

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

NOKIA OF AMERICA CORPORATION *et al.*,

Petitioners

v.

IANARCH TECHNOLOGIES, LIMITED,

Iarnach

Case No. IPR2024-00899

U.S. Patent No. 9,806,892

PETITIONERS' REPLY TO IARNACH'S RESPONSE

Mail Stop PATENT BOARD
Patent Trial and Appeal Board
US Patent and Trademark Office
PO Box 1450
Alexandria, Virginia 22313-1450

TABLE OF CONTENTS

I. INTRODUCTION.....	1
II. CLAIM CONSTRUCTION	1
III. THE CHALLENGED CLAIMS ARE OBVIOUS.....	4
A. A POSITA Would be Motivated to Implement Direct Transitions	5
B. A POSITA Would Find the Challenged Claims Obvious	9
IV. CLAIM 4.....	18
V. CLAIM 14.....	20
VI. CLAIM 15.....	20
VII. CLAIM 12	24
VIII. CONCLUSION.....	27

TABLE OF AUTHORITIES

	Page(s)
CASES	
<i>3M Innovative Props. v. Avery Dennison</i> , 350 F.3d 1365 (Fed. Cir. 2003)	28
<i>Accent Packaging v. Leggett & Platt</i> , 707 F.3d 1318 (Fed. Cir. 2013)	9
<i>Curtiss-Wright v. Velan</i> , 438 F.3d 1374 (Fed. Cir. 2006)	8
<i>Ecolochem, Inc. v. S. Cal. Edison Co.</i> , 227 F.3d 1361 (Fed. Cir. 2000)	18
<i>Gillette v. Energizer</i> , 405 F.3d 1367 (Fed. Cir. 2005)	28
<i>In re Mouttet</i> , 686 F.3d 1322 (Fed. Cir. 2012)	17
<i>In re Sneed</i> , 710 F.2d 1544 (Fed. Cir. 1983)	17, 18
<i>In re Varma</i> , 816 F.3d 1352 (Fed. Cir. 2016)	29
<i>Randall Mfg. v. Rea</i> , 733 F.3d 1355 (Fed. Cir. 2013)	17
<i>Samsung v. Elm 3DS</i> , 925 F.3d 1373 (Fed. Cir. 2019)	17
<i>Teleflex, Inc. v. Ficosa</i> , 299 F.3d 1313 (Fed. Cir. 2002)	9
OTHER AUTHORITIES	
37 C.F.R. §42.24(a)(1)(i)	38

TABLE OF EXHIBITS

Exhibit	Short Name	Description
Ex. 1001	'892 Patent	U.S. Patent No. 9,806,892
Ex. 1002	'892 File History	File History of U.S. Patent No. 9,806,892
Ex. 1003	Declaration	Declaration of Dr. Alexander V. Sergienko
Ex. 1004	CV	<i>Curriculum Vitae</i> of Dr. Alexander V. Sergienko
Ex. 1005	'892 Contentions*	Iarnach's Infringement Contentions for the '892 Patent in <i>Iarnach Techs. v. AT&T Corp., et al.</i> , Case No. 2:23-cv-0231-JRG (E.D. Tex.)
Ex. 1006	Röger*	M. Röger <i>et al.</i> , "Optically Powered Fiber Networks" <i>Optics Express</i> , Vol. 16, No. 26 (Dec. 22, 2008)
Ex. 1007	G.987.3*	ITU-T Standard G.987.3 (2010)
Ex. 1008	G.988*	ITU-T Standard G.988 (2010)
Ex. 1009	Ghazisaidi	International Publication No. WO2013014483 to Ghazisaidi
Ex. 1010	G.9807.1*	ITU-T Standard G.9807.1 (2023)
Ex. 1011	Wong*	Shing-Wa Wong <i>et al.</i> , "Sleep Mode for Energy Saving PONs: Advantages and Drawbacks" <i>2009 IEEE Globecom Workshops</i> (2009)

* Citations throughout are made to the exhibit page number rather than the document page number.

Exhibit	Short Name	Description
Ex. 1012	Dixit*	Abhishek Dixit <i>et al.</i> , “ONU power saving modes in next generation optical access networks: progress, efficiency and challenges” <i>Optics Express</i> , Vol. 20, No. 26 (Dec. 10, 2012)
Ex. 1013	Amitai	U.S. Patent No. 9,209,897
Ex. 1014	Hood ’969	U.S. Patent No. 8,873,969
Ex. 1015	Hood ’813	European Patent Specification EP 2 710 813 B1
Ex. 1016	Hood ’080	European Patent Specification EP 2 692 080 B1
Ex. 1017	Schmuck	European Patent Specification EP 2 333 989 B1
Ex. 1018	Hall Ellis Declaration	Declaration of Dr. Sylvia D. Hall-Ellis
Ex. 1019	Hall Ellis CV	<i>Curriculum Vitae</i> of Dr. Sylvia D. Hall-Ellis
Ex. 1020	Attachment 1A	Hall-Ellis Declaration Attachment 1A
Ex. 1021	Attachment 2A	Hall-Ellis Declaration Attachment 2A
Ex. 1022	Attachment 2B	Hall-Ellis Declaration Attachment 2B
Ex. 1023	Attachment 2C	Hall-Ellis Declaration Attachment 2C
Ex. 1024	Attachment 2D	Hall-Ellis Declaration Attachment 2D
Ex. 1025	Attachment 3A	Hall-Ellis Declaration Attachment 3A
Ex. 1026	Attachment 3B	Hall-Ellis Declaration Attachment 3B
Ex. 1027	Attachment 3C	Hall-Ellis Declaration Attachment 3C
Ex. 1028	Attachment 3D	Hall-Ellis Declaration Attachment 3D

Exhibit	Short Name	Description
Ex. 1029	AT&T Case— DCO	Doc. No. 50, Docket Control Order, <i>Iarnach Technologies Ltd. v. AT&T Corp. et al.</i> , No. 2:23-cv-00231 (E.D. Tex.)
Ex. 1030	AT&T Case— Intervenor	Doc. No. 31, Order Granting Nokia’s Motion to Intervene, <i>Iarnach Technologies Ltd. v. AT&T Corp. et al.</i> , No. 2:23-cv-00231 (E.D. Tex.)
Ex. 1031	Caseload	U.S. District Courts – Judicial Caseload Profile (Dec. 2023)
Ex. 1032	Verizon Case— DCO	Doc. No. 45, Agreed Docket Control Order, <i>Iarnach Technologies Ltd. v. Verizon Communications, Inc. et al.</i> , No. 2:23-cv-00631 (E.D. Tex)
Ex. 1033	AT&T Complaint	Doc. No. 1, Complaint, <i>Iarnach Technologies Ltd. v. AT&T Corp. et al.</i> , No. 2:23-cv-00231 (E.D. Tex.)
Ex. 1034	Verizon Complaint	Doc. No. 1, Complaint, <i>Iarnach Technologies Ltd. v. Verizon Communications, Inc. et al.</i> , No. 2:23-cv-00631 (E.D. Tex)
Ex. 1035	Dismissal	Doc. No. 114, Order Dismissing U.S. Patent No. 9,806,892, 2.23-cv-231 (E.D. Tex)
Ex. 1036	Litvin Tr.	Deposition Transcript of Dr. Kerry Litvin
Ex. 1037	D5	ITU-T, SG15, Q2, Editorial Summary: XG-PON Transmission Convergence layer specification / Clause 16, March 29, 2010
Ex. 1038	D72	ITU-T, SG15, Q2, Proposed Revisions for simplifying power saving modes in G.987.3, Meeting, date: May 23, 2013, Chengdu
Ex. 1039	G.987.3 (2014)	ITU-T Standard G.987.3 (2014)
Ex. 1040	D8	“Two proposals in ChengDu and the path forward for ONU power management simplification” June 5, 2013

Exhibit	Short Name	Description
Ex. 1041	D75	ITU-T, SG15, Q2, Unified ONU power management, Meeting, date: May 23, 2013, Chengdu
Ex. 1042	Litvin Dep. Ex. 99	Screen Capture of Röger Fig. 2
Ex. 1043	D12	ITU-T, SG15, Q2, proposed modifications on updated power saving mechanism in G.987.3, Meeting Date: December 2, 2013, Geneva

CLAIMS APPENDIX

Claim	Recitation
1[A]	A method of optical communication in a passive optical network, comprising:
1[B]	operating an optical network unit (ONU) in a first state in which a transmitter of the ONU is turned off and a receiver of the ONU is turned on;
1[C]	operating the ONU in a second state in which both the transmitter and the receiver are turned off;
1[D]	transitioning the ONU directly from the first state to the second state and transitioning the ONU directly from the second state to the first state, based on a power management rule;
1[E]	ensuring the ONU is fully powered up, synchronized, and capable of responding to both upstream and downstream traffic and control before exiting the first state or the second state; and
1[G]	receiving, by the receiver, a power management message from an optical line terminal (OLT); and
1[E]	changing the power management rule based on the received power management message.
2	The method of claim 1, further comprising: operating the ONU in a third state in which both the transmitter and the receiver are turned on.
3	The method of claim 1, wherein the power management rule specifies a first time period for operation in the first state and a second time period for operation in the second state and wherein the transitioning is performed upon expiration of at least one of the first time period and the second time period.
4	The method of claim 1, further comprising: transmitting, to an optical line terminal, a message indicative of the transitioning between the first state and the second state.
5	The method of claim 1, further comprising: performing the transitioning responsive to the received power management message and a local decision to change an operational state.
10[A]	An optical communication apparatus, comprising:
10[B]	a memory that stores processor-executable instructions; and
10[C]	a processor that uses the stored instructions to implement a method, comprising operating an optical network unit (ONU) in a first state in

Claim	Recitation
	which a transmitter of the ONU is turned off and a receiver of the ONU is turned on; and operating the ONU in a second state in which both the transmitter and the receiver are turned off; and
10[D]	wherein the processor includes means for transitioning the ONU directly from the first state to the second state and means for transitioning the ONU directly from the second state to the first state, based on a power management rule;
10[E]	wherein the processor uses stored instructions to ensure the ONU is fully powered up, synchronized, and capable of responding to both upstream and downstream traffic and control before exiting the first state or the second state; and
10[F]	wherein the processor further uses the stored instructions to implement the method by receiving, by the receiver, a power management message from an optical line terminal (OLT) and changing the power management rule based on the received power management message.
11	The apparatus as in claim 10, wherein the power management rule specifies a first time period for operation in the first state and a second time period for operation in the second state and wherein the transitioning is performed upon expiration of at least one of the first time period and the second time period.
12[A]	An optical line terminal (OLT) for operation in a passive optical network (PON), the optical line terminal comprising:
12[B]	a processor configured to generate messages for controlling a transition of an optical network unit from a first low power state in which a receiver of the optical network unit is turned on but a transmitter of the optical network unit is turned off to a second low power state in which both the receiver and the transmitter of the optical network unit are turned off;
12[C]	a transmitter configured to transmit the generated messages to the optical network unit;
12[D]	wherein the generated messages comprises a periodic consent message to allow the optical network unit to remain in either the first low power state or the second low power state.
13	The optical line terminal as in claim 12, wherein the processor includes means for specifying a first time period for operation in the first low power state and a second time period for operation in the

Claim	Recitation
	second low power state and wherein the transition of the optical network unit from the first low power state to the second low power state is controlled to occur upon expiration of at least one of the first time period and the second time period.
14[A]	A passive optical network (PON) communications system, comprising:
14[B]	an optical network unit (ONU) operable in a first low power mode in which the ONU is able to receive but not transmit and a second low power mode in which the ONU is not able to either receive or transmit, wherein the ONU is configured to transition from the first low power mode to the second low power mode and to transition from the second low power mode to the first low power mode based on a power management rule, and wherein the ONU changes a power management rule based on a received power management message;
14[C]	an optical line terminal (OLT) communicably coupled to the ONU, the OLT configured to transmit a control message to the ONU to control at least one aspect of transition of the ONU between the first low power mode and the second low power mode; and
14[D]	the ONU configured to ensure that the ONU is fully powered up, synchronized, and capable of responding to both upstream and downstream traffic and control before exiting the first low power mode or the second low power mode.
15	The system as in claim 14, wherein: the OLT is configured to transmit the control message that includes the power management rule that specifies a first time period for operation in the first low power state and a second time period for operation in the second low power state and to control the ONU to transition from the first low power state to the second low power state upon expiration of at least one of the first time period and the second time period.

I. INTRODUCTION

Iarnach's Response recognizes that the positions it and its first expert, Bruce Schofield, took in the POPR are untenable and incorrect. Iarnach and its *first* expert originally argued that the claimed direct transitions were not known in either G.987.3 or in Röger. Now, after institution, Iarnach has jettisoned both its first position and Mr. Schofield, realizing that its position was meritless. Iarnach's new position concedes that the claimed direct transitions were known and considered in both the drafting of G.987.3 and Röger, and challenges only motivation to combine. Iarnach proffers a declaration from a *new* expert that directly contradicts both Iarnach's original position and Mr. Schofield. But Iarnach's new arguments remain meritless, and the challenged claims should be found unpatentable.

II. CLAIM CONSTRUCTION

Iarnach again seeks a construction of "transition . . . from . . .to" in Claim 14 that requires a "direct transition . . . from . . .to." Resp., 6-10. But Iarnach has abandoned its argument that "transition" in *Claim 12* requires a direct transition. POPR, 12. This is an admission that the patentee distinctly claimed a "direct" transition in Claims 1, 6, and 10, while expressly claiming a broader "transition" in Claims 12 and 14. As the Board correctly recognized in the Institution Decision, the claims are not uniformly directed to a direct "transition." Claims 1, 6, and 10 expressly recite a direct transition, while Claims 12 and 14 do not. Adopting

Iarnach's proposed construction of Claim 14 would render the term "direct" in Claims 1, 6, and 10 superfluous, against precedent. *Curtiss-Wright v. Velan*, 438 F.3d 1374, 1381 (Fed. Cir. 2006).

The specification uses the term "transition" to broadly refer to transitions that include indirect transitions yet expressly identifies "direct transitions" when referring to a "direct transition" between a first and second low power state. For example, in discussing Fig. 7A, the specification discusses a "transition" from "Active Free" to "Sleep Aware" or "Doze Aware." '892 Patent, 4:29-32. The specification also discusses that there is "no direct transition between Doze Aware and the Sleep Aware states." *Id.*, 4:32-33. The specification continues, noting that "ONUs therefore lack the technology of **directly transitioning** between two low power consumption states without having to go through an active state," while noting that "such a **transition** through the **active state** may increase the power consumed by the ONU." *Id.*, 4:34-39 (emphasis added). The specification uses the broader term "transition" to refer to indirect and direct transitions, while, in certain embodiments, explicitly describes a "*direct*" transition between states. The specification is replete with examples using "transition" to describe the journey from a low power state to a high-power state. *Id.*, 5:61-63, 11:66-67. The specification provides a definition for a "direct transition," which demonstrates that the patentee

appreciated the distinction between a “direct transition” and the broader “transition.” *Id.*, 12:33-37.

Iarnach seeks to improperly import a limitation from an embodiment. *Teleflex, Inc. v. Ficos*, 299 F.3d 1313, 1328 (Fed. Cir. 2002). Iarnach argues that the specification “pervasively advocates that *the invention* is direct transitions between low power states.” Resp., 7. But Iarnach merely cites to various embodiments and cites no authority that supports importing a limitation into an independent claim where the patentee had claimed that embodiment *in other* independent claims through the use of *narrower* language. Iarnach argues that the Board should not construe Claim 14 consistent with the words of the claim because “a claim interpretation that excludes all preferred embodiments from the scope of the claim is rarely, if ever, correct.” Resp., 9. This ignores that *other* claims in the ’892 Patent claim direct transitions. Iarnach’s purported authority, *Accent Packaging v. Leggett & Platt*, 707 F.3d 1318 (Fed. Cir. 2013), concerned a construction that affected *all* independent claims, which is not the case here.

The ’892 Patent prosecution history contradicts Iarnach’s positions. Faced with a §103 rejection, the patentee purported to amend pending Claims 1, 7, 12, and

16.¹ Ex. 1002, 30-34. Claim 1 was amended to expressly recite a direct transition from the second state to the first state, while pending Claims 7 and 12 already recited a direct transition. *Id.* But pending Claim 16 was not amended to include a “direct” transition. *Id.*, 33-34. The patentee stated that pending Claim 16 was “amended in a similar manner as Independent Claim 1,” but that simply is not true. *Id.*, 27. It did *not* amend pending Claim 16 to recite a direct transition. If anything, the deletion of “between” and “and” *broadens* the claimed transition from the first low power mode to the second low power mode as it contemplates that there is some *other* state that can now be *between* these states. The Board should decline to adopt Iarnach’s attempt to re-write the claims.

III. THE CHALLENGED CLAIMS ARE OBVIOUS

Iarnach has abandoned its POPR arguments that G.987.3 and Röger do not teach the claimed direct transitions. Now, Iarnach simply argues that G.987.3 discloses direct transitions but chooses not to adopt them, and that a POSITA would not be motivated to, or could not, combine the direct transition teaching of Röger

¹ Pending claim 7 became issued Claim 6, pending Claim 12 became issued Claim 10, and pending Claim 16 became issued Claim 14.

into G.987.3. Iarnach has now admitted that all of the claimed elements were known, and its remaining quibbles focus on irrelevant inquiries that should be disregarded.

A. A POSITA Would be Motivated to Implement Direct Transitions

G.987.3 explicitly identified ONU power savings as a goal of the (prior art) XG-PON standard. Ex. 1007, 97 (“For a variety of reasons, it is desirable to reduce the power consumed by an ONU as much as possible.”); Pet., 10-12. G.987.3 discusses the importance of this goal for nearly an entire page. Similarly, Röger recognized that minimizing ONU power consumption was critical because the Röger ONUs are optically powered by photonic energy. Ex. 1006, 2-3; Pet., 10-12. A POSITA would be motivated to look to Röger to optimize ONU power because of Röger’s focus on ONU power savings. Pet., 11-15.

Iarnach’s Response focuses heavily on the ONU state transition tables as they are written in G.987.3. But the Petition did not assert an anticipation ground under §102—instead, the asserted grounds are based on *obviousness* over G.987.3 in view of Röger and further in view of G.988 (and further in view of Ghazisaidi for Ground 2). It necessarily follows that there would be some modification to the base reference because it would have been obvious to try (Pet., 12; ID., 34-35) and/or in view of the combination and in order to find the claims *obvious* (Pet., 12-15)—as opposed to *anticipated*.

Iarnach's Response focuses heavily on "Note 2" to support its argument that a POSITA would not, and could not, modify G.987.3 to incorporate the claimed direct low power state transitions. Iarnach misstates both G.987.3's disclosures and Petitioner's argument. Note 2 appears in Table 16-7 of G.987.3, which is titled "OLT state transition and output table" and is found in the "**OLT** state machine" section, 16.3.2. Ex. 1007, 102-105 (emphasis added). Note 2, or even a similar note, *does not appear* in Table 16-4, the "**ONU** state transition and output table." *Id.* To be clear, Note 2 is directed to the OLT state machine—not the ONU state machine.² G.987.3 is clear that the ONU and OLT state machines are distinct state machine entities that only "operate in partial state alignment," which indicates that the OLT state machine is not a mere mirror of the ONU state machine. Ex. 1007, 98.

Regardless, even if Note 2 were to be interpreted the way Iarnach is now alleging, Note 2 acknowledges that ONU "direct transitions between Doze Mode and Cyclic Sleep mode" *were known and contemplated in the prior art. Id.*, 97. Indeed, Dr. Litvin expressly concedes this fact. Ex. 2007, ¶¶108-110; Ex. 1036,

² Adopting Petitioner's assertions, the Board was persuaded that "G.987.3's prohibition on direct transitions between the Doze and Cyclic Sleep Modes is directed to an OLT, not an ONU." ID, 49 citing Pet., 10-11.

47:14-51:15. The fact that G.987.3 lacked express support for those transitions in the 2010 version of that standard is irrelevant to the undisputable fact that these direct transitions were known. *Id.* Further, under Iarnach’s interpretation of Note 2, not only were direct transitions known, *but OLTs could receive requests by ONUs to execute direct transitions.* In such a scenario, Note 2 provides guidance for how the OLT should react to an ONU that is performing a direct transition. In other words, G.987.3 teaches that an ONU could request to directly transition between the claimed low power states. Finally, an identical version of “Note 2” also appears in G.9807.1, which formed the basis for Iarnach’s infringement contentions. Ex. 1010, 238; Ex. 1005; Pet. 10-11; Ex. 1003, ¶69. This proves that Note 2 *does not prevent* direct state transitions. Regardless, Ground 1 relies on both G.987.3 *and* Röger, rendering Iarnach’s position moot.

Iarnach also incorrectly argues that the “prior art foresaw the specific invention that was later made, and warned against taking that path.” Resp., 22-23. First, ***this is an admission*** that the invention *is not novel* and *was known*. Second, even if there were such a warning, technology advancements undercut such a warning and “made it easier for an ordinarily skilled artisan to take advantage of known energy savings by incorporating the direct transitions of Röger into G.987.3.” ID, 50 citing Pet. 12-14; Ex. 1003 ¶¶ 70–74; Ex. 1011, 3–4; Ex. 1006, 5–7. Third, to the extent Iarnach is correct and G.987.3 does not allow for direct transitions, it is

not due to some architectural limitation that would prevent the proposed combination.

The two low-power branches found in G.987.3 were simply developed independently under a time deadline. Ex. 1037, 2-3. Specifically, different proposals for Cyclic Sleep and Doze Mode were independently submitted by different ITU members. Both were implemented under a June 2010 deadline. *Id.*, 3. Iarnach's conclusory statements to the contrary are not supported by *any* evidence and Dr. Litvin did not conduct any investigation. Ex. 1036, 29:13-17. The design and architecture of G.987.3 does not present a fundamental barrier to further implementing direct transitions. Instead, as seen in G.9807.1 and later editions of G.987.3, the limited addition of a handful of parameters confirms that the architecture of G.987.3 does in fact allow for the claimed direct transitions. Ex. 1036, 36:8-37:14, 39:10-40:8, 45:9-46:22.

Iarnach's argument that "transceiver, receiver, and transmitter turn-on times were not of concern" ignores the very evidence upon which it relies. Ex. 2007, ¶112. Specifically, G.987.3 defines time parameters "Itransinit" and "Itxinit" because the OLT must know the capabilities of the ONU, including how long it takes the ONU to perform state transitions. Ex. 1007, 98-99. The existence of these parameters proves the importance of chip performance to the architecture of modifying power states. Further, POSITAs involved in amending and revising G.987.3 were keenly

aware of developments in performance of relevant chipsets in evaluating power saving states. For example, an ITU-T submission for the May 23, 2013 meeting, directed to “proposed revisions for simplifying power saving modes in G.987.3,” expressly acknowledged that the Study Group must account for “the current progress of transmitter driver technology” and that “[c]hips are now commercially available that offer very fast enable/disable times.” Ex. 1038, 1. As laid out in the Petition and in the Institution Decision, these advancements in chip performance were a consideration in standards development and motivating factor as to why a POSITA would have sought to include direct transitions in G.987.3. Pet., 13-14; ID., 37-38; *see also* Ex. 1011, 1012.

B. A POSITA Would Find the Challenged Claims Obvious

There is no dispute that G.987.3 teaches each limitation of Claim 1, aside from Limitation 1[D]. And there is no dispute that the claimed direct transitions were known to the authors of G.987.3 and that they are explicitly present in Röger. Ex. 2007, ¶¶108-110. According to Dr. Litvin, a POSITA would naturally have understood direct transitions to be one of four distinct possibilities for ONU power state transitions and would have been motivated to consider direct transitions. Ex. 2007, ¶¶109-110 (“With so few realistic power saving options the ITU standard body undoubtedly considered all of them, . . .”); *see also* Pet. 12 (asserting that direct transition between Listen mode and Asleep sleep mode would be obvious to try).

Iarnach's fundamental dispute with the combination of G.987.3 and the direct transitions of Röger is that it would allegedly be impossible for a POSITA to implement such a combination due to incompatibilities. This is not true and is based on an improper obviousness analysis.

First, Iarnach's argument that the modification would "render G.987.3 inoperable for its intended design where the OLT relies upon the fact that a dozing ONU cannot slip into the Asleep state" is, at best, circular. Resp., 28. Iarnach is arguing that one cannot modify G.987.3 as part of an obviousness inquiry because that would require *modifying G.987.3*. This circular reasoning should be disregarded. Specifically, Iarnach relies on the argument that "G.987.3 is designed to operate where an ONU sends SR messages to an OLT," but "never from doze to sleep or the reverse" to support its proposition that an ONU could not transition between the claimed first and second states. Resp., 27. This argument ignores that part of an obvious combination necessarily involves *modifying* a reference in view of another reference.

Moreover, the details cited in Iarnach's Response are far beyond what is claimed in the challenged claims. For example, Iarnach relies on G.987.3's use of the ONU sending SR (sleep request) messages to an OLT and an "ONU cannot send a notification of direct transitions between Asleep (4) and Listen (6) states" without turning on its transmitter. Resp., 26-27. But these signaling mechanics are not found

in the challenged claims and these alleged incompatibilities cannot form the basis for a reason as to why the claimed *invention* would not have been obvious to a POSITA. *Samsung v. Elm 3DS*, 925 F.3d 1373, 1382 (Fed. Cir. 2019); *Randall Mfg. v. Rea*, 733 F.3d 1355, 1360–63 (Fed. Cir. 2013).

This argument also ignores that G.987.3 already contemplates many power management parameters are *known to the OLT*. An OLT’s knowledge of an ONU’s ability to directly transition between the claimed first and second states would allow an OLT to account for an ONU’s inability to receive downstream transitions while the ONU is in the claimed second state. G.987.3 already allows an OLT to buffer downstream traffic for ONUs in a sleep state. Ex. 1007, 103 (“... in the low power sleep state, the OLT may buffer downstream traffic.”).

The appropriate question is not whether a POSITA could readily integrate every aspect of the Röger system into G.987.3 as “[i]t is well-established that a determination of obviousness based on teachings from multiple references does not require an actual, physical substitution of elements.” *In re Mouttet*, 686 F.3d 1322, 1332-33 (Fed. Cir. 2012); *In re Sneed*, 710 F.2d 1544, 1550 (Fed. Cir. 1983) (“[I]t is not necessary that the inventions of the references be physically combinable to render obvious the invention under review.”). In *Mouttet* the court explained that an inability to physically combine the separate components of an electrical system and optical system did not take away from the obviousness analysis. *Id.* Instead, the

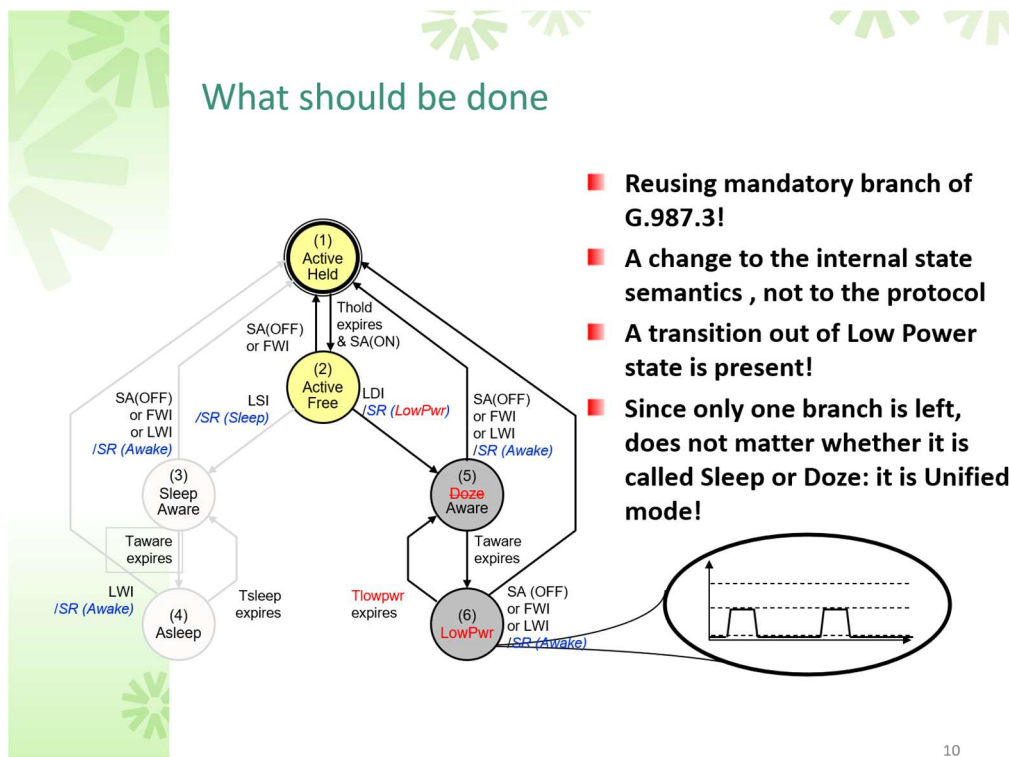
relevant consideration under § 103 was whether “[a POSITA] would indeed have recognized that Falk's arithmetic processor could have been combined with Das's wired crossbar array to predictably yield Mouttet's claimed computing device.” Put more plainly, the appropriate instant inquiry is “what the combined teachings of the references would have suggested to those having ordinary skill in the art.” *Id.* And an engineer with “at least a bachelor’s degree in electrical engineering, computer engineering, or similar discipline . . . and at least two years of experience with optical communications and networks” would have readily recognized that direct transitions could be combined into G.987.3. Ex. 1003, ¶¶ 70-74, 81-86.

There is simply no doubt that a POSITA would have been able to modify G.987.3 as alleged in the Petition. *Ecolochem, Inc. v. S. Cal. Edison Co.*, 227 F.3d 1361, 1379 (Fed. Cir. 2000). This is further confirmed by the fact that POSITAs *did in fact* modify G.987.3 to implement the direct transitions disclosed in Röger. Ex. 1036, 36:8-37:14, 39:10-40:8, 45:9-46:22.; Ex. 1039, 102-112; Ex. 1010, 230-239. The G.9807.1 Recommendation (XGS-PON) was created by modifying G.987.3 (XG-PON). *Id.*³ Iarnach cannot credibly argue that implementing direct transitions

³ Iarnach argues G.9807.1 discloses the claimed invention. Ex. 1005.

into G.987.3 was an impossible task due to the alleged incompatibilities within G.987.3 when that is exactly what was done.

Further examination confirms the ease with which G.987.3 could be modified to incorporate direct transitions. G.987.3 simply reused the existing power savings branch of G.987.3 and changed “the internal state semantics, not to the protocol” to implement direct transitions. Ex. 1040, 10.



The existing Doze branch already included the necessary transitions to an active state to accept the implementation of direct transitions. *Id.*, 12.

Conclusions

- It does NOT matter which half of the state machine is deprected and how the states are called
 - As long as the critical transitions are present and backward compatibility is maintained
- In the current G.987.3, Doze mode is mandatory, Cyclic Sleep is optional
- The former Doze branch provides the necessary transition from LowPower to the ActiveHeld on external wakeup stimulus
- For the specification details, see D75 in Chengdu

12

The corresponding technical contribution, D75, confirmed that implementing direct transitions could be “derived as a reduction of the two-mode state machines currently specified in G.987.3.” Ex. 1041, 7. That same contribution also proposed redline edits to G.987.3 showing the minor changes to implement direct transitions into G.987.3. *Id.*, 10-11. Another contribution that includes Futurewei as a contributor, D12, proposed other minor revisions to G.987.3 to implement direct transitions in yet another way. Ex. 1043, 1-13. Further, the 2014 version of G.987.3 implements the claimed direct transitions and G.9807.1 copied this later version of

G.987.3. Ex. 1039, 102-112; Ex. 1010, 230-239. There is no fundamental structural limitation in G.987.3 that would prevent the implementation of direct transitions. Ex. 1003, ¶74.

Iarnach also incorrectly asserts that “G.987.3 explicitly considered the very direct transitions that Petitioners say would be used . . .” Resp., 24. First, this is a clear admission that the direct transitions were known and obvious. Second, this ignores the historical record of how G.987.3 came to have both Doze and Sleep modes. The two branches of the state machine diagram are a direct result of the fact that there were two competing proposals being considered by Study Group 15 of the ITU-T, one for Cyclic Sleep and one for Doze. Ex. 1037, 3. As a compromise, both power saving modes were incorporated into G.987.3. *Id.*, 2. Iarnach and Dr. Litvin have adduced no evidence that supports the conclusion that the authors of G.987.3 considered implementing direct transitions and made a considered decision to abstain. Rather, Note 2 (the sole text upon which Iarnach hangs its argument) merely indicates that the OLT state diagram as drawn did not support OLT state transitions between the two branches in that version. Pet., 11-12.

Iarnach also contends that specific aspects of Röger make it incompatible with G.987.3. This is not the correct inquiry as Iarnach only contends that the claimed direct transitions are not taught in G.987.3. As such, the only remaining question is whether 1[D] is obvious in view of Röger. The specific signaling mechanisms and

times when the OLT transmits data to the ONUs in Röger are irrelevant to this dispute and are outside of the claimed invention. For example, Claim 1 does not require that an OLT transmit user data to an ONU. In fact, the only transmission claimed in Claim 1 is a “power management message,” which Iarnach does not dispute is taught in G.987.3. Whether rendezvous signals of Röger are different from the Sleep Request messages of G.987.3 is irrelevant. Similarly, whether Röger’s OLT expects to receive data during the first and second claimed states is also irrelevant. That is simply not claimed. The claimed first and second power states are merely defined by the power states of the receiver and transmitter—not on extraneous architecture details that are absent from *all claims*.

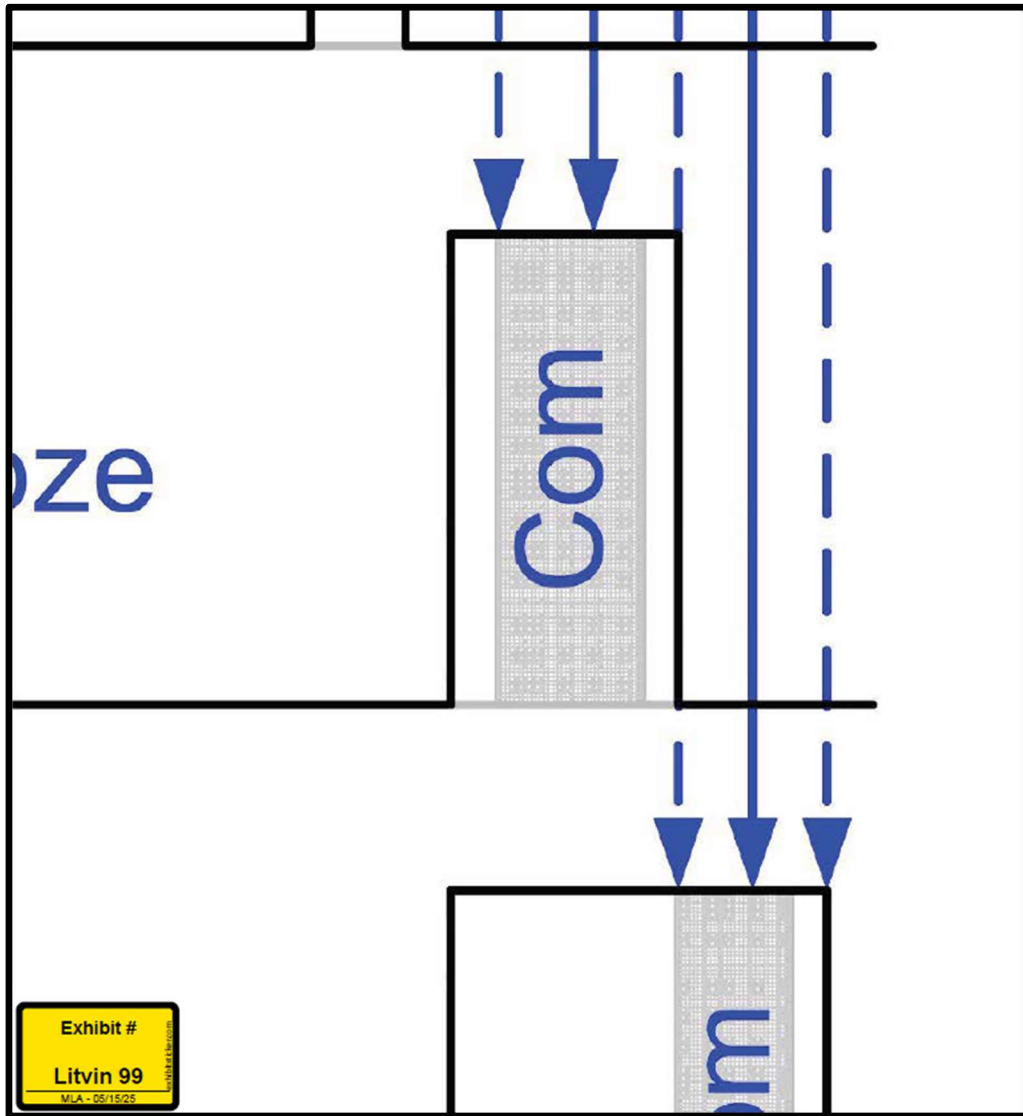
Iarnach’s Response relies on Dr. Litvin, who based his opinions regarding the relevance of Röger on an understanding that Claim 1 is limited to telecommunication networks for high bandwidth because the *preamble* of Claim 1 recites a “method of optical communication in a *passive optical network*.” Ex. 1036, 88:8-98:7. His opinions should be disregarded.⁴ There can be no credible argument that Röger is

⁴ Dr. Litvin’s conclusions should be afforded little weight as he has spent hundreds of hours over years acting as a litigation consultant for Iarnach. Ex. 1036, 22:14-26:16. Specifically, he was hired to evaluate Iarnach’s patent portfolio to

not directed to a PON. Ex. 1006, 1; Ex. 1003, ¶67. And there is no basis for construing *passive optical network* to import a limitation that is limited to “high bandwidth networks.”

Regardless, Röger *does* teach receiving messages, including power management messages, during its periods in the claimed first state in both Figs. 2 and 6. Pet.,20-23. In sum, Röger teaches a simplified power management scheme whereby the ONU transitions its transceiver from RX:off/TX:off to RX:on/TX:off to RX:off/TX:off. *Id.*, 21. It also teaches ONU transceiver transitions from RX:off/TX:off to RX:on/TX:off to RX:on/TX:on and the reverse. *Id.* This is apparent from Fig. 2, enhanced below.

determine which patents should be asserted. *Id.* Moreover, Dr. Litvin did not read or consider the POPR or the Schofield Declaration. *Id.*, 60:22-61:9, 63:8-66:7.



Ex. 1042; Ex. 1036, 82:19-86:9. As such, Röger teaches the claimed direct transitions where power savings through transceiver component management is paramount.

IV. CLAIM 4

Iarnach disputes that G.987.3 discloses Claim 4 by relying on an overly narrow interpretation of the Claim. But Iarnach offers no explanation as to how the

ONU could transmit “a message indicative of the transitioning between the first state and the second state” under its interpretation of the claim. Resp., 40. G.987.3 teaches that the ONU transmits “Sleep_Request” messages to “signal the ONU’s intention to change power saving modes.” Ex. 1007, 52; Ex. 1003, ¶117. It also teaches the transmission of a message indicative of a state change to the OLT *each and every time* the ONU transitions from a low power state (either Asleep or Listen) into an Active state. Pet., 42-43. The same is true for *each and every time* the ONU transitions from an Active state into a low power state (either Asleep or Listen). *Id.* There is no way in G.987.3 for an ONU to transition from Asleep to Listen (or vice versa) *without* the transmission of a message to the OLT indicative of a transition. That is to say that there is no teaching in G.987.3 that in the event of a direct transition from Asleep to Listen, there would *not* be a message sent. *Indeed*, Note 2 in Table 16-7 teaches the exact *opposite*. Note 2 states that “[w]hen the OLT receives a request to execute such a [direct] transition, it attempts to regain state machine synchronization by waking up the ONU.” Ex. 1007, 97. As such, G.987.3 teaches that the ONU would send a message (the “request” of Note 2) when transitioning directly between Doze Mode and Cyclic Sleep Mode.

V. CLAIM 14

Iarnach's Response effectively concedes that Claim 14 should be cancelled if the Board does not adopt Iarnach's attempt to import a limitation from the specification that is plainly not found in the claims. Resp., 42.

VI. CLAIM 15

Iarnach incorrectly argues that Claim 15 is not obvious because it is not "equivalent" to previously addressed claims. Specifically, Claims 14 and 15 collectively recite an OLT that transmits "a control message to the ONU to control at least one aspect of [the ONU] transition" and "the control message that includes the power management rule that specifies a first time period for operation in the first low power state and a second time period for operation in the second low power state" Iarnach incorrectly argues that Claim 15 is distinguished from Claims 1 and 3 because Claim 1 does not expressly claim transmitting the "power management rule," but instead claims transmitting "a power management message" (1[F]) from the OLT that changes "the power management rule" (1[G]). This is a distinction without a difference as Claim 3 recites an *identical* requirement of a "power management rule that specifies a first time period for operation in the first low power state and a second time period for operation in the second low power state" Iarnach concedes that the additional limitation of Claim 3 is obvious.

Claims 3, 11, and 15 each requires a power management rule that specifies a first time period for the operation of the ONU in the first state and a second time period for operation of the ONU in the second state. Critically, Iarnach *does not* contest that G.987.3 teaches the claimed power management rule of Claims 3 and 11. That is to say, Iarnach *concedes* that G.987.3 in view of Röger and G.988 renders obvious a power management rule that specifies a first time period for the operation of the ONU in the first state and a second time period for operation of the ONU in the second state.

Iarnach also incorrectly argues that Claim 15 requires the transmission of two separate time values that are transmitted in a single control message. Claim 14 requires transmitting “a control message to the ONU to control at least one aspect of transition of the ONU between the first low power mode and the second low power mode.” And Claim 15 further requires that “*the* control message includes the power management rule” that specifies a first time period for the first low power state and a second time period for the second state. It is well-settled that the indefinite article “a” refers to one *or more*. There is no restriction in the claims that only one control message may be sent to the ONU. Each transmission of an OMCI message that contains an “Isleep” parameter is a control message that sets “the maximum time

the ONU spends in its Asleep or Listen states.” Ex. 1007, 98.⁵ This controls how long an ONU can exist in either the first or second low power state before beginning a transition to the other low power state. The claimed “message” of Claim 14 is only required to transmit a (one or more) control messages that controls *at least one aspect of the* ONU transition. Claim 15’s use of the definite article “*the* control message” refers to the *one or more* messages of Claim 14.

Iarnach’s alleged authority does not support the notion that this claim language requires two *separate* time periods in a *single* control message. In *Gillette v. Energizer*, 405 F.3d 1367, 1373 (Fed. Cir. 2005), the claim language at issue uses “first, second, and third” to describe the physical orientation of three different blades. This discussion has no bearing on a time period, which need not take up a specific location in space. In *3M Innovative Props. v. Avery Dennison*, 350 F.3d 1365, 1371 (*Fed. Cir. 2003*), the court’s understanding that “first” and “second” required two distinct patterns was rooted in the specification’s own lexicography

⁵ The OLT transmits an “Iaware” time parameter, which is “the minimum time the ONU spends in its Aware state,” an intermediate state between the existing low power states of G.987.3. Ex. 1007, 100; Ex. 1003, ¶138. This further controls the ONU’s transition between claimed states.

that required “‘two or more embossing patterns’ be ‘superimposed.’” No such lexicography or relational geometry exists here. Finally, with respect to the control message, even *Varma*, which is cited by Iarnach, acknowledges that “‘a’ sometimes is non-restrictive as to number, permitting the presence of more than one of the objects following that indefinite article, context matters even as to whether the word has that meaning.” *In re Varma*, 816 F.3d 1352, 1362-1363 (Fed. Cir. 2016). And the context of the claim language here does not require a single control message, particularly where the claim *does not require direct transitions*.

Iarnach also ignores Röger, which is discussed extensively for Claim 3. Pet., 37-42. Röger teaches that the OLT transmits RV signals that “transmit information about the next rendezvous time with CO.” Ex. 1006, 12. If a RV signal is received the ONU snoozes (second low power state) for a specific period of time (second time period) until the rendezvous. *Id.* (“The RV signal (details see left inset of Fig. 6) comprises a time stamp which tells each listening subscriber the waiting time TSnooze that can be spent snoozing until the next rendezvous with CO.”) At the rendezvous, the ONU stays awake until it receives confirmation that the OLT has moved onto the next ONU or it receives an END command from the OLT. *Id.*, 13. Both result in the OLT transmitting messages that control how long the ONU is first low power state. Further, Iarnach does not substantively contest that Claims 3 or 13,

which effectively recites the same limitations as Claim 15, are rendered obvious by Ground 1.

VII. CLAIM 12

Iarnach has not contested that G.987.3's Sleep_Allow(ON) and Sleep_Allow(OFF) messages are the claimed messages in 12[B] that control the transition of an ONU from a first lower power state to a second low power state. Instead, Iarnach attacks the disclosure of G.987.3 in view of 12[D], which requires that the messages of 12[B] comprise a periodic consent message to allow the ONU to remain in either the first low power state or the second low power state.

Iarnach has proffered an interpretation of “a periodic consent message to allow the optical network unit to remain in either the first low power state or the second low power state” that excludes the ONU receiving the consent message and then transitioning into and remaining in either the first or second low power state. This interpretation imports a limitation that is both not found in and is contradictory to the plain language of the claim. There is no express requirement in 12[D] that the ONU *already* be in a low power state when it receives the claimed message—that language is simply absent from the claim. Instead, the limitation recites a “. . . message *to allow* . . . ,” which refers to a future action by the ONU—not a present state of the ONU. Iarnach's sole support for its position is a description of the LPM-Allow message from the specification. Resp., 49-52. But Iarnach's interpretation of

this statement is contradicted by the patent figures—none of which depict an LPM-Allow message being transmitted to an ONU in a low power state. Instead, the figures depict an LPM-Allow (or a Sleep_Allow(ON)) message only being sent to an ONU in the Active Held state. Ex. 1001, Figs. 5, 7A, 7B, 7D, 7E. Further, the corresponding state diagram figure in G.987.3 (Figure 16-1) mirrors the disclosure of LPM-Allow/Sleep_Allow(On) and is what Iarnach relies on to support its argument that G.987.3's Sleep_Allow messages are *not* sent to ONUs in a low power state. Ex. 1007, 101.

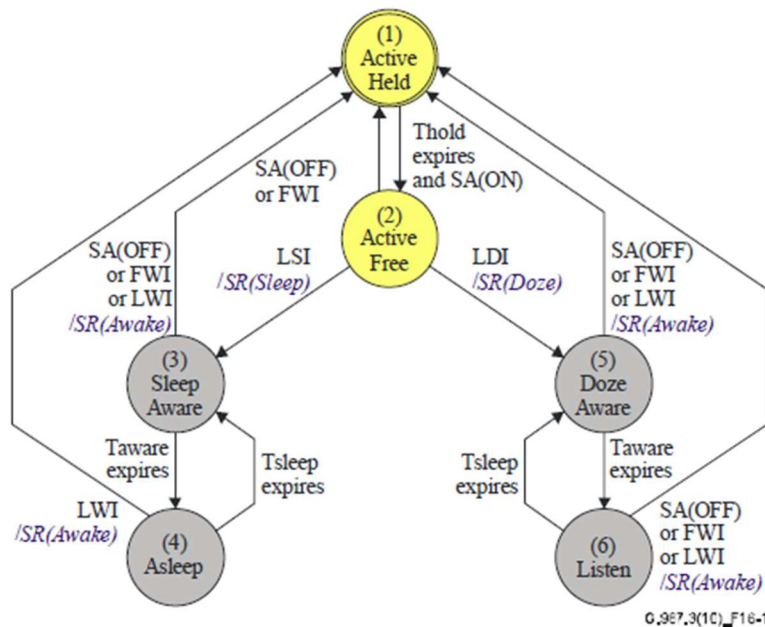


Figure 16-1 – ONU state transition diagram (initial state circled)

Regardless, Iarnach's interpretation is nonsensical in view of 12[D], which requires that the message allows the ONU to remain in the *first or second* low power

state. The second low power state requires that the ONU's receiver and transmitter are *turned off*. But an ONU cannot receive the claimed messages if its receiver is turned off. As a result, Iarnach's position requires that the claims recite a nonsensical and impossible outcome where the OLT is required to send messages to an ONU that cannot receive them to cause the ONU to *stay* in its "receiver off" low power state.

But even if Iarnach were correct, there is nothing in G.873.3 that *prohibits* sending Sleep_Allow(ON) messages to an ONU in the Listen state, which corresponds to the claimed first lower power state. A POSITA would be motivated to have an OLT send a Sleep_Allow(ON) messages to an ONU in the Listen state *before* the Isleep timer expired such that the ONU would not have to exit the Listen state to a Doze Aware state. Pet., 62-63; Ex. 1003, ¶163. Indeed, Table 11-2 of G.987.3 describes that the Sleep_Allow PLOAM message is triggered "[a]t the OLT's discretion." Ex. 1007, 51.

Iarnach agrees with Petitioners that G.987.3's OLT sending the PLOAM message Sleep_Allow(ON) is a "consent message." Resp., 49. And the message, which results in the ONUs remaining in a claimed low power state, can be sent each time the ONU is in Active Held, which happens periodically. *Id.*, 52. These messages allow an ONU to remain in the claimed low power states under either interpretation of this limitation.

Iarnach also ignores Röger, which further teaches this limitation. As discussed with respect to 12[B] (and as not contested by Iarnach), Röger teaches that the OLT generates polling signals, which are the claimed “generated messages” that are periodically sent to the ONUs. Pet., 32-35, 59-61; Ex. 1006, 6-7. Fig. 2 further depicts these messages as being periodically transmitted to the ONUs (S1–S4). Ex. 1006, 7. Fig. 2 and the accompanying text disclose that these messages allow the ONUs to stay in a low power mode where the receiver is ON and the transmitter is OFF (claimed state one) and where the receive and transmitter are both OFF (claimed state two). Ex. 1006, 6-7. The messages of Röger—which Iarnach does not contest disclose the claimed messages of 12[B]—also teach the limitation of 12[D] in addition to G.987.3.

VIII. CONCLUSION

Petitioners request cancellation of the Challenged Claims.

Dated: May 29, 2025

By: / Christopher TL Douglas /
Christopher TL Douglas
Reg. No. 56,950
ALSTON & BIRD LLP
Vantage South End
1120 S. Tryon Street, Suite 300
Charlotte, NC 28203
Phone: 704.444.1119
Fax: 704.444.1799
Email:
christopher.douglas@alston.com

CERTIFICATE OF WORD COUNT

Petitioners certify that the word count in this Reply is 5,577 words, as counted by the word-processing program (Microsoft Word for Office 365) used to generate this Reply, where such word count excludes the table of contents, table of authorities, mandatory notices, certificate of service, appendix of exhibits, and this certificate of word count. This Reply is in compliance with the 5,600-word limit set in 37 C.F.R. §42.24(c)(1).

Respectfully submitted,

Dated: May 29, 2025

By: / Christopher TL Douglas /
Christopher TL Douglas
Reg. No. 56,950

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§42.6(e), 42.105 and in view of the agreement between the Parties under 37 C.F.R. § 42.105(b), the undersigned hereby certifies that true and correct copies of the above-captioned PETITIONERS' REPLY TO IARNACH'S RESPONSE and all associated exhibits were served in their entirety on May 29, 2025, upon Iarnach via P-TACTS and email at the following addresses:

Robert Allan Bullwinkel (abullwinkel@hpcllp.com)
Michael F Heim (mheim@hpcllp.com)
Blaine Andrew Larson (blarson@hpcllp.com)
Christopher L. Limbacher (climbacher@hpcllp.com)
Michael Dean McBride (mmcbride@aatriallaw.com)
Joshua S. Wyde (jwyde@aatriallaw.com)
IPR2024-00899@aatriallaw.com

Dated: May 29, 2025

By: / Christopher TL Douglas /
Christopher TL Douglas
Reg. No. 56,950