the scales against a petitioner merely for being a defendant in the district court”).

Factor 6: Other circumstances that impact the Board’s discretion, including the merits. This Petition presents a strong case for invalidity of the ’108 patent. Director Vidal’s Interim Guidance, dated June 21, 2022, indicated that the Board should not issue discretionary denials where a petition presents compelling

⁷ As noted above, Plume is not a party to the litigation.

evidence. Where, as here, a strong case for anticipation and/or obviousness is presented, this factor weighs against discretionary denial. *See Fintiv, Inc.*, IPR2020-00019, Paper 11 at 14-16; *Sand Revolution II, LLC*, IPR2019-01393, Paper 24 at 12-14, 57.

Fintiv factors 3-6 weigh against discretionary denial, and factors 1-2 are neutral. Together, the factors weigh against discretionary denial and the merits of this Petition warrant consideration.

B. 35 U.S.C. §325(d) Does Not Favor Denial

Ground 2 relies on the Werner reference, which was cited by the examiner (a) in his reasons for allowance of the '108 patent, and (b) in related family members. Petitioner's reliance on Werner implicates the two-part framework of *Advanced Bionics, LLC v. Med-El Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6 at 8 (Feb. 13, 2020) (precedential). Under this framework, discretionary denial is unwarranted.

1. *Advanced Bionics* Step 1

Step 1 considers several non-exclusive factors set forth in *Becton, Dickinson & Co. v. B. Braun Melsungen AG* (hereinafter "*Becton*"), namely factors (a), (b), and (d).

Factors (a)-(b)

The first two factors for Step 1 are:

- (a) the similarities and material differences between the asserted art and the prior art involved during examination;
- (b) the cumulative nature of the asserted art and the prior art evaluated during examination.⁸

These factors favor Petitioner. Ground 1 has never been considered by the Office. This alone counsels against discretionary denial. As for Ground 2, while Werner was discussed during prosecution, the examiner never considered the Wiley reference (Ex-1006), which describes the OSI model and discloses using information collected from one layer (the OSI Data Link layer, in particular) to identify operational conditions in other layers. (*See* Ground 2.) Accordingly, Petitioner presents new arguments and art not previously raised during examination.

Factor (d)

Step 1, factor (d) is:

- (d) the extent of the overlap between the arguments made during examination and the manner in which petitioner relies on the prior art.⁹

⁸ *VMWare, Inc. v. Intellectual Ventures II LLC*, IPR2020-00859, Paper 13 at 18-19 (Nov. 13, 2020) (citing *Becton*, IPR2017-01586, Paper 8 at 17–18 (Dec. 15, 2017) (precedential as to Section III.C.5, first paragraph)).

⁹ *VMWare*, IPR2020-00859, Paper 13 at 18-19.

Factor (d) also favors Petitioner. Again, Ground 1 was not considered by the Office.

As for Ground 2 and “arguments made [by the Office] during examination,” the examiner correctly relied on Werner for most aspects of the claims, but did not appear to understand that Werner’s computer networking disclosures implicate the use of standard communication protocols/layers, including layers of the OSI and TCP/IP models. Wiley’s express disclosures supplement Werner’s computer networking teachings, and as such Ground 2 relies on Werner and Wiley to show the communication layer concept was obvious. Accordingly, Petitioner’s arguments materially differ from the Werner arguments raised by the examiner during prosecution.

As for “arguments made [by the applicant] during prosecution,” there is minimal overlap between the material issues in this Petition and the applicant’s arguments. In particular, the applicant never responded to obviousness arguments relative to the communications layer limitations because none were raised by the examiner. Instead, the examiner relied on anticipation by Werner regarding the independent claim language during prosecution of the ’513 application; the examiner’s obviousness arguments related to joint analysis of LAN and WAN information (which is not at issue in the Challenged Claims) in view of the Son reference (which is not relied on herein). (*E.g.*, Ex-1009-513FH at 276-81 (examiner’s analysis), 312-24 (applicant’s amendments and remarks).)

Unfortunately, the examiner apparently did not understand that the computer networking disclosures of Werner implicated conventional communication models. (*See* §V.) The examiner should have realized the communication layer limitations were well-known to a POSITA. Indeed, the communication layer limitations relate to fundamental network models that have existed since the 1970s, and Petitioner relies on the Wiley reference to show that the communication layer limitations were obvious. (*See* Ground 2.)

For at least the above reasons, *Becton* factors (a)-(b) and (d) favor Petitioner—the same or substantially the same art was ***not*** previously presented to the Office and the same or substantially the same arguments were ***not*** previously presented to the Office. *See Snap, Inc. v. SRK Tech., LLC*, IPR2020-00820, Paper 15 at 25-28 (Oct. 21, 2020) (rejecting patentee’s argument regarding Step 1 where only one prior art reference in obviousness combinations was previously considered by the examiner).

2. *Advanced Bionics* Step 2

While Petitioner has shown it is unnecessary to proceed to Step 2 of *Advanced Bionics*, the remaining *Becton* factors (c), (e), and (f) also favor Petitioner as it relates to Ground 2. *Advanced Bionics* Step 2 is irrelevant to Ground 1.

Factor (c)

Step 2, factor (c) is:

(c) the extent to which the asserted art was evaluated during examination, including whether the prior art was the basis for rejection.¹⁰

This factor favors Petitioner because Wiley was never before the examiner. Werner was cited during prosecution. (*See* §V.B.) Werner’s lack of explicit discussion of “communication layers” appeared to be the dispositive issue for the examiner. (*See* §V.B.4.) The discussion of factor (e) below explains the examiner’s error.

Factor (e)

Step 2, factor (e) is:

(e) whether Petitioner has pointed out sufficiently how the Examiner erred in its evaluation of the asserted prior art.¹¹

This factor asks whether the examiner erred in evaluating the prior art. This factor heavily favors Petitioner. More specifically, the communication layer amendments impact limitations 1.4-1.5 (and corresponding limitations of the other independent claims) and require:

“[1.4] collecting LAN information from one or more communication layers on the LAN; and

[1.5] identifying one or more operational conditions within the WAN in a different communication layer from the one or more

¹⁰ *VMWare*, IPR2020-00859, Paper 13 at 18-19.

¹¹ *VMWare*, IPR2020-00859, Paper 13 at 18-19.

communication layers on the LAN by analyzing at least the collected LAN information.” (Ex-1001 at claim 1.)

Collecting information in a network discloses collecting information from “one or more layers” because layers were conventionally used to characterize networks. (Ex-1003-Houh at ¶¶32-43.) Thus, the communication layer amendments merely reflect a common scenario in which LAN information is collected from one or more layers and used to identify problems in non-overlapping layers. There is no technical reason to exclude overlapping layers, nor is one described in the specification. The examiner should have realized that the communication layer amendments did nothing more than invoke conventional networking models in a routine and predictable way. (See Ex-1003-Houh at §§VI.D, VII, & VIII.B.) Moreover, the prior art discussed herein shows that it was obvious to collect information at one communication layer in a LAN and use it to identify operational conditions at another communication layer in a WAN. (See Ground 2.)

Factor (f)

Step 2, factor (f) is:

(f) the extent to which additional evidence and facts presented in the Petition warrant reconsideration of the prior art or arguments.¹²

This factor favors Petitioner.

¹² *VMWare*, IPR2020-00859, Paper 13 at 18-19.

As noted above, Petitioner relies on prior art that was not cited or considered by the examiner during prosecution. Petitioner also relies on expert testimony from Dr. Houh that was not previously considered, which establishes that a POSITA would have been motivated to combine the references at issue in Ground 2 in ways that render each Challenged Claim obvious. This evidence was not considered by the examiner and would have overcome any arguments raised by Applicant during prosecution.

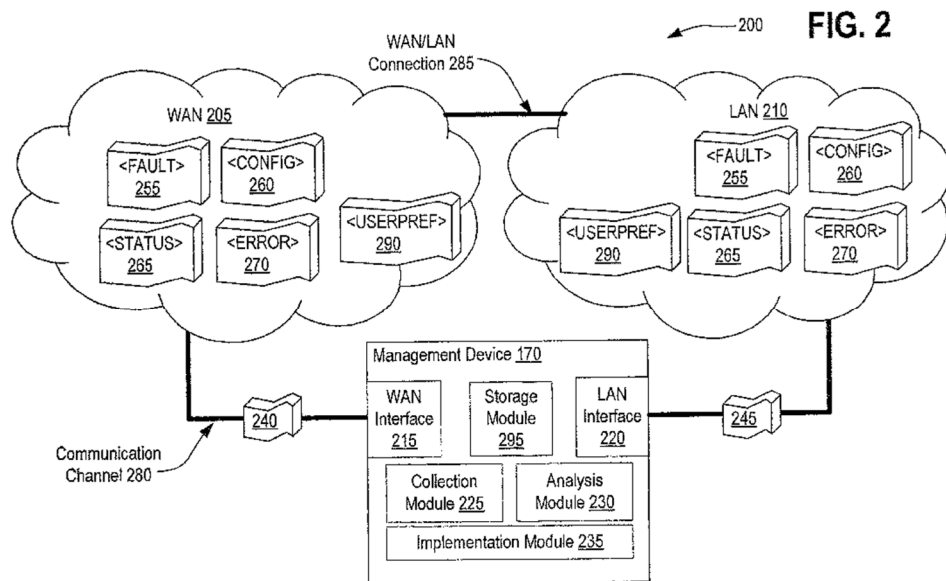
In sum, this Petition relies on new facts and evidence that shows that the examiner erred during prosecution. Thus, under *Advanced Bionics* discretionary denial is inappropriate.

X. GROUND 1: Chow-669 anticipates claims 1-20

Ground 1 relies on Chow-669. Chow-669 shares the same specification as the '108 patent and thus includes the same written description as the '108 patent. Accordingly, Chow-669 discloses every limitation of claims 1-20 to the same extent as the '108 patent.

[1.0] A management device, comprising:

Chow-669 discloses the preamble. Specifically, FIG. 2 illustrates the claimed management device:



(Ex-1004-Chow at FIG. 2.) Chow-669 further explains:

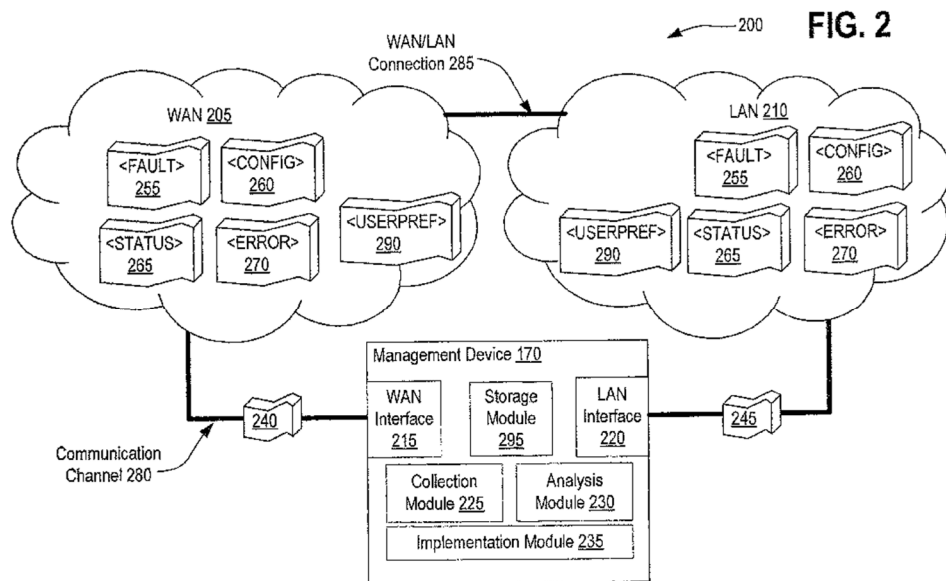
“FIG. 2 illustrates an alternative exemplary architecture 200 in which embodiments may operate. Architecture 200 depicts a Wide Area Network (WAN) 205 and Local Area Network (LAN) 210, each communicatively interfaced with management device 170.” (Ex-1004-Chow at 0037.)

Thus, Chow-669 discloses the preamble.

[1.1] a Local Area Network (LAN) interface to communicably interface the management device with a LAN;

[1.2] a Wide Area Network (WAN) interface to communicably interface the management device with a WAN, wherein the WAN is to provide broadband connectivity to the LAN;

Chow-669 discloses these limitations. Specifically, Chow-669 discloses the claimed interfaces and provision of broadband connectivity:



“[M]anagement device 170 includes a Wide Area Network (WAN) interface 215 to communicably interface the management device 170 with the WAN 205 and a Local Area Network (LAN) interface 220 to communicably interface the management device 170 with the LAN 210.” (Ex-1004-Chow at 0038; *see id.* at 0031 (noting that the management device is interfaced to a LAN and broadband WAN, e.g., the Internet), claim 1 (“the WAN provides broadband connectivity to the LAN”).)

Thus, Chow-669 discloses these limitations.

[1.3] one or more processors; and a non-transitory computer-readable medium or media storing one or more sequences of instructions which, when executed by at least one of the one or more processors, cause the management device to perform operations comprising:

Chow-669 discloses this limitation. Specifically, Chow-669 discloses a system that includes one or more processors, and non-transitory memory for storing

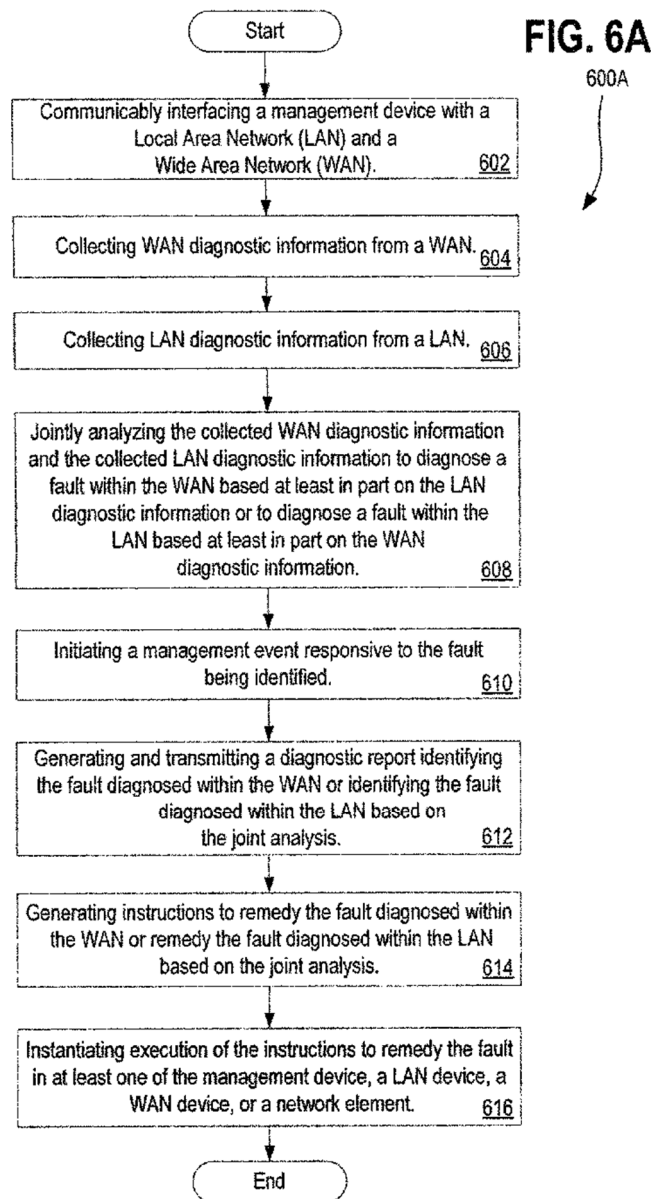
instructions that are executed on the processor(s) of a management device to perform the operations of limitations 1.4-1.5. (*See, e.g., Ex-1004-Chow at 0094-95.*)

Thus, Chow-669 discloses this limitation.

[1.4] collecting LAN information from one or more communication layers on the LAN; and

[1.5] identifying one or more operational conditions within the WAN in a different communication layer from the one or more communication layers on the LAN by analyzing at least the collected LAN information.

Chow-669 discloses these limitations. Specifically, Chow-669 illustrates in FIG. 6A that LAN information is collected (step 606) and then WAN operational conditions are identified (step 608) from an analysis that includes the collected LAN information:



As shown, Chow-669 discloses identifying operational conditions based on analyzing at least the collected LAN information. (Ex-1004-Chow at FIG. 6A; *see id.* at 0044 (“Although failures may be exhibited and available from the LAN, many such failures may nevertheless be attributable to operational conditions (e.g., configurations, faults, congestion, etc.) within the WAN 205.”)) The specification

provides examples where LAN information is collected from the OSI Application or Networking layers, and used to identify operational conditions in a different layer (e.g., the OSI Physical layer):

“For example, information from one layer on the WAN 205 may be used to diagnose or improve the performance on a different layer on the LAN 210, or vice versa. ...In one example, a management event may include adjusting settings and configurations on a WAN 205 (for example a DSL network) in response to the analysis. Information collected from the LAN 210 may be from different layers of the LAN 210, such as from the application layer and the networking layer. The settings and configuration on the DSL system may be implemented at the physical layer, by setting physical layer parameters of the DSL system.” (Ex-1004-Chow at 0077; *see id.* at 0078-79 (providing additional examples).)

Accordingly, Chow-669 discloses a management device collecting information from layers other than the OSI Physical layer and using that information to identify operational conditions associated with the OSI Physical layer on the WAN. (*See also* Ex-1003-Houh at ¶¶90-103.)

Thus, Chow-669 discloses these limitations and anticipates claim 1.

[Claim 2] The management device of claim 1 wherein the operations further comprising: initiating a management event responsive to at least one of the one or more operational conditions being identified.

Chow-669 discloses this limitation. For example, FIG. 6A (reproduced above) discloses step 610, in which a management event is initiated in response to

identifying a fault on the WAN. (Ex-1004-Chow at FIG. 6A; *see id.* at 0077-79 (disclosing the initiation of OSI Physical layer [or corresponding layer of the TCP/IP model] configuration changes on the WAN in response to identifying operational conditions at that layer); Ex-1003-Houh at ¶¶104-05.)

Thus, Chow-669 discloses this limitation and anticipates claim 2.

[Claim 3] The management device of claim 2 wherein initiating the management event comprises one or more of: decreasing WAN rate to improve link stability and quality; increasing one or more Impulse Noise Protection (INP) parameter settings; and increasing one or more margin parameter settings.

Chow-669 discloses this limitation. For example, Chow-669 discloses:

“Alternatively, DSL rate may be decreased to improve link stability and quality. Other management events could include higher INP (Impulse Noise Protection) parameter setting, improved margin parameter settings and/or power parameter settings.” (Ex-1004-Chow at 0078; *see* Ex-1003-Houh at ¶¶106-07.)

Thus, Chow-669 discloses this limitation and anticipates claim 3.

[Claim 4] The management device of claim 2 wherein initiating the management event comprises performing one or more of the following operations: generating instructions to change transmit power of WAN elements; generating instructions to modify one or more parameters affecting WAN forward error correction (FEC), WAN latency, WAN transmit power levels, and WAN data rate; and generating instructions to modify an active profile or configuration settings based on at least identified network traffic related to the WAN.

Chow-669 discloses this limitation. Specifically, Chow-669 discloses a management device that generates instructions to modify, *inter alia*, WAN transmit

power levels and WAN data rate. (Ex-1004-Chow at 0078; Ex-1003-Houh at ¶¶108-09.)

Thus, Chow-669 discloses this limitation and anticipates claim 4.

[Claim 5] The management device of claim 1 wherein the one or more communication layers on the LAN and the different communication layer in the WAN are layers of Open Systems Interconnection (OSI) model.

Chow-669 discloses this limitation. As shown regarding limitations 1.4-1.5, Chow-669 discloses layers in the context of the OSI model (e.g., the Application layer, Network layer, and Physical layer). (Ex-1004-Chow at 0076-78; Ex-1003-Houh at ¶¶110-11.)

Thus, Chow-669 discloses this limitation and anticipates claim 5.

[Claim 6] The management device of claim 1 wherein the one or more communication layers on the LAN and the different communication layer in the WAN are layers of TCP/IP model.

Chow-669 discloses this limitation. Specifically, the examples discussed above with respect to OSI layers in limitations 1.4-1.5 are also applicable to TCP/IP layers, as shown below:

“The OSI model is a commonly used model describing the different data processing layers, in digital communication systems. The communication layers could also correspond to other communication protocols or layers such as TCP/IP which might not directly correspond to one of the layers of the OSI model.” (Ex-1004-Chow at 0076; *see id.* at 0078 (referring to TCP/IP layers); Ex-1003-Houh at ¶¶112-13.)

Thus, Chow-669 discloses this limitation and anticipates claim 6.

[Claim 7] The management device of claim 1 wherein the one or more operational conditions identified within the WAN comprise at least one of: network congestion within the WAN; excess power consumption by communication elements within the WAN; bandwidth utilization of the WAN in excess of a maximum threshold; bandwidth availability of the WAN below a minimum threshold; errors on WAN connection; performance measures on the WAN; quality of WAN connection; and failure of WAN connection.

Chow-669 discloses this limitation. Specifically, Chow-669 discloses these operational conditions within the WAN. (Ex-1004-Chow at 0050; Ex-1003-Houh at ¶¶114-15.)

Thus, Chow-669 discloses this limitation and anticipates claim 7.

[Claims 8-20]

Claims 1-7 (“Claim Set 1”) generally correspond to Claims 8-14 (“Claim Set 2”) and Claims 15-20 (“Claim Set 3”) as shown in the table below:

Claim Set 1	Claim Set 2	Claim Set 3
[Claim 1, 1.0] A management device, comprising:	[Claim 8, 8.0] A method for communication management comprising:	[Claim 15, 15.0] A non-transitory computer-readable medium or media comprising one or more sequences of instructions which, when executed by at least one processor, causes steps for communication management comprising:
[1.1] a Local Area Network (LAN) interface to communicably interface the management device with a LAN;	[8.1] communicably interfacing, via a Local Area Network (LAN) interface, a management device with a LAN;	[15.1] communicably interfacing, via a Local Area Network (LAN) interface, a management device with a LAN;

[1.2] a Wide Area Network (WAN) interface to communicably interface the management device with a WAN, wherein the WAN is to provide broadband connectivity to the LAN;	[8.2] communicably interfacing, via a Wide Area Network (WAN) interface, the management device with a WAN, wherein the WAN is to provide broadband connectivity to the LAN;	[15.2] communicably interfacing, via a Wide Area Network (WAN) interface, the management device with a WAN, wherein the WAN is to provide broadband connectivity to the LAN;
[1.3] one or more processors; and a non-transitory computer-readable medium or media storing one or more sequences of instructions which, when executed by at least one of the one or more processors, cause the management device to perform operations comprising:		[See preamble 15.0]
[1.4] [cause the management device to perform operations comprising:] collecting LAN information from one or more communication layers on the LAN; and	[8.3] collecting, at the management device, LAN information from one or more communication layers on the LAN; and	[15.3] collecting, at the management device, LAN information from one or more communication layers on the LAN;
[1.5] [cause the management device to perform operations comprising:] identifying one or more operational conditions within the WAN in a different	[8.4] identifying, at the management device, one or more operational conditions within the WAN in a different communication layer from the one or more	[15.4] and identifying, at the management device, one or more operational conditions within the WAN in a different communication layer from the one or more

communication layer from the one or more communication layers on the LAN by analyzing at least the collected LAN information.	communication layers on the LAN by analyzing at least the collected LAN information.	communication layers on the LAN by analyzing at least the collected LAN information.
[Claim 2] The management device of claim 1 wherein the operations further comprising: initiating a management event responsive to at least one of the one or more operational conditions being identified.	[Claim 9] The method of claim 8 further comprising: initiating a management event responsive to at least one of the one or more operational conditions being identified.	[Claim 16] The non-transitory computer-readable medium or media of claim 15 further comprising one or more sequences of instructions which, when executed by at least one processor, causes steps for communication management comprising: initiating a management event responsive to at least one of the one or more operational conditions being identified.
[Claim 3] The management device of claim 2 wherein initiating the management event comprises one or more of: decreasing WAN rate to improve link stability and quality; increasing one or more Impulse Noise Protection (INP) parameter settings; and increasing one or more	[Claim 10] The method of claim 9 wherein initiating the management event comprises one or more of: decreasing WAN rate to improve link stability and quality; increasing one or more Impulse Noise Protection (INP) parameter settings; and increasing one or more	[Claim 17] The non-transitory computer-readable medium or media of claim 16 wherein initiating the management event comprises one or more of: decreasing WAN rate to improve link stability and quality; increasing one or more Impulse Noise Protection (INP) parameter settings; and increasing one or more

margin parameter settings.	margin parameter settings.	margin parameter settings.
[Claim 4] The management device of claim 2 wherein initiating the management event comprises performing one or more of the following operations: generating instructions to change transmit power of WAN elements; generating instructions to modify one or more parameters affecting WAN forward error correction (FEC), WAN latency, WAN transmit power levels, and WAN data rate; and generating instructions to modify an active profile or configuration settings based on at least identified network traffic related to the WAN.	[Claim 11] The method of claim 9 wherein initiating the management event comprises performing one or more of the following operations: generating instructions to change transmit power of WAN elements; generating instructions to modify one or more parameters affecting WAN forward error correction (FEC), WAN latency, WAN transmit power levels, and WAN data rate; and generating instructions to modify an active profile or configuration settings based on at least identified network traffic related to the WAN.	[Claim 18] The non-transitory computer-readable medium or media of claim 16 wherein initiating the management event comprises performing one or more of the following operations: generating instructions to change transmit power of WAN elements; generating instructions to modify one or more parameters affecting WAN forward error correction (FEC), WAN latency, WAN transmit power levels, and WAN data rate; and generating instructions to modify an active profile or configuration settings based on at least identified network traffic related to the WAN.
[Claim 5] The management device of claim 1 wherein the one or more communication layers on the LAN and the different communication layer in the WAN are layers of Open Systems Interconnection (OSI) model.	[Claim 12] The method of claim 8 wherein the one or more communication layers on the LAN and the different communication layer in the WAN are layers of Open Systems Interconnection (OSI) model.	[Claim 19] The non-transitory computer-readable medium or media of claim 15 wherein the one or more communication layers on the LAN and the different communication layer in the WAN are layers of Open Systems

		Interconnection (OSI) model.
[Claim 6] The management device of claim 1 wherein the one or more communication layers on the LAN and the different communication layer in the WAN are layers of TCP/IP model.	[Claim 13] The method of claim 8 wherein the one or more communication layers on the LAN and the different communication layer in the WAN are layers of TCP/IP model.	[Claim 20] The non-transitory computer-readable medium or media of claim 15 wherein the one or more communication layers on the LAN and the different communication layer in the WAN are layers of TCP/IP model.
[Claim 7] The management device of claim 1 wherein the one or more operational conditions identified within the WAN comprise at least one of: network congestion within the WAN; excess power consumption by communication elements within the WAN; bandwidth utilization of the WAN in excess of a maximum threshold; bandwidth availability of the WAN below a minimum threshold; errors on WAN connection; performance measures on the WAN; quality of WAN connection; and failure of WAN connection.	[Claim 14] The method of claim 8 wherein the one or more operational condition within the WAN identified comprise at least one of: network congestion within the WAN; excess power consumption by communication elements within the WAN; bandwidth utilization of the WAN in excess of a maximum threshold; bandwidth availability of the WAN below a minimum threshold; errors on WAN connection; performance measures on the WAN; quality of WAN connection; and failure of WAN connection.	

Thus, Chow-669 anticipates claims 8-20 for the reasons discussed above regarding claims 1-7. (*See* Ex-1003-Houh at ¶¶116-17.)

XI. GROUND 2: Werner in view of Wiley renders obvious claims 1-20

A. Scope, Content, and Rationale for Combining Prior Art

Ground 2 relies on Werner in view of Wiley. As noted above, Werner was cited by the examiner, who found that Werner discloses all elements of claim 1 except limitation 1.5. (Ex-1002-108FH at 120-21.)

More specifically, Werner discloses a COS Determination & Provisioning Support System (CDPSS) that includes a LAN coupled to a WAN via a router. (Ex-1005-Werner at 0023, FIG. 1.) The LAN may be operated by a customer and the WAN may be operated by a service provider. (*Id.*) The CDPSS gathers data packet information (“DPI”) from packets traversing within a customer’s LAN or between a LAN and a WAN by analyzing LAN or LAN-WAN traffic.¹³ (Ex-1005-Werner at 0008, 0021.)

The CDPSS gathers DPI via device (1400), which has a packet analyzer (1460). (Ex-1005-Werner at 0025-29.) The analyzer “can monitor and/or inspect traffic flowing through router 1300, and particularly traffic traveling between LAN

¹³ Werner defines “LAN-WAN traffic” as any traffic from the LAN to the WAN, or vice-versa. (Ex-1005-Werner at 0026.)

1600 and WAN 1700” and “can comprise a packet sniffer and/or other packet inspection mechanism....” (*Id.* at 0025.) The analyzer associates packet traffic with WAN capacities and provides notifications when adequate capacity is not available on the WAN. (*Id.* at 0029.) Based on information from the analyzer, Werner’s system optimizes WAN capacity,¹⁴ costs, and/or charges for LAN-WAN traffic. (*Id.* at 0030-31; *see* Werner at claim 1 (disclosing adjusting WAN capacity “on-demand” based on LAN packet traffic), FIG. 3; Ex-1003-Houh at ¶¶118-26.)

Although Werner discloses conventional computer network features (LAN, WAN, routers, computers, packet communications) and collecting LAN information to adjust WAN capacities, Werner does not explain how conventional communication layers relate to those disclosures. Nonetheless, conventional networking models (OSI and TCP/IP in particular) were well known and it was routine, conventional, predictable, and obvious to characterize and interpret networks with reference to communication layers within those models. (Ex-1003-

¹⁴ Werner uses the term “capacity” broadly to refer to “an available traffic flow capability and/or limit, such as a transport bandwidth, Class of Service subscriptions, Class of Service profile, Quality of Service subscription, etc.” (Ex-1005-Werner at 0045.)

Houh at ¶¶127-28; *see* §VII.A & §§VIII.C-E (describing the layers of both conventional models).)

Like Werner, Wiley is concerned with ensuring proper network performance by analyzing LAN or WAN data. Wiley explains:

“Service providers often have trouble isolating and diagnosing network problems. To attempt to locate a packet loss problem along a node segment (i.e., a path between two network communications devices) over a network a probe that may be used to trace data packets being communicated over the node segment. This probe, however, is typically an external device from the network communications devices and operates to run a trace over an instant of time to determine network performance information, such as packet loss, jitter, and delay.” (Ex-1006-Wiley at 0015.)

To this end, Wiley uses performance information packets (“PIPs”) to obtain performance information about network communications. (*Id.* at 0103.) PIPs are included in a conventional data packet stream. (*Id.* at 0111, FIG. 4). PIPs may be “formatted to include any information capable of providing information to network nodes to determine network performance information,” such as “transmission rate, transmission quality, and/or transmission connectivity....” (*Id.* at 0105.) PIPs may be received/used by any network nodes, including a router and or a “controller, switch...**computer**...CPE (customer premises equipment)...or any other packet service network node.” (*Id.* at 0115-16; FIGS. 3, 5-7.) Further, PIPs facilitate the

collection of information from one layer (e.g., the Data Link Layer of the OSI model), and contain information that may be used to identify operational conditions occurring in other layers to facilitate a change to address the condition. (*Id.* at 0271-78.)

It was obvious to employ Wiley's teachings with Werner. Specifically, it was obvious to use Wiley's PIPs in Werner's system to enable Werner's packet sniffer (analyzer 1406) to analyze network conditions and ascertain useful network performance information. (Ex-1003-Houh at ¶¶129-33.) Indeed, Werner discloses using such information to make informed WAN capacity adjustments. (Ex-1005-Werner at 0028, 0033.)

Employing Wiley's PIP data packets would further enable Werner's system to determine and address the root cause of operational conditions, such as by identifying that OSI Physical layer degradation has occurred based on data collected from the OSI Data Link layer, as described above. (Ex-1006-Wiley at 0271.) A POSITA would have found it obvious to apply Wiley's teachings (utilizing information collected from one layer to identify network performance issues at other layers) with Werner in order to obtain additional data about network conditions and/or to ensure Werner's WAN was appropriately configured. (Ex-1003-Houh at ¶¶132-34.)

A POSITA also had a reasonable expectation of successfully implementing Wiley’s teachings with Werner. As shown above, Wiley’s PIPs traversed nodes in typical packet-switched networks (e.g., networks characterized in terms of layers of the well-known networking models including the OSI model and TCP/IP model), like Werner’s LAN-WAN environment. Wiley also expressly indicates that the PIPs may be used by computers with appropriate software/hardware, including Werner’s computing devices and routers. (Ex-1005-Werner at FIG. 1, 0023-25.) Accordingly, a POSITA would find it straightforward to apply Wiley’s teachings with respect to PIP packets and performance information analysis in Werner’s CDPSS. (Ex-1003-Houh at ¶134.)

B. Challenged Claims

Claims 1-20 are addressed below. Notably, during prosecution of the ’108 patent, the examiner expressly found that Werner “discloses a management device 1400 (fig. 1)” having each element of claim 1 except limitation 1.5. (Ex-1002-108FH at 120-21.)

[1.0] A management device, comprising:

Werner teaches the preamble. Specifically, as explained in §XI.A, Werner discloses a CDPSS having an information device (ID1400), which includes an “analyzer 1460” (“A1460”). (Ex-1005-Werner at 0023-24.)

“Via analyzer 1460, information device 1400 can monitor and/or inspect traffic flowing through router 1300, and particularly traffic

traveling between LAN 1600 and WAN 1700. ...Analyzer 1460 can comprise a packet sniffer and/or other packet inspection mechanism and/or an interface to the WAN service provider's provisioning system.” (*Id.* at 0025.)

ID1400 discloses a “management device” because its A1460 performs management, including the following:

- “analyzer 1460 can automatically monitor, inspect, gather, analyze, store, report, render, and/or respond to information regarding packet traffic conveyed on LAN 1600, from LAN 1600 to WAN 1700, and/or from WAN 1700 to LAN 1600 (the latter two traffic types referred to herein as ‘LAN-WAN’ traffic).” (*Id.* at 0026.)
- “analyzer 1460 can store, query, retrieve, relay, and/or report information, such as packet traffic information, via database 1500.” (*Id.* at 0027; *see id.* at 0028-29 (describing further analyses).)
- “analyzer 1460 can determine and/or request any one or more desired capacity (e.g., bandwidth and/or Class of Service level) and/or change in capacity.” (*Id.* at 0029.)¹⁵

As shown, the A1460 of ID1400 manages various aspects of traffic within local and wide area networks for ID1400. (Ex-1003-Houh at ¶¶135-39.)

¹⁵ Werner defines the term “capacity” as “an available traffic flow capability and/or limit, such as a transport bandwidth, Class of Service subscriptions, Class of Service profile, Quality of Service subscription, etc.” (Ex-1005-Werner at 0037.)

Thus, Werner teaches the preamble.

[1.1] a Local Area Network (LAN) interface to communicably interface the management device with a LAN;

Werner teaches this limitation. Werner's LAN 1600 includes a router 1300, which is used to “*communicably interface*” Werner's ID1400 with the LAN:

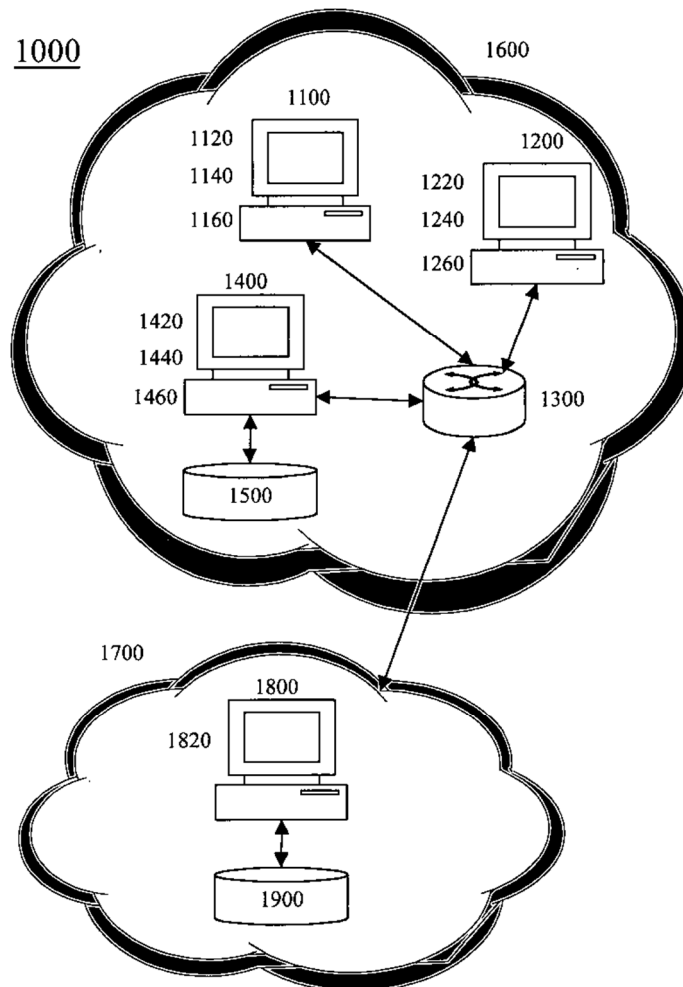


Fig. 1

“Within LAN 1600, router 1300 can be *coupled to* other entities, such as information devices 1100, 1200, and/or 1400.” (Ex-1005-Werner at 0024, FIG. 1; *see* Ex-1003-Houh at ¶¶140-43.)

Thus, Werner teaches this limitation.

[1.2] a Wide Area Network (WAN) interface to communicably interface the management device with a WAN, wherein the WAN is to provide broadband connectivity to the LAN;

Werner teaches this limitation. FIG. 1 illustrates “a local area network (LAN) 1600 *coupled to a wide area network (WAN) 1700 via a router 1300.*” (Ex-1005-Werner at 0023.) Router 1300 allows for communications between the WAN, LAN and ID1400. (*Id.* at 0023-24.) Thus, Werner discloses “*a Wide Area Network (WAN) interface to communicably interface the management device with a WAN.*”

Werner further discloses that a service provider that offered WAN network connectivity to customers and their corresponding LANs. (Ex-1005-Werner at Abstract; *see id.* at 0007-12, 0016-25 (describing customer ability to control service levels offered by service provider); 0036-37 (offering definitions of terms including those indicative of a typical customer/provider relationship, including “customer” and “service provider”).) Werner’s disclosures are offered in the context of broadband services like voice and video. (Ex-1005-Werner at 0001-02; *see id.* at 0037 (disclosing a cable modem, which would be used to provide broadband connectivity).) Accordingly, a POSITA would have reasonably understood Werner’s disclosure of WAN service providers to include broadband service

providers that provide services to customers and their corresponding LANs. (Ex-1003-Houh at ¶¶144-52.)¹⁶

Thus, Werner teaches this limitation.

[1.3] one or more processors; and a non-transitory computer-readable medium or media storing one or more sequences of instructions which, when executed by at least one of the one or more processors, cause the management device to perform operations comprising:

Werner teaches this limitation. Specifically, Werner discloses that any of its information devices, including ID1400, would include standard computer components including “one or more **processors** 2200, one or more **memories** 2300 containing **instructions** 2400, one or more input/output (I/O) devices 2500, and/or one or more user interfaces 2600 coupled to I/O device 2500, etc.” (Ex-1005-Werner at 0032, FIG. 2.)

¹⁶ While the term “broadband” is ambiguous, it at least includes network speeds that allow for the use of voice and/or video applications. (Ex-1003-Houh at ¶144.)

2000

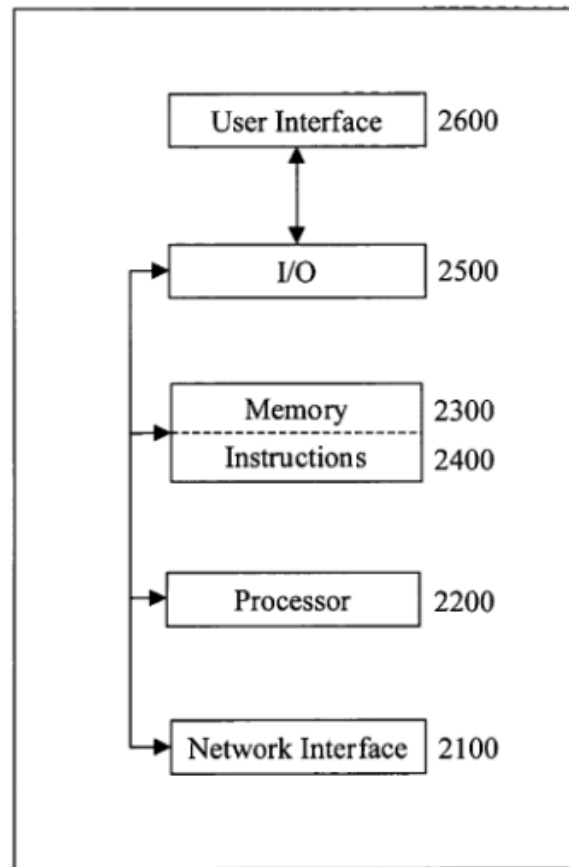


Fig. 2

Thus, Werner discloses the first part of limitation 1.3, i.e., “*one or more processors; and a non-transitory computer-readable medium or media storing one or more sequences of instructions.*” A1460 within ID1400 also performs the operations required by limitations 1.4-1.5 (discussed below), as required by the second part of limitation 1.3. (Ex-1003-Houh at ¶¶153-56.)

A1460 also performs conventional computing tasks that teach and suggest the presence of processors and non-transitory media, including monitoring, inspecting,

gathering, analyzing, storing, reporting, rendering, and responding to information regarding packet traffic. (Ex-1003-Houh at ¶¶157-59; Ex-1005-Werner at 0007, 0025-28.) Thus, A1460 would be expected to comprise “*one or more processors; and a non-transitory computer-readable medium or media storing one or more sequences of instructions.*”

Thus, Werner teaches this limitation.

[1.4] collecting LAN information from one or more communication layers on the LAN; and

Werner alone and in view of Wiley teach this limitation.

First, Werner discloses analyzing packets in a network characterized by multiple communication layers, as was routine and conventional. (Ex-1003-Houh at ¶160.) For example, Werner discloses collecting information associated with conventional network layers:

“Analyzer 1460 can analyze packet traffic information for any one or more user-specified and/or predetermined entity (such as a packet type, Class of Service level, Quality of Service level, time period, application type, application, information device type, information device, origin, destination, IP address, MAC address, user type, and/or user, etc.).” (Ex-1005-Werner at 0028.)

A POSITA would have recognized from at least the above excerpt that Werner’s networks comprised various communication layers. Dr. Houh provides several confirmatory examples, including that the IP protocol is a TCP/IP Internet layer

protocol and the MAC layer is a sublayer of the OSI Data Link layer. (Ex-1003-Houh at ¶¶160-61 (citing Ex-1008-Tanenbaum at 43, 48).) Thus, a POSITA would have recognized that Werner's disclosures were provided in the context of typical networks that had multiple communication layers.

Second, Werner's A1460 monitors and inspects traffic flowing through router 1300 within the LAN:

“Via analyzer 1460, information device 1400 can monitor and/or inspect traffic flowing through router 1300, and particularly traffic traveling between LAN 1600 and WAN 1700. A user interface 1440 for analyzer 1460 can be provided to a user 1420 of information device 1400. Analyzer 1460 can comprise a packet sniffer and/or other packet inspection mechanism and/or an interface to the WAN service provider's provisioning system.

Based upon parameters specified by a user, customer, and/or WAN service provider, *analyzer 1460 can automatically monitor, inspect, gather, analyze, store, report, render, and/or respond to information regarding packet traffic conveyed on LAN 1600, from LAN 1600 to WAN 1700, and/or from WAN 1700 to LAN 1600* (the latter two traffic types referred to herein as 'LAN-WAN' traffic).” (Ex-1005-Werner at 0025-26; *see id.* at 0058 (“gather—to collect, obtain, and/or receive.”))

As shown, A1460 uses a “packet sniffer” or other “packet inspection mechanism” to collect LAN information by inspecting packets flowing through router 1300,

including LAN traffic and LAN-WAN traffic. (Ex-1003-Houh at ¶¶160-61.) Thus, Werner discloses collecting LAN information from one or more communication layers on the LAN. (Ex-1003-Houh at ¶¶163-66; Ex-1005-Werner at 0028, 0033, claim 1.) Notably, the examiner also found this limitation was disclosed in Werner. (Ex-1002-108FH at 120-21.)

Werner in view of Wiley confirms limitation 1.4 is obvious. Specifically, as explained in §XI.A, Wiley uses PIPs to collect DPI (namely, network performance information from data packets), and it was obvious to use both standard data packets and Wiley's PIPs in Werner's network to enhance data collection with a reasonable expectation of success. (Ex-1003-Houh at ¶167.) Wiley notes that its PIP packets are communicated over the Data Link Layer of the OSI model. (Ex-1006-Wiley at 0106 (“In one embodiment, the PIP data packets 302 may be communicated over Layer 2 of the OSI model and the network performance information may be determined in Layer 2.”); *see id.* 0266, 0338.) A POSITA would have been motivated and found it obvious to use Werner's “packet sniffer” to collect LAN information relating to “network traffic ingressing and/or egressing a customer's LAN from/to a service provider's WAN” via Wiley's PIPs from the OSI Data Link layer, where Wiley discloses relevant network performance information would be available for collection. (§XI.A; Ex-1005-Werner at 0025, 0028; Ex-1003-Houh at ¶¶168-71.)

Thus, Werner alone and Werner in view of Wiley teaches this limitation.

[1.5] identifying one or more operational conditions within the WAN in a different communication layer from the one or more communication layers on the LAN by analyzing at least the collected LAN information.

Werner in view of Wiley teaches this limitation.¹⁷ Specifically, as explained in §XI.A and relative to limitation 1.4, Werner’s A1460 analyzes “network traffic ingressing and/or egressing a customer’s LAN from/to a service provider’s WAN” in order to “automatically provide...a request to a network service provider’s provisioning system sufficient to allow the network service provider’s provisioning system *to automatically and dynamically change the WAN bandwidth and/or COS subscription profiles provisioned for the customer on-demand and/or in real-time.*” (Ex-1005-Werner at 0021; *see id.* at claim 1 (“analyzing historical information regarding *packet traffic conveyed on a local area network* associated with a customer...and *requesting from the service provider an on-demand change in capacity provisioned for packet traffic conveyed on the wide area network.*”).) Thus, Werner discloses identifying operational conditions within the WAN (e.g., conditions relating to available bandwidth and provided class-of-service [“COS”] levels) using packet data collected at the LAN. A POSITA would have recognized that WAN bandwidth and COS levels may be impacted by many network factors,

¹⁷ This limitation is also discussed above in the context of discretionary denial (§IX), the prosecution history (§V.B), and claim construction (§VII).

including characteristics of the physical link(s) in a network. Werner, for example, teaches that packet traffic can be associated with “capacity” measures, such as bandwidth and COS levels, which relate to the available traffic flow capability/limit. (Ex-1005-Werner at 0045 (defining “capacity” as “an available traffic flow capability and/or limit, such as a transport bandwidth, [COS] subscriptions, [COS] profile, [QOS] subscription, etc.”); *see id.* at 0010-13, 0029-35, 0047-48; Ex-1003-Houh at ¶¶172-75.)

Wiley further discloses that physical link degradation may be the root cause of limitations on the bandwidth or COS provided in the system:

“In one embodiment, the degradation of a copper-based link due to induced noise or any other source of impairment, delay, or loss of data could **limit the quantity of information that can be carried error-free across the link.**” (Ex-1006-Wiley at 0271.)

Wiley also discloses collecting data from the Data Link Layer via PIPs, and analyzing that collected information to identify the source of the physical degradation that is limiting network capacity, so that a modification may be made to address the source of the degradation:

“In one embodiment, real-time transmission **performance information acquired in the Data Link Layer 3104 may be communicated to the Physical Layer 3102.** In one embodiment, **the degradation of a copper-based link due to induced noise or any other source of impairment, delay, or loss of data could limit the**

quantity of information that can be carried error-free across the link. The transmission performance information carried in the PIP packet is capable of identifying this degradation. This degradation may be reported to the Physical Layer 3102, where a protocol operating on the Physical Layer 3102 realizes the degradation and modifies the route to optimize throughput and overcome the impairment, such as rerouting the link to an alternative physical copper link or a reduction in the number of Quadrature Amplitude Modulation (QAM) windows or change to another transmission schema all together.” (Ex-1006-Wiley at 0271.)

Thus, the combination of Werner and Wiley discloses and render obvious limitation 1.5—by collecting network performance information from the Data Link layer in Werner’s LAN, including from PIPs, Werner’s CDPSS would be able to analyze the collected information, determine if there is a condition associated with WAN capacity (e.g., relating to bandwidth or COS levels), and identify the source of such conditions. (Ex-1003-Houh at ¶¶176-78.) In the example above, the source of the condition is an operational condition within the WAN in the physical layer (Ex-1006-Wiley at 0271), but Wiley discloses other conditions at other layers may be identified as well. (*Id.* at 0273 (network layer), 0274 (transport layer), 0275 (session layer), 0276 (presentation layer), and 0277-78 (application layer); *see* Ex-1003-Houh at ¶178.)

Indeed, the combination of Werner and Wiley merely required combining known prior art elements and methods in a predictable way, i.e., by ensuring that Werner would collect LAN information from one layer, analyze it, then adjust WAN capacities associated to address operational conditions within the WAN in with other communication layers, as disclosed in Wiley. (§XI.A; Ex-1003-Houh at ¶179; *see* Ex-1006-Wiley at 0271, 27378 (disclosing that performance information collected from the OSI Data Link layer may be used to identify problems associated with all other layers).)

As explained in §XI.A, a POSITA also would have had a reasonable expectation of success in utilizing PIPs and Wiley's related teaching that information from one layer may be used to identify problems at another layer. (Ex-1003-Houh at ¶180.) There would have been no technological hurdles to implementing this combination. (Ex-1003-Houh at ¶181.) Indeed, Werner already uses an analyzer to analyze normal data packets, and it would be routine to add Wiley's PIPs to Werner's existing network such that Werner's analyzer would determine additional or enhanced network information based on PIPs. Werner also already discloses a system that collects LAN information and analyzes it to identify operational conditions in a WAN, which would encompass Wiley's narrower teaching that information may be collected from one layer (the OSI Data Link layer) and used to

determine that a problem exists at a different layer (e.g., the OSI Physical layer).
(*Id.*)

Thus, Werner in view of Wiley teaches this limitation and renders obvious claim 1.

[Claim 2] The management device of claim 1 wherein the operations further comprising: initiating a management event responsive to at least one of the one or more operational conditions being identified.

A “management event” is described broadly in the ’108 patent and includes generating diagnostic reports as well as instructions to remedy a fault or trigger new configurations. (Ex-1001 at 3:55-66; Ex-1003-Houh at ¶183.)

Werner in view of Wiley teaches this limitation. Specifically, as explained in Claim 1, Werner’s A1460 analyzes “network traffic ingressing and/or egressing a customer’s LAN from/to a service provider’s WAN” in order to “automatically provide...a request to a network service provider’s provisioning system sufficient to allow the network service provider’s provisioning system *to automatically and dynamically change the WAN bandwidth and/or COS subscription profiles provisioned for the customer on-demand and/or in real-time.*” (Ex-1005-Werner at 0021; *see id.* at claim 1, 0029-36.) By automatically and dynamically changing the WAN bandwidth, Werner discloses “initiating a management event responsive to at least one of the one or more operational conditions being identified.” (Ex-1003-Houh at ¶184.) Additionally, as explained above regarding claim 1, Werner in view

of Wiley discloses using PIP packets to identify with specificity the network degradation causing network performance issues, such as inadequate bandwidth availability or performance in association with COS levels. (See Ex-1006-Wiley at 0271, 0273-78.) In response, Werner in view of Wiley would initiate a management event—examples in Wiley include rerouting a physical link or reducing QAM windows in response to link degradation in the physical layer (Ex-1006-Wiley at 0271), and as well as several proposed remediation steps for addressing degradation at the application layer (*id.* at 0277-78). (Ex-1003-Houh at ¶¶185-86.)

Thus, Werner in view of Wiley teaches this limitation and renders obvious claim 2.

[Claim 3] The management device of claim 2 wherein initiating the management event comprises one or more of: decreasing WAN rate to improve link stability and quality; increasing one or more Impulse Noise Protection (INP) parameter settings; and increasing one or more margin parameter settings.

Because the claim recites “one or more of,” claim 3 is met if initiating the management event comprises any one of the steps listed above.

Werner in view of Wiley teaches claim 3. As shown above regarding claims 1-2, Werner in view of Wiley discloses initiating management events to address operational conditions within the WAN, including OSI Physical layer conditions.

Wiley further discloses dynamically configuring other performance information parameters, including for example in view of bandwidth and COS-related issues:

“[D]ynamic configuration changes based on network performance may be made by the Network Management System 4508 to optimize circuit performance. For instance, if a DSL circuit 4502 suddenly experienced a peak or spike in impulse noise on the non-Ethernet segment, appropriate diagnostic information may be inserted into the Ethernet management stream and adjustments may be temporarily made by the network management system 4508 to the DSL Signal-to-Noise ratio to compensate for the interference and to ensure line stability. ...Other exemplary network performance information parameters that may be captured and inserted into the management stream include: near-end failures, far-end failures, last state transmitted (downstream and upstream), actual signal-to-noise ratio, maximum attainable data rate, actual power spectrum density, actual aggregate transmit power, xDSL profile, xDSL limit PSD mask and band-plan, xDSL Power Spectral Density mask, estimated upstream power back-off electrical loop length, trellis code use, actual cyclic extension, band number, line attenuation per band, signal attenuation per band, signal-to-noise ratio margin per band, actual data rate (downstream and upstream), previous data rate (downstream and upstream), actual interleave delay (downstream and upstream), actual impulse noise protection, impulse noise protection report, actual size of Reed-Solomon codeword, actual number of Reed-Solomon redundancy bytes, actual number of bits per second, actual interleaving depth, actual interleaving block depth, actual latency path, interval number, interval status (valid and complete; invalid or incomplete), forward error correction seconds, errored seconds-line, severely errored seconds-line, loss of signal

seconds-line, unavailable seconds-line, full initializations, failed full initializations, short initializations, failed short initializations, sync mode, or other capabilities identified in xDSL (e.g., ADSL1, ADSL2, ADSL2+, VDSL2, etc.).” (Ex-1006-Wiley at 0308-09.)

As shown, Wiley teaches adjusting parameters relating to Impulse Noise Protection (INP) parameter settings and margin parameter settings to ensure line stability. (Ex-1003-Houh at ¶¶187-90.) The excerpt above discloses, for example, dynamically adjusting a “DSL Signal-to-Noise ratio” parameter setting to maintain link stability, as well as adjusting an “impulse noise protection” parameter setting. A POSITA would have understood that these parameters may be increased or decreased, as appropriate given the observed performance. (*Id.* at ¶¶190-92 (explaining that increasing and decreasing performance parameters like transmission rate and transmit power were well known); *see* Ex-1006-Wiley at 0313 (“network performance information may be used to dynamically alter some performance parameters of the Physical Link, such as transmit power.”); Ex-1008-Tanenbaum at 535-41 (disclosing that it was routine and conventional to decrease transmission rate as part of achieving a fair operating point).)

Wiley also discloses making temporary adjustments to the “Signal-to-Noise” ratio margin parameter, which indicates that such changes may ultimately involve both increasing and decreasing such margin parameter settings. (Ex-1003-Houh at ¶192 (citing Ex-1006-Wiley at 0308, 0313).) It was obvious to include this

functionality for dynamically adjusting known network performance parameters in Werner, as doing so would predictably improve Werner by facilitating dynamic adjustments that alleviate problems associated with impulse noise. (Ex-1003-Houh at ¶¶192-93.)

Thus, Werner in view of Wiley teaches this limitation and renders obvious claim 3.

[Claim 4] The management device of claim 2 wherein initiating the management event comprises performing one or more of the following operations: generating instructions to change transmit power of WAN elements; generating instructions to modify one or more parameters affecting WAN forward error correction (FEC), WAN latency, WAN transmit power levels, and WAN data rate; and generating instructions to modify an active profile or configuration settings based on at least identified network traffic related to the WAN.

Because the claim recites “one or more of,” claim 4 is met if initiating the management event comprises any one of the steps listed above.

Werner in view of Wiley teaches claim 4. As shown above regarding claims 1-2, Werner in view of Wiley discloses initiating management events to address operational conditions within the WAN, including OSI Physical layer conditions. Wiley further discloses that “network performance information may be used to dynamically alter some performance parameters of the Physical Link, such as transmit power.” (Ex-1006-Wiley at 0313.) Dynamically altering transmit power further entailed generating instructions to cause the change by “issu[ing] the proper AOC Bit Swapping commands (see FIG. 46) to affect the necessary performance

requirements.” (*Id.*; *see id.* at 308-09.) A POSITA also would have understood from Wiley that other parameters may be dynamically adjusted in a similar way, including to modify FEC seconds and data rates. (Ex-1003-Houh at ¶¶194-98 (citing Ex-1006-Wiley at 308-309 (excerpted above, disclosing that FEC seconds parameters and data rates are among the many parameters that may be dynamically adjusted); *id.* at 313 (“network performance information may be used to dynamically alter some performance parameters of the Physical Link, *such as* transmit power.”))

Thus, Werner in view of Wiley teaches this limitation and renders obvious claim 4.

[Claim 5] The management device of claim 1 wherein the one or more communication layers on the LAN and the different communication layer in the WAN are layers of Open Systems Interconnection (OSI) model.

Werner in view of Wiley teaches this limitation. As noted above regarding limitation 1.4, a POSITA would have recognized that Werner’s networks comprised various communication layers. (Ex-1003-Houh at ¶199 (citing Ex-1008-Tanenbaum at 43, 48).) Werner does not include conventional OSI model details; Wiley does. (*See, e.g.*, Ex-1006-Wiley at 0004 (noting that the OSI model dates back to 1977 and describing each layer), 0269 (referring to FIG. 31 and noting that the invention uses services at the OSI Data Link layer).) As shown above regarding limitations 1.4 and 1.5, Werner in view of Wiley discloses that the “one or more communication layers on the LAN” is the OSI Data Link layer, and the “different communication layer in

the WAN” may be any other layer (the Physical layer and the Application layer being two specific examples discussed above). (Ex-1003-Houh at ¶¶200-202.) The example detailed above relative to claim 1 uses the OSI Physical layer as the “different” layer, but Wiley also discloses examples in which the “different” layer is the OSI Network layer, Transport layer, Session layer, Presentation layer, or Application layer. (See, e.g., Ex-1006-Wiley at 0271, 0273-78.)

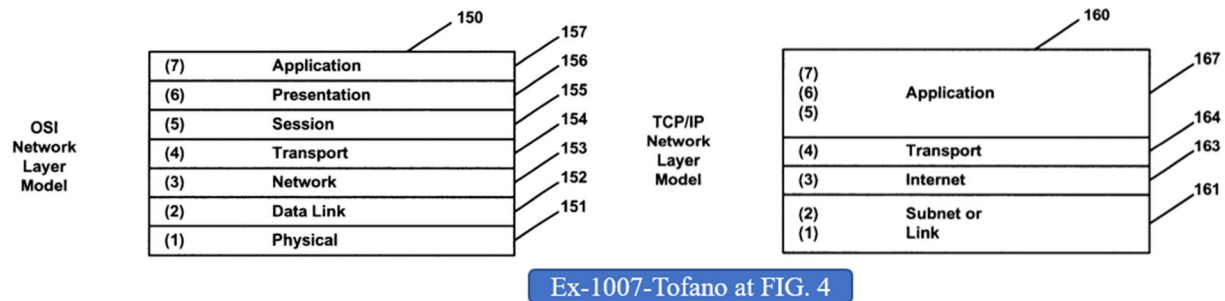
Thus, Werner in view of Wiley teaches and renders obvious claim 5.

/Claim 6/ The management device of claim 1 wherein the one or more communication layers on the LAN and the different communication layer in the WAN are layers of TCP/IP model.

The '108 patent provides essentially no teachings regarding the TCP/IP model. For example, the patent merely states that the “layers” may be layers of the TCP/IP model, which may or may not directly correspond to OSI layers:

“[I]nformation collected from the LAN 210 and WAN 205 relates to two distinct communication layers. One example of the two communication layers is two layers of the Open Systems Interconnection model (OSI model). The OSI model is a commonly used model describing the different data processing layers, in digital communication systems. The communication layers could also correspond to other communication protocols or layers such as TCP/IP which might not directly correspond to one of the layers of the OSI model.” (Ex-1001 at 16:62-17:4.)

Nonetheless, the TCP/IP model was well-known to a POSITA. As described in §VII, the layers of the OSI model loosely correspond to the TCP/IP model as shown in Tofano:



(Ex-1007-Tofano at FIG. 4.)

Werner in view of Wiley teaches this limitation. As explained above relative to limitation 1.4, Werner discloses collecting packet traffic information associated that have known associations to TCP/IP model layers, such as an IP address (relating to the TCP/IP Internet layer) and a MAC address (relating to the TCP/IP Link layer). (Ex-1003-Houh at §VI.D, ¶¶161, 203 (citing Ex-1005-Werner at 0028; Ex-1008-Tanenbaum at 43, 48).) Further, as detailed above relative to limitations 1.4-1.5 and claim 5, Werner in view of Wiley discloses “the one or more communication layers on the LAN” is the Data Link layer of the OSI model, which corresponds to the TCP/IP Link layer. Likewise, Werner in view of Wiley discloses that “the different communication layer in the WAN” may be the Network, Transport, Session, Presentation, or Application layer, all of which correspond to a layer that is

“different” in the TCP/IP Link layer. (Ex-1003-Houh at ¶¶202-206 (citing Ex-1006-Wiley at 0273-78).)

Thus, Werner in view of Wiley teaches this limitation and renders obvious claim 6.

[Claim 7] The management device of claim 1 wherein the one or more operational conditions identified within the WAN comprise at least one of: network congestion within the WAN; excess power consumption by communication elements within the WAN; bandwidth utilization of the WAN in excess of a maximum threshold; bandwidth availability of the WAN below a minimum threshold; errors on WAN connection; performance measures on the WAN; quality of WAN connection; and failure of WAN connection.

Because the claim recites “one or more of,” claim 7 is met if the operational condition identified within the WAN comprises any one of the items listed above.

Werner in view of Wiley teaches this limitation. As explained in claim 1, Werner in view of Wiley discloses analyzing data collected from the Data Link layer “to automatically and dynamically *change the WAN bandwidth*...on-demand and/or in real-time.” (Ex-1005-Werner at 0021.)

As detailed above regarding limitations 1.4-1.5 and claim 2, Werner in view of Wiley discloses identifying operational conditions on layers other than the Data Link layer. As examples, Wiley discloses collecting information relative to degradation of a connection from the Data Link layer and using that information to identify a network congestion condition in any one of the Network, Transport, and

Application layers, as well as bandwidth availability conditions in the physical layer.

(Ex-1006-Wiley at 0271, 0273-74, 0277-78; Ex-1003-Houh at ¶¶207-10.)

Thus, Werner in view of Wiley teaches this limitation and renders obvious claim 7.

[Claims 8-20]

Claims 1-7 (“Claim Set 1”) generally correspond to Claims 8-14 (“Claim Set 2”) and Claims 15-20 (“Claim Set 3”) as shown in the table set forth above in Ground

1. Thus, Werner in view of Wiley renders obvious claims 8-20 for the reasons discussed above regarding claims 1-7. (Ex-1003-Houh at ¶¶211-12.)

XII. Conclusion

For the foregoing reasons, Petitioner respectfully requests cancellation of claims 1-20.

Respectfully submitted,
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CERTIFICATE OF SERVICE

The undersigned certifies that a true and correct copy of the Petition together with all exhibits identified in the above Table of Exhibits and Petitioner's Powers of Attorney, have been served on the Patentee via Priority Mail Express or by means at least as fast and reliable as Priority Mail Express on the below date, at the following address:

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