UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

IARNACH TECHNOLOGIES LTD., *Plaintiff*, v. AT&T INC., AT&T CORP., AT&T COMMUNICATIONS LLC, AT&T MOBILITY LLC, AT&T MOBILITY II LLC, and AT&T SERVICES INC., *Defendants*, NOKIA OF AMERICA CORPORATION, *Intervenor*.	Civil Action No. 2:23-cv-00231-JRG

DEFENDANT'S INVALIDITY CONTENTIONS

Pursuant to this Court's Docket Control Order (Dot. No. 50) and Local Patent Rule 3-3, Defendants AT&T Corp., AT&T Communications LLC, AT&T Mobility LLC, AT&T Mobility II LLC, and AT&T Services Inc. ("AT&T") and Intervenor Nokia of America ("Nokia") respectfully submit these invalidity contentions.

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I. ASSERTED PATENTS AND ASSERTED CLAIMS

On September 14, 2023, Plaintiff Iarnach Technologies Ltd. ("Iarnach") served its Preliminary Infringement Contentions. The Asserted Claims are claims 1-7 of U.S. Patent No. 8,712,242 (the "'242 Patent"); claims 1-3 and 5-9 of U.S. Patent No. 8,934,359 (the "'359 Patent"); claims 1-8 of U.S. Patent No. 8,942,378 (the "'378 Patent"); claims 1-4, 11, 13, and 14 of U.S. Patent No. 9,363,013 (the "'013 Patent"); and claims 1-3 and 5 of U.S. Patent No. 9,806,892 (the "'892 Patent"). The patents are referred to collectively as the "Asserted Patents," and the asserted claims are referred to collectively as the "Asserted Claims."

II. PRELIMINARY STATEMENT

These invalidity contentions are preliminary in nature and do not address noninfringement. Defendants reserve all rights with respect to such issues, including their position that claims of the Asserted Patents should be construed in a particular manner and/or are not infringed. These invalidity contentions are based on Defendants' current knowledge, understanding, and belief of the Asserted Patents and prior art, of Iarnach's infringement theories (as disclosed in the Infringement Contentions), and of the facts and other information available as of the date of these invalidity contentions. Defendants' investigation, discovery, and analysis of information related to this action is ongoing. Additional discovery and/or orders of the Court may require Defendants to amend or supplement these invalidity contentions, and Defendants expressly reserve the right to do so as the case proceeds. These contentions represent Defendants' good-faith effort to provide a comprehensive identification of prior art relevant to this case, but Defendants reserve the right to modify or supplement their prior art list and invalidity contentions at a later time with, or based upon, pertinent information that may be subsequently discovered.

A. No Waiver.

Nothing in these invalidity contentions is intended, nor should be construed, as a waiver of any claim construction argument, noninfringement position, or argument under 35 U.S.C. § 112. Defendants' statements herein (including the accompanying claim charts) reflect Defendants' present understanding of the purported scope of the claims as alleged by Iarnach in its Preliminary Infringement Contentions (as best as those contentions can be understood in light of their present deficiencies). For the avoidance of doubt, these contentions are not intended to present or argue in favor of any construction of the Asserted Claims, and Defendants expressly reserve the right to present constructions that differ from any construction that may be alleged to underlie these contentions. These invalidity contentions do not constitute an acquiescence to Iarnach's interpretation of any claims to the extent they depart from the plain meaning of the Asserted Claims and/or from the proper scope of the claims as may be subsequently construed by the Court. Defendants disagree with Iarnach's apparent positions as to the purported scope of the Asserted Claims to the extent they seek to expand or otherwise alter the scope of the Asserted Claims beyond their proper construction.

B. No Admission.

Nothing disclosed herein is an admission or acknowledgement that any product or instrumentality accused of infringement by Iarnach in its Preliminary Infringement Contentions (the "Accused Products"), or any of Defendants' other products or instrumentalities, infringes any of the Asserted Claims.

Defendants further note that Iarnach appears to rely on overly broad constructions of the Asserted Claims. At the same time, Iarnach's Preliminary Infringement Contentions are in most places too general and vague to discern Iarnach's infringement theories, how Iarnach contends each Accused Product meets or practices each element of each of the Asserted Claims, and the

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precise contour of Iarnach's belief about the scope of the Asserted Patents. For example, Iarnach's Preliminary Infringement Contentions fail to clearly identify the aspects or features of the Accused Products that Iarnach contends meet the elements of the Asserted Claims. As a result, Defendants have been prejudiced in their ability to prepare these invalidity contentions. To the extent that Iarnach is later permitted by the Court to amend its contentions to cure the deficiencies of its current contentions, to add additional detail or infringement theories, or to pursue any currently undisclosed doctrine of equivalents theories, Defendants expressly reserve the right to supplement and/or amend these invalidity contentions to account for such supplementation and/or amendment.

To the extent that any of the prior art references disclose the same functionality or feature of any of the Accused Products, Defendants reserve the right to argue that said feature or functionality does not practice any element of any of the Asserted Claims, and to argue, in the alternative, that if said feature is found to practice any element of any of the Asserted Claims, then the prior art reference demonstrates that the element is not novel, would have been obvious, and/or is otherwise not patentable.

Attached hereto are representative claim charts that demonstrate how the Asserted Claims of the Asserted Patents are invalid in view of certain prior art. The references cited in the attached claim charts may disclose the limitations of the Asserted Claims expressly and/or inherently. The suggested obviousness combinations may be presented in conjunction with or in the alternative to Defendants' contentions regarding anticipation. These obviousness combinations should not be construed to suggest that any reference included in any combination is not anticipatory in its own right.

C. Reservation of Rights.

Prior art not included in this disclosure may become relevant. Defendants are currently unaware of the extent, if any, to which Iarnach will contend that limitations of the Asserted Claims

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are not disclosed in the prior art identified by Defendants. Defendants reserve the right to identify other references that would have made the addition of the allegedly missing limitation to the disclosed device or method obvious or show that the allegedly missing limitation would have been known or readily apparent to persons of ordinary skill in the art ("POSITA") at the time of the invention in light of the disclosure of the prior art at issue. Moreover, Defendants reserve the right to identify additional portions of prior art identified below in response to any additional contention, argument, or evidence submitted by Iarnach with respect to any issue in this case.

Defendants are reviewing Iarnach's document production to date and will seek to supplement these invalidity contentions, as may be warranted, once Defendants have had a fair opportunity to review and analyze that production, including any pertinent prior art provided therein. Defendants also reserve the right to amend their invalidity contentions with any additional potential prior art known by Iarnach but not yet disclosed to Defendants.

Defendants provide these invalidity contentions only for the claims asserted by Iarnach, but reserve the right to seek invalidation of all claims in each of the Asserted Patents.

D. Ongoing Investigation.

Defendants' investigation is ongoing, and Defendants expressly reserve the right to amend their disclosures and document production to account for evidence uncovered as their investigation continues. Such amendments include identifying and relying on additional references that may result from Defendants' further search and analysis, as well as additional citations to the prior art identified below. Defendants reserve the right to supplement these contentions in light of any additional prior art of which Iarnach is aware and did not disclose to Defendants in discovery, or that might be subsequently disclosed by Iarnach in response to Defendants' discovery requests. Defendants anticipate issuing subpoenas to third parties believed to have knowledge, documentation and/or corroborating evidence concerning some of the prior art listed herein and/or

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additional prior art. These third parties include, but are not limited to, the authors, employers of authors, inventors, assignees, or former or current employees of assignees, of the references identified in these invalidity contentions. For example, Defendants anticipate that they may issue subpoenas to potential prior artists including but not limited to individuals and entities responsible for the development of certain prior art systems. Defendants reserve the right to supplement these contentions in light of any newly discovered information produced by these or other individuals or companies.

E. Incorporation of Admitted Prior Art

Each of the asserted patents contains numerous descriptions of the state of the prior art, disclosure which would have been obvious to one skilled in the art, and other admitted prior art. Defendants incorporate by reference and reserve the right to rely upon the admitted prior art disclosures of the asserted patents, including for the purposes of background art, evidence of knowledge of a skilled artisan, or with other disclosures to demonstrate that an asserted claim is invalid as obvious.

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III. THE ’242 PATENT IS INVALID.

A. Identification of Prior Art

Defendants contend that the prior art references described and charted in Exhibits A-1 – A-7 and Appendix A-Secondary anticipate and/or render obvious, alone or in combination, one or more of the Asserted Claims of the ’242 Patent.

B. The Asserted Claims Are Anticipated and/or Rendered Obvious.

Iarnach asserts claims 1-7 of the ’242 Patent against the Defendants in this lawsuit. These claims are invalid because the ’242 Patent fails to meet one or more of the requirements for patentability. The individual bases for invalidity are provided below and in Exhibits A-1 – A-7 and Appendix A-Secondary. Each of the prior art references, the underlying work, and/or the underlying apparatus or method qualifies as prior art under one or more sections of 35 U.S.C. §§ 102 and/or 103.

In an effort to focus the issues, the Defendants have cited representative portions of identified references, even where a reference may contain additional disclosures or support for a particular claim element. Each and every disclosure of the same limitation in the same reference is not necessarily identified. In addition, POSITA generally read a prior art reference as a whole and in the context of other publications and literature and in the context of their knowledge as persons of ordinary skill in the art. Thus, to understand and interpret any specific statement or disclosure within a prior art reference, such persons would rely on other information within the reference, along with other publications and their general scientific knowledge and experience in the field. Thus, each prior art reference identified herein should be understood in the context of the reference itself, in conjunction with anything incorporated by reference or described as relevant technology by the reference, any documents that are referred to for further understanding by the reference, any system embodying the reference, and any testimony by those with knowledge of

the reference, such as the named authors and inventors. The Defendants may rely on uncited portions of the prior art references and on other publications and expert testimony to provide context, and as aids to understanding and interpreting the portions that are cited. The Defendants may also rely on uncited portions of the prior art references, other disclosed publications, and the testimony of experts to establish that a person of ordinary skill in the art would have been motivated to modify or combine certain of the cited references so as to render the claims obvious.

1. The '242 Patent Priority Date.

Iarnach's Preliminary Infringement Contentions allege that the Asserted Claims of the '242 Patent are entitled at least to the priority date November 23, 2009. To the extent Iarnach alleges that any prior art relied on in these invalidity contentions does not qualify as prior art to an Asserted Patent, Defendants reserve the right to rebut those allegations (*e.g.*, by demonstrating an earlier relevant date for the challenged prior art and/or a later priority date for the Asserted Patent and/or Asserted Claim).

2. The '242 Patent Is Anticipated and/or Rendered Obvious by the Prior Art.

Some or all of the Asserted Claims of the '242 Patent are invalid as anticipated and/or rendered obvious under 35 U.S.C. §§ 102 and/or 103 in view of each of the primary prior art references identified in the claim charts included in Exhibits A-1 – A-7, which identify specific examples of where each limitation of the Asserted Claims is found in the prior art references. As explained above, the cited portions of prior art references identified in the attached claim charts are exemplary in nature and representative of the content and teaching of the prior art references, and should be understood in the context of the reference as a whole and as they would be understood by a person of ordinary skill in the art.

Defendants identify the following references as anticipating and/or rendering obvious one or more of the Asserted Claims of the '242 Patent under 35 U.S.C. §§ 102 and/or 103. The table of anticipating and/or rending obvious references below is exemplary, and it does not constitute an admission that any reference not listed below does not also anticipate and/or render obvious the claims of the '242 Patent. Further, Defendants contend that any prior art reference in the attached charts that is charted for each limitation of any given claim, anticipates that claim, regardless of whether that prior art reference is listed in the following table.

Exhibit	**Primary Prior Art**	**Date**[1]
A-1	U.S. Patent Application Publication No. 2007/0237189 to Miguel et. al. ("Miguel")	October 11, 2007
A-2	International Telecommunication Union Telecommunication Standardization Sector Recommendation G.984.3 (03/2008) ("G.984.3")	March 29, 2008
A-3	International Telecommunication Union Telecommunication Standardization Sector Recommendation G.983.1 (01/2005) ("G.983.1")	January 13, 2005
A-4	Canadian Patent Application Publication No. CA2639905 to Delew et. al. ("Delew")	November 1, 2007
A-5	U.S. Patent No. 7,583,898 to Dalton et. al. ("Dalton")	September 1, 2009
A-6	U.S. Patent Application Publication No. US2008/0124075 to Xu et. al. ("Xu")	May 29, 2008
A-7	U.S. Patent Application Publication No. US2004/0146064 to Kramer ("Kramer")	July 29, 2004

[1] Defendants reserve the right to identify additional bases for qualification as prior art for each of the identified references in the event that it is determined that the Asserted Patents are not entitled to the claimed priority date.

To the extent any item of prior art cited above is deemed not to disclose and/or render obvious, explicitly or inherently, any limitation of an Asserted Claim of the ’242 Patent, Defendants reserve the right to argue that any difference between that prior art and the corresponding patent claim would have been either inherent in the art or obvious to a person of ordinary skill in the art, even if Defendants have not specifically denoted that the art is to be combined with the knowledge of a person of ordinary skill in the art.

3. The ’242 Patent Is Obvious Over the Prior Art.

To the extent Iarnach argues that any limitation of the Asserted Claims of the ’242 Patent are not explicitly disclosed and/or rendered obvious by an item of prior art identified above and in A-1 – A-7 and Appendix A-Secondary, any purported differences are such that the claimed subject matter as a whole would have been obvious to one skilled in the art at the time of the alleged invention, in view of the state of the art and knowledge of those skilled in the art. The item of prior art would, therefore, render such claims invalid as obvious under 35 U.S.C. § 103.

a) The Claims Are Obvious Over the Primary References in Light of One or More Secondary References.

To the extent the foregoing references are found not to anticipate and/or render obvious the Asserted Claims of the ’242 Patent, the foregoing references render the Asserted Claims obvious, either alone or in combination with one or more of the other references identified above. One of ordinary skill in the art would have been motivated to combine the various references cited above and herein so as to disclose each and every limitation of the Asserted Claims of the ’242 Patent.

Prior art references rendering the Asserted Claims of the ’242 Patent obvious, either alone or in combination with other references in Exhibits A-1 – A-7 and Appendix A-Secondary, are provided in the tables above and below and in Exhibits A-1 – A-7 and Appendix A-Secondary. The prior art identified in Exhibits A-1 – A-7 render one or more asserted claims of the ’242 Patent

obvious when the references are read in combination with one or more of each other, when read in combination with any of the prior art identified in Exhibit Appendix A-Secondary, and/or when read in view of the state of the art and knowledge of those skilled in the art.

Appendix-A Secondary Exhibits	**Date**
US2009/0067850 ("Mizutani")	March 12, 2009
US2010/0040371 ("Wu")	October 22, 2009
US2009/0080891 ("Kazawa")	March 26, 2009
US2009/0263132 ("Rafel")	March 7, 2007
US2003/0048801 ("Sala")	August 21, 2002
US2010/0278533 ("Julien")	April 30, 2009
US2010/0183316 ("Gordon")	January 20, 2009
EP2043286 ("Gasiorowski")	September 26, 2007

To the extent Iarnach argues that any Asserted Claim of the '242 Patent is not disclosed or rendered obvious by any Exhibit A-1 – A-7 and Appendix A-Secondary reference, the Asserted Claims nevertheless would have been obvious in light of one or more other Exhibit A-1 – A-7 references and/or one or more references identified and charted in Appendix A-Secondary and in view of the knowledge, experience, and understanding of persons of ordinary skill in the art.

Each and every reference identified is also relevant to the state of the art at the time of the alleged invention. Any of the references disclosed above may be combined with another to render obvious (and therefore invalid) each of Iarnach's Asserted Claims. Defendants may rely on a subset of (or all of) the above-identified references, including all references in Exhibits A-1 – A-7 and Appendix A-Secondary, for purposes of obviousness in view of the Court's claim construction, positions taken by Iarnach during this litigation, and further investigation and discovery.

b) Exemplary Combinations of the Prior Art.

The table below provides an identification of exemplary combinations of prior art references that, based on Defendants' present understanding of Iarnach's Preliminary Infringement Contentions and apparent reading of the Asserted Claims, render obvious one or more of the Asserted Claims of the '242 Patent. The combinations of references identified below are non-exhaustive, and additional examples are apparent from other combinations of references addressed in Exhibits A-1 – A-7 and Appendix A-Secondary. Defendants expressly note that, although certain references charted in Exhibits A-1 – A-7 and Appendix A-Secondary are listed variously in the left or right column below, Defendants do not thereby imply any restriction as to which Exhibits A-1 – A-7 reference is primary and which Exhibits A-1 – A-7 reference is secondary in such a combination. Defendants reserve the right to rely on either identified reference in the identified combinations as a primary and/or secondary reference.

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Reference	Combination References
Miguel	G.984.3, G.983.1, Delew, Dalton, Xu, Kramer, and/or Appendix A-Secondary
G.984.3	Miguel, G.983.1, Delew, Dalton, Xu, Kramer, and/or Appendix A-Secondary
G.983.1	Miguel, G.984.3, Delew, Dalton, Xu, Kramer, and/or Appendix A-Secondary
Delew	Miguel, G.984.3, G.983.1, Dalton, Xu, Kramer, and/or Appendix A-Secondary
Dalton	Miguel, G.984.3, G.983.1, Delew, Xu, Kramer, and/or Appendix A-Secondary
Xu	Miguel, G.984.3, G.983.1, Delew, Dalton, Kramer, and/or Appendix A-Secondary
Kramer	Miguel, G.984.3, G.983.1, Delew, Dalton, Xu, and/or Appendix A-Secondary

It would have been obvious to combine these references for reasons that are readily apparent to one of ordinary skill in the art, and for reasons explained herein.

c) Prior Art Solutions

In addition to the exemplary combinations provided above, to the extent Iarnach alleges the references in Exhibits A-1 – A-7 and Appendix A-Secondary do not disclose any particular limitation of the Asserted Claims of the ’242 Patent, either expressly or inherently, it would have been obvious to a person of ordinary skill in the art as of the alleged invention date of the ’242 Patent to modify the references in Exhibits A-1 – A-7 and Appendix A-Secondary and/or combine the teachings of the references in Exhibits A-1 – A-7 and Appendix A-Secondary with the other prior art references in Exhibits A-1 – A-7 and Appendix A-Secondary in a manner that would have rendered the Asserted Claims invalid as obvious. The Defendants provide examples of such combinations below. The exemplary combinations below are non-exhaustive, and the Defendants

reserve the right to rely on additional combinations as may be apparent from the prior art references in Exhibits A-1 – A-7 and Appendix A-Secondary. These obviousness combinations should not be construed to suggest that any reference included in any combination is not anticipatory in its own right.

(1) Exemplary Miguel Solutions

POSITA would be motivated to combine Miguel with G.984.3 for many reasons. For example, Miguel describes a method of ranging an Optical Network Terminal (ONT) in a Passive Optical Network (PON). *See, e.g.*, Miguel at Abstract. POSITA would have been motivated to modify the method and/or device of Miguel to implement features of the ranging methodology taught by G.984.3 because was the ITU recommendation for the transmission convergence layer in Gigabit-capable Passive Optical Networks (G-PON). POSITA would understand that G.984.3 offered alternative yet potentially advantageous ways of improving Miguel. In addition, POSITA would be motivated to combine Miguel with G.984.3 because (a) Miguel and G.984.3 disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the '242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.984.3's teachings with those of Miguel. For similar reasons, POSITA would be motivated to combine Miguel with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

POSITA would be motivated to combine Miguel with G.983.1 for many reasons. For example, Miguel describes a method of ranging an Optical Network Terminal (ONT) in a Passive Optical Network (PON). *See, e.g.*, Miguel at Abstract. POSITA would have been motivated to modify the method and/or device of Miguel to implement features of the ranging methodology taught by G.983.1 because was the ITU recommendation for broadband optical access systems

based on Passive Optical Networks (PON). POSITA would understand that G.983.1 offered alternative yet potentially advantageous ways of improving Miguel. In addition, POSITA would be motivated to combine Miguel with G.983.1 because (a) Miguel and G.983.1 disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the '242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.983.1's teachings with those of Miguel. For similar reasons, POSITA would be motivated to combine Miguel with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

POSITA would be motivated to combine Miguel with Delew for many reasons. For example, Miguel describes a method of ranging an Optical Network Terminal (ONT) in a Passive Optical Network (PON). *See, e.g.*, Miguel at Abstract. POSITA would have been motivated to modify the method and/or device of Miguel to implement features of the ranging methodology taught by Delew because it is also directed at ranging and efficient use and duration of quiet windows used for ranging in PONs. POSITA would be motivated by the potential advantages of such functionality, such as including more effective and efficient ranging. *See, e.g.*, Delew at 40:12-16. In addition, POSITA would be motivated to combine Miguel with Delew because (a) Miguel and Delew disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the '242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Delew's teachings with those of Miguel. For similar reasons, POSITA would be motivated to combine Miguel with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

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POSITA would be motivated to combine Miguel with Dalton for many reasons. For example, Miguel describes a method of ranging an Optical Network Terminal (ONT) in a Passive Optical Network (PON). *See, e.g.*, Miguel at Abstract. POSITA would have been motivated to modify the method and/or device of Miguel to implement features of the ranging methodology taught by Dalton because it is also directed at ranging and efficient use and duration of quiet windows used for ranging in PONs. POSITA would be motivated by the potential advantages of such functionality, such as including more effective and efficient ranging. *See, e.g.*, Dalton at 6:58-7:16. In addition, POSITA would be motivated to combine Miguel with Dalton because (a) Miguel and Dalton disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the '242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Dalton's teachings with those of Miguel. For similar reasons, POSITA would be motivated to combine Miguel with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

POSITA would be motivated to combine Miguel with Xu for many reasons. For example, Miguel describes a method of ranging an Optical Network Terminal (ONT) in a Passive Optical Network (PON). *See, e.g.*, Miguel at Abstract. POSITA would have been motivated to modify the method and/or device of Miguel to implement features of the ranging methodology taught by Xu because it is also directed at ranging and efficient use and duration of quiet windows used for ranging in PONs. POSITA would be motivated by the potential advantages of such functionality, such as more effective and efficient ranging. *See, e.g.*, Xu at [00013]. In addition, POSITA would be motivated to combine Miguel with Xu because (a) Miguel and Xu disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor

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as the ’242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Xu’s teachings with those of Miguel. For similar reasons, POSITA would be motivated to combine Miguel with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

POSITA would be motivated to combine Miguel with Kramer for many reasons. For example, Miguel describes a method of ranging an Optical Network Terminal (ONT) in a Passive Optical Network (PON). *See, e.g.*, Miguel at Abstract. POSITA would have been motivated to modify the method and/or device of Miguel to implement features of the ranging methodology taught by Kramer because it is also directed at ranging and efficient use and duration of quiet windows used for ranging in PONs. POSITA would be motivated by the potential advantages of such functionality, such as more effective and efficient ranging. *See, e.g.*, Kramer at [00013]. In addition, POSITA would be motivated to combine Miguel with Kramer because (a) Miguel and Kramer disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the ’242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kramer’s teachings with those of Miguel. For similar reasons, POSITA would be motivated to combine Miguel with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

(2) Exemplary G.984.3 Solutions

POSITA would be motivated to combine G.984.3 with Miguel for many reasons. For example, G.984.3 describes specifications for ranging in G-PON. *See, e.g.*, G.984.3 at 1. POSITA would have been motivated to supplement G.984.3 to implement features of the ranging methodology taught by Miguel because it is directed at ranging and efficient use and duration of

quiet windows used for ranging in PONs. POSITA would be motivated by the potential advantages of such functionality, such as including more effective and efficient ranging. *See, e.g.*, Miguel at [0003]. In addition, POSITA would be motivated to combine G.984.3 with Miguel because (a) G.984.3 and Miguel disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the '242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Miguel's teachings with those of G.984.3. For similar reasons, POSITA would be motivated to combine G.984.3 with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

POSITA would be motivated to combine G.984.3 with G.983.1 for many reasons. For example, G.984.3 describes specifications for ranging in G-PON. *See, e.g.*, G.984.3 at 1. POSITA would have been motivated to supplement G.984.3 to implement features of the ranging methodology taught by G.983.1 because it is directed at ranging and efficient use and duration of quiet windows used for ranging in PONs. POSITA would be motivated by the potential advantages of such functionality, such as ranging protocols applicable for several types of installation methods of ONUs and several types of ranging processes, if necessary, with additional or optional functions. *See, e.g.*, G.983.1 at 71. In addition, POSITA would be motivated to combine G.984.3 with G.983.1 because (a) G.984.3 and G.983.1 disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the '242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.983.1's teachings with those of G.984.3. For similar reasons, POSITA would be motivated to combine G.984.3 with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

POSITA would be motivated to combine G.984.3 with Delew for many reasons. For example, G.984.3 describes specifications for ranging in G-PON. *See, e.g.*, G.984.3 at 1. POSITA would have been motivated to supplement G.984.3 to implement features of the ranging methodology taught by Delew because it is directed at ranging and efficient use and duration of quiet windows used for ranging in PONs. POSITA would be motivated by the potential advantages of such functionality, such as including more effective and efficient ranging. *See, e.g.*, Delew at 40:12-16. In addition, POSITA would be motivated to combine G.984.3 with Delew because (a) G.984.3 and Delew disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the '242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Delew's teachings with those of G.984.3. For similar reasons, POSITA would be motivated to combine G.984.3 with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

POSITA would be motivated to combine G.984.3 with Dalton for many reasons. For example, G.984.3 describes specifications for ranging in G-PON. *See, e.g.*, G.984.3 at 1. POSITA would have been motivated to supplement G.984.3 to implement features of the ranging methodology taught by Dalton because it is directed at ranging and efficient use and duration of quiet windows used for ranging in PONs. POSITA would be motivated by the potential advantages of such functionality, such as including more effective and efficient ranging. *See, e.g.*, Dalton at 6:58-7:16. In addition, POSITA would be motivated to combine G.984.3 with Dalton because (a) G.984.3 and Dalton disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the '242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable

expectation of success in incorporating Dalton's teachings with those of G.984.3. For similar reasons, POSITA would be motivated to combine G.984.3 with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

POSITA would be motivated to combine G.984.3 with Xu for many reasons. For example, G.984.3 describes specifications for ranging in G-PON. *See, e.g.*, G.984.3 at 1. POSITA would have been motivated to supplement G.984.3 to implement features of the ranging methodology taught by Xu because it is directed at ranging and efficient use and duration of quiet windows used for ranging in PONs. POSITA would be motivated by the potential advantages of such functionality, such as more effective and efficient ranging. *See, e.g.*, Xu at [00013]. In addition, POSITA would be motivated to combine G.984.3 with Xu because (a) G.984.3 and Xu disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the '242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Xu's teachings with those of G.984.3. For similar reasons, POSITA would be motivated to combine G.984.3 with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

POSITA would be motivated to combine G.984.3 with Kramer for many reasons. For example, G.984.3 describes specifications for ranging in G-PON. *See, e.g.*, G.984.3 at 1. POSITA would have been motivated to supplement G.984.3 to implement features of the ranging methodology taught by Kramer because it is directed at ranging and efficient use and duration of quiet windows used for ranging in PONs. POSITA would be motivated by the potential advantages of such functionality, such as more effective and efficient ranging. *See, e.g.*, Kramer at [00013]. In addition, POSITA would be motivated to combine G.984.3 with Kramer because (a) G.984.3

and Kramer disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the '242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kramer's teachings with those of G.984.3. For similar reasons, POSITA would be motivated to combine G.984.3 with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

(3) Exemplary G.983.1 Solutions

POSITA would be motivated to combine G.983.1 with Miguel for many reasons. For example, G.983.1 describes a ranging protocol applicable for several types of installation methods of ONUs and several types of ranging processes, if necessary, with additional or optional functions. *See, e.g.*, G.983.1 at 71. POSITA would have been motivated to supplement G.983.1 to implement features of the ranging methodology taught by Miguel because it is directed at ranging and efficient use and duration of quiet windows used for ranging in PONs. POSITA would be motivated by the potential advantages of such functionality, such as including more effective and efficient ranging. *See, e.g.*, Miguel at [0003]. In addition, POSITA would be motivated to combine G.983.1 with Miguel because (a) G.983.1 and Miguel disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the '242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Miguel's teachings with those of G.983.1. For similar reasons, POSITA would be motivated to combine G.983.1 with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

POSITA would be motivated to combine G.983.1 with G.984.3 for many reasons. For example, G.983.1 describes a ranging protocol applicable for several types of installation methods of ONUs and several types of ranging processes, if necessary, with additional or optional functions.

See, e.g., G.983.1 at 71. POSITA would have been motivated to supplement G.983.1 to implement features of the ranging methodology taught by G.984.3 because describes specifications for ranging in PONs. POSITA would be motivated by the potential advantages of such functionality, such as including more effective and efficient ranging. *See, e.g.*, G.984.3 at 1. In addition, POSITA would be motivated to combine G.983.1 with G.984.3 because (a) G.983.1 and G.984.3 disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the '242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.984.3's teachings with those of G.983.1. For similar reasons, POSITA would be motivated to combine G.983.1 with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

POSITA would be motivated to combine G.983.1 with Delew for many reasons. For example, G.983.1 describes a ranging protocol applicable for several types of installation methods of ONUs and several types of ranging processes, if necessary, with additional or optional functions. *See, e.g.*, G.983.1 at 71. POSITA would have been motivated to supplement G.983.1 to implement features of the ranging methodology taught by Delew because it is directed at ranging and efficient use and duration of quiet windows used for ranging in PONs. POSITA would be motivated by the potential advantages of such functionality, such as including more effective and efficient ranging. *See, e.g.*, Delew at 40:12-16. In addition, POSITA would be motivated to combine G.983.1 with Delew because (a) G.983.1 and Delew disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the '242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Delew's teachings with those of G.983.1. For

similar reasons, POSITA would be motivated to combine G.983.1 with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

POSITA would be motivated to combine G.983.1 with Dalton for many reasons. For example, G.983.1 describes a ranging protocol applicable for several types of installation methods of ONUs and several types of ranging processes, if necessary, with additional or optional functions. *See, e.g.*, G.983.1 at 71. POSITA would have been motivated to supplement G.983.1 to implement features of the ranging methodology taught by Dalton because it is directed at ranging and efficient use and duration of quiet windows used for ranging in PONs. POSITA would be motivated by the potential advantages of such functionality, such as including more effective and efficient ranging. *See, e.g.*, Dalton at 6:58-7:16. In addition, POSITA would be motivated to combine G.983.1 with Dalton because (a) G.983.1 and Dalton disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the '242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Dalton's teachings with those of G.983.1. For similar reasons, POSITA would be motivated to combine G.983.1 with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

POSITA would be motivated to combine G.983.1 with Xu for many reasons. For example, G.983.1 describes a ranging protocol applicable for several types of installation methods of ONUs and several types of ranging processes, if necessary, with additional or optional functions. *See, e.g.*, G.983.1 at 71. POSITA would have been motivated to supplement G.983.1 to implement features of the ranging methodology taught by Xu because it is directed at ranging and efficient use and duration of quiet windows used for ranging in PONs. POSITA would be motivated by the potential advantages of such functionality, such as more effective and efficient ranging. *See, e.g.*,

Xu at [00013]. In addition, POSITA would be motivated to combine G.983.1 with Xu because (a) G.983.1 and Xu disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the '242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Xu's teachings with those of G.983.1. For similar reasons, POSITA would be motivated to combine G.983.1 with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

POSITA would be motivated to combine G.983.1 with Kramer for many reasons. For example, G.983.1 describes a ranging protocol applicable for several types of installation methods of ONUs and several types of ranging processes, if necessary, with additional or optional functions. *See, e.g.*, G.983.1 at 71. POSITA would have been motivated to supplement G.983.1 to implement features of the ranging methodology taught by Kramer because it is directed at ranging and efficient use and duration of quiet windows used for ranging in PONs. POSITA would be motivated by the potential advantages of such functionality, such as more effective and efficient ranging. *See, e.g.*, Kramer at [00013]. In addition, POSITA would be motivated to combine G.983.1 with Kramer because (a) G.983.1 and Kramer disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the '242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kramer's teachings with those of G.983.1. For similar reasons, POSITA would be motivated to combine G.983.1 with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

(4) Exemplary Delew Solutions

POSITA would be motivated to combine Delew with Miguel for many reasons. For example, Delew describes a method for ranging an optical network terminal (ONT) in a passive

optical network (PON). *See, e.g.*, Delew at 2:9-3:7. POSITA would have been motivated to modify the method and/or device of Delew to implement features of the ranging methodology taught by Miguel because it is also directed at ranging and efficient use and duration of quiet windows used for ranging in PONs. POSITA would be motivated by the potential advantages of such functionality, such as including more effective and efficient ranging. *See, e.g.*, Miguel at [0003]. In addition, POSITA would be motivated to combine Delew with Miguel because (a) Delew and Miguel disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the '242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Miguel's teachings with those of Delew. For similar reasons, POSITA would be motivated to combine Delew with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

POSITA would be motivated to combine Delew with G.984.3 for many reasons. For example, Delew describes a method for ranging an optical network terminal (ONT) in a passive optical network (PON). *See, e.g.*, Delew at 2:9-3:7. POSITA would have been motivated to modify the method and/or device of Delew to implement features of the ranging methodology taught by G.984.3 because was the ITU recommendation for the transmission convergence layer in Gigabit-capable Passive Optical Networks (G-PON). POSITA would understand that G.984.3 offered alternative yet potentially advantageous ways of improving Delew. In addition, POSITA would be motivated to combine Delew with G.984.3 because (a) Delew and G.984.3 disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the '242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating

G.984.3's teachings with those of Delew. For similar reasons, POSITA would be motivated to combine Delew with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

POSITA would be motivated to combine Delew with G.983.1 for many reasons. For example, Delew describes a method for ranging an optical network terminal (ONT) in a passive optical network (PON). *See, e.g.*, Delew at 2:9-3:7. POSITA would have been motivated to modify the method and/or device of Delew to implement features of the ranging methodology taught by G.983.1 because was the ITU recommendation for broadband optical access systems based on Passive Optical Networks (PON). POSITA would understand that G.983.1 offered alternative yet potentially advantageous ways of improving Delew. In addition, POSITA would be motivated to combine Delew with G.983.1 because (a) Delew and G.983.1 disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the '242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.983.1's teachings with those of Delew. For similar reasons, POSITA would be motivated to combine Delew with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

POSITA would be motivated to combine Delew with Dalton for many reasons. For example, Delew describes a method for ranging an optical network terminal (ONT) in a passive optical network (PON). *See, e.g.*, Delew at 2:9-3:7. POSITA would have been motivated to modify the method and/or device of Delew to implement features of the ranging methodology taught by Dalton because it is also directed at ranging and efficient use and duration of quiet windows used for ranging in PONs. POSITA would be motivated by the potential advantages of such functionality, such as including more effective and efficient ranging. *See, e.g.*, Dalton at 6:58-7:16.

In addition, POSITA would be motivated to combine Delew with Dalton because (a) Delew and Dalton disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the ’242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Dalton’s teachings with those of Delew. For similar reasons, POSITA would be motivated to combine Delew with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

POSITA would be motivated to combine Delew with Xu for many reasons. For example, Delew describes a method for ranging an optical network terminal (ONT) in a passive optical network (PON). *See, e.g.*, Delew at 2:9-3:7. POSITA would have been motivated to modify the method and/or device of Delew to implement features of the ranging methodology taught by Xu because it is also directed at ranging and efficient use and duration of quiet windows used for ranging in PONs. POSITA would be motivated by the potential advantages of such functionality, such as more effective and efficient ranging. *See, e.g.*, Xu at [00013]. In addition, POSITA would be motivated to combine Delew with Xu because (a) Delew and Xu disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the ’242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Xu’s teachings with those of Delew. For similar reasons, POSITA would be motivated to combine Delew with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

POSITA would be motivated to combine Delew with Kramer for many reasons. For example, Delew describes a method for ranging an optical network terminal (ONT) in a passive

optical network (PON). *See, e.g.*, Delew at 2:9-3:7. POSITA would have been motivated to modify the method and/or device of Delew to implement features of the ranging methodology taught by Kramer because it is also directed at ranging and efficient use and duration of quiet windows used for ranging in PONs. POSITA would be motivated by the potential advantages of such functionality, such as more effective and efficient ranging. *See, e.g.*, Kramer at [00013]. In addition, POSITA would be motivated to combine Delew with Kramer because (a) Delew and Kramer disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the '242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kramer's teachings with those of Delew. For similar reasons, POSITA would be motivated to combine Delew with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

(5) Exemplary Dalton Solutions

POSITA would be motivated to combine Dalton with Miguel for many reasons. For example, Dalton describes initializing burst mode receivers during an initialization phase such as ranging. *See, e.g.*, Dalton at Abstract. POSITA would have been motivated to modify the method and/or device of Dalton to implement features of the ranging methodology taught by Miguel because it is also directed at ranging and efficient use and duration of quiet windows used for ranging in PONs. POSITA would be motivated by the potential advantages of such functionality, such as including more effective and efficient ranging. *See, e.g.*, Miguel at [0003]. In addition, POSITA would be motivated to combine Dalton with Miguel because (a) Dalton and Miguel disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the '242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in

incorporating Miguel's teachings with those of Dalton. For similar reasons, POSITA would be motivated to combine Dalton with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

POSITA would be motivated to combine Dalton with G.984.3 for many reasons. For example, Dalton describes initializing burst mode receivers during an initialization phase such as ranging. *See, e.g.*, Dalton at Abstract. POSITA would have been motivated to modify the method and/or device of Dalton to implement features of the ranging methodology taught by G.984.3 because was the ITU recommendation for the transmission convergence layer in Gigabit-capable Passive Optical Networks (G-PON). POSITA would understand that G.984.3 offered alternative yet potentially advantageous ways of improving Dalton. In addition, POSITA would be motivated to combine Dalton with G.984.3 because (a) Dalton and G.984.3 disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the '242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.984.3's teachings with those of Dalton. For similar reasons, POSITA would be motivated to combine Dalton with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

POSITA would be motivated to combine Dalton with G.983.1 for many reasons. For example, Dalton describes initializing burst mode receivers during an initialization phase such as ranging. *See, e.g.*, Dalton at Abstract. POSITA would have been motivated to modify the method and/or device of Dalton to implement features of the ranging methodology taught by G.983.1 because was the ITU recommendation for broadband optical access systems based on Passive Optical Networks (PON). POSITA would understand that G.983.1 offered alternative yet

potentially advantageous ways of improving Dalton. In addition, POSITA would be motivated to combine Dalton with G.983.1 because (a) Dalton and G.983.1 disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the '242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.983.1's teachings with those of Dalton. For similar reasons, POSITA would be motivated to combine Dalton with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

POSITA would be motivated to combine Dalton with Delew for many reasons. For example, Dalton describes initializing burst mode receivers during an initialization phase such as ranging. *See, e.g.*, Dalton at Abstract. POSITA would have been motivated to modify the method and/or device of Dalton to implement features of the ranging methodology taught by Delew because it is also directed at ranging and efficient use and duration of quiet windows used for ranging in PONs. POSITA would be motivated by the potential advantages of such functionality, such as including more effective and efficient ranging. *See, e.g.*, Delew at 40:12-16. In addition, POSITA would be motivated to combine Dalton with Delew because (a) Dalton and Delew disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the '242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Delew's teachings with those of Dalton. For similar reasons, POSITA would be motivated to combine Dalton with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

POSITA would be motivated to combine Dalton with Xu for many reasons. For example, Dalton describes initializing burst mode receivers during an initialization phase such as ranging.

See, e.g., Dalton at Abstract. POSITA would have been motivated to modify the method and/or device of Dalton to implement features of the ranging methodology taught by Xu because it is also directed at ranging and efficient use and duration of quiet windows used for ranging in PONs. POSITA would be motivated by the potential advantages of such functionality, such as more effective and efficient ranging. *See, e.g.*, Xu at [00013]. In addition, POSITA would be motivated to combine Dalton with Xu because (a) Dalton and Xu disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the '242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Xu's teachings with those of Dalton. For similar reasons, POSITA would be motivated to combine Dalton with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

POSITA would be motivated to combine Dalton with Kramer for many reasons. For example, Dalton describes initializing burst mode receivers during an initialization phase such as ranging. *See, e.g.*, Dalton at Abstract. POSITA would have been motivated to modify the method and/or device of Dalton to implement features of the ranging methodology taught by Kramer because it is also directed at ranging and efficient use and duration of quiet windows used for ranging in PONs. POSITA would be motivated by the potential advantages of such functionality, such as more effective and efficient ranging. *See, e.g.*, Kramer at [00013]. In addition, POSITA would be motivated to combine Dalton with Kramer because (a) Dalton and Kramer disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the '242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kramer's teachings with those of Dalton. For similar reasons, POSITA would be

motivated to combine Dalton with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

(6) Exemplary Xu Solutions

POSITA would be motivated to combine Xu with Miguel for many reasons. For example, Xu describes a ranging method and system for Passive Optical Network (PON), and an Optical Network Unit (ONU) thereof. *See, e.g.*, Xu at [0002]. POSITA would have been motivated to modify the method and/or device of Xu to implement features of the ranging methodology taught by Miguel because it is also directed at ranging and efficient use and duration of quiet windows used for ranging in PONs. POSITA would be motivated by the potential advantages of such functionality, such as including more effective and efficient ranging. *See, e.g.*, Miguel at [0003]. In addition, POSITA would be motivated to combine Xu with Miguel because (a) Xu and Miguel disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the ’242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Miguel’s teachings with those of Xu. For similar reasons, POSITA would be motivated to combine Xu with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

POSITA would be motivated to combine Xu with G.984.3 for many reasons. For example, Xu describes a ranging method and system for Passive Optical Network (PON), and an Optical Network Unit (ONU) thereof. *See, e.g.*, Xu at [0002]. POSITA would have been motivated to modify the method and/or device of Xu to implement features of the ranging methodology taught by G.984.3 because was the ITU recommendation for the transmission convergence layer in Gigabit-capable Passive Optical Networks (G-PON). POSITA would understand that G.984.3 offered alternative yet potentially advantageous ways of improving Xu. In addition, POSITA

would be motivated to combine Xu with G.984.3 because (a) Xu and G.984.3 disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the ’242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.984.3’s teachings with those of Xu. For similar reasons, POSITA would be motivated to combine Xu with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

POSITA would be motivated to combine Xu with G.983.1 for many reasons. For example, Xu describes a ranging method and system for Passive Optical Network (PON), and an Optical Network Unit (ONU) thereof. *See, e.g.*, Xu at [0002]. POSITA would have been motivated to modify the method and/or device of Xu to implement features of the ranging methodology taught by G.983.1 because was the ITU recommendation for broadband optical access systems based on Passive Optical Networks (PON). POSITA would understand that G.983.1 offered alternative yet potentially advantageous ways of improving Xu. In addition, POSITA would be motivated to combine Xu with G.983.1 because (a) Xu and G.983.1 disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the ’242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.983.1’s teachings with those of Xu. For similar reasons, POSITA would be motivated to combine Xu with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

POSITA would be motivated to combine Xu with Delew for many reasons. For example, Xu describes a ranging method and system for Passive Optical Network (PON), and an Optical Network Unit (ONU) thereof. *See, e.g.*, Xu at [0002]. POSITA would have been motivated to

modify the method and/or device of Xu to implement features of the ranging methodology taught by Delew because it is also directed at ranging and efficient use and duration of quiet windows used for ranging in PONs. POSITA would be motivated by the potential advantages of such functionality, such as including more effective and efficient ranging. *See, e.g.*, Delew at 40:12-16. In addition, POSITA would be motivated to combine Xu with Delew because (a) Xu and Delew disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the '242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Delew's teachings with those of Xu. For similar reasons, POSITA would be motivated to combine Xu with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

POSITA would be motivated to combine Xu with Dalton for many reasons. For example, Xu describes a ranging method and system for Passive Optical Network (PON), and an Optical Network Unit (ONU) thereof. *See, e.g.*, Xu at [0002]. POSITA would have been motivated to modify the method and/or device of Xu to implement features of the ranging methodology taught by Dalton because it is also directed at ranging and efficient use and duration of quiet windows used for ranging in PONs. POSITA would be motivated by the potential advantages of such functionality, such as including more effective and efficient ranging. *See, e.g.*, Dalton at 6:58-7:16. In addition, POSITA would be motivated to combine Xu with Dalton because (a) Xu and Dalton disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the '242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Dalton's teachings with those of Xu. For similar reasons, POSITA would be

motivated to combine Xu with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

POSITA would be motivated to combine Xu with Kramer for many reasons. For example, Xu describes a ranging method and system for Passive Optical Network (PON), and an Optical Network Unit (ONU) thereof. *See, e.g.*, Xu at [0002]. POSITA would have been motivated to modify the method and/or device of Xu to implement features of the ranging methodology taught by Kramer because it is also directed at ranging and efficient use and duration of quiet windows used for ranging in PONs. POSITA would be motivated by the potential advantages of such functionality, such as more effective and efficient ranging. *See, e.g.*, Kramer at [00013]. In addition, POSITA would be motivated to combine Xu with Kramer because (a) Xu and Kramer disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the ’242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kramer’s teachings with those of Xu. For similar reasons, POSITA would be motivated to combine Xu with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

(7) Exemplary Kramer Solutions

POSITA would be motivated to combine Kramer with Miguel for many reasons. For example, Kramer describes a system that facilitates discovery of remote nodes in EPONs. *See, e.g.*, Kramer at Abstract. POSITA would have been motivated to modify the method and/or device of Kramer to implement features of the ranging methodology taught by Miguel because it is also directed at ranging and efficient use and duration of quiet windows used for ranging in PONs. POSITA would be motivated by the potential advantages of such functionality, such as including more effective and efficient ranging. *See, e.g.*, Miguel at [0003]. In addition, POSITA would be

motivated to combine Kramer with Miguel because (a) Kramer and Miguel disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the ’242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Miguel’s teachings with those of Kramer. For similar reasons, POSITA would be motivated to combine Kramer with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

POSITA would be motivated to combine Kramer with G.984.3 for many reasons. For example, Kramer describes a system that facilitates discovery of remote nodes in EPONs. *See, e.g.*, Kramer at Abstract. POSITA would have been motivated to modify the method and/or device of Kramer to implement features of the ranging methodology taught by G.984.3 because was the ITU recommendation for the transmission convergence layer in Gigabit-capable Passive Optical Networks (G-PON). POSITA would understand that G.984.3 offered alternative yet potentially advantageous ways of improving Kramer. In addition, POSITA would be motivated to combine Kramer with G.984.3 because (a) Kramer and G.984.3 disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the ’242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.984.3’s teachings with those of Kramer. For similar reasons, POSITA would be motivated to combine Kramer with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

POSITA would be motivated to combine Kramer with G.983.1 for many reasons. For example, Kramer describes a system that facilitates discovery of remote nodes in EPONs. *See, e.g.*, Kramer at Abstract. POSITA would have been motivated to modify the method and/or device

of Kramer to implement features of the ranging methodology taught by G.983.1 because was the ITU recommendation for broadband optical access systems based on Passive Optical Networks (PON). POSITA would understand that G.983.1 offered alternative yet potentially advantageous ways of improving Kramer. In addition, POSITA would be motivated to combine Kramer with G.983.1 because (a) Kramer and G.983.1 disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the '242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.983.1's teachings with those of Kramer. For similar reasons, POSITA would be motivated to combine Kramer with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

POSITA would be motivated to combine Kramer with Delew for many reasons. For example, Kramer describes a system that facilitates discovery of remote nodes in EPONs. *See, e.g.*, Kramer at Abstract. POSITA would have been motivated to modify the method and/or device of Kramer to implement features of the ranging methodology taught by Delew because it is also directed at ranging and efficient use and duration of quiet windows used for ranging in PONs. POSITA would be motivated by the potential advantages of such functionality, such as including more effective and efficient ranging. *See, e.g.*, Delew at 40:12-16. In addition, POSITA would be motivated to combine Kramer with Delew because (a) Kramer and Delew disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the '242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Delew's teachings with those of Kramer. For similar reasons, POSITA would be motivated to

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combine Kramer with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

POSITA would be motivated to combine Kramer with Dalton for many reasons. For example, Kramer describes a system that facilitates discovery of remote nodes in EPONs. *See, e.g.*, Kramer at Abstract. POSITA would have been motivated to modify the method and/or device of Kramer to implement features of the ranging methodology taught by Dalton because it is also directed at ranging and efficient use and duration of quiet windows used for ranging in PONs. POSITA would be motivated by the potential advantages of such functionality, such as including more effective and efficient ranging. *See, e.g.*, Dalton at 6:58-7:16. In addition, POSITA would be motivated to combine Kramer with Dalton because (a) Kramer and Dalton disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the '242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Dalton's teachings with those of Kramer. For similar reasons, POSITA would be motivated to combine Kramer with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

POSITA would be motivated to combine Kramer with Xu for many reasons. For example, Kramer describes a system that facilitates discovery of remote nodes in EPONs. *See, e.g.*, Kramer at Abstract. POSITA would have been motivated to modify the method and/or device of Kramer to implement features of the ranging methodology taught by Xu because it is also directed at ranging and efficient use and duration of quiet windows used for ranging in PONs. POSITA would be motivated by the potential advantages of such functionality, such as more effective and efficient ranging. *See, e.g.*, Xu at [00013]. In addition, POSITA would be motivated to combine Kramer

with Xu because (a) Kramer and Xu disclose similar products, methods, and solutions, and (b) both patents are analogous art and in the same field of endeavor as the '242 Patent; for example, both relate to improving the efficiency of ranging in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Xu's teachings with those of Kramer. For similar reasons, POSITA would be motivated to combine Kramer with other references in Exhibits A-1 to A-7 and Appendix A—Secondary with similar teachings.

d) The Claims Recite Well-Known Concepts That Would Have Been Obvious to Implement.

The Asserted Claims represent nothing more than an arrangement of well-known concepts and features and add nothing to the state of the art at the time of the alleged invention. For each of the concepts represented by the Asserted Claims, it would have been obvious to add to the teachings of any number of known products and references, including to the teachings of any of the primary references in Exhibits A-1 to A-7 and Appendix A—Secondary to the extent that such reference is alleged to be missing such concept or feature. The following are examples of concepts that would have been obvious, which is not intended to be an exhaustive list of the claimed features that would have been obvious. Defendants reserve the right to supplement these examples as necessary.

(1) It would have been obvious to modify any primary reference to "obtain[] a Round Trip Delay (RTD) between an Optical Line Terminal (OLT) and an Optical Network Unit (ONU)." (Claim 1)

To the extent Iarnach contends that any reference charted in Exhibits A-1 to A-7 and Appendix A—Secondary does not disclose "obtaining a Round Trip Delay (RTD) between an Optical Line Terminal (OLT) and an Optical Network Unit (ONU)," it would have been obvious to combine such well-known features with any of the references charted in Exhibits A-1 to A-7 and Appendix A—Secondary. POSITA would have known and been motivated to employ or

implement obtaining an RTD between an OLT and an ONU. *See, e.g.*, Miguel, G.984.3, G.983.1, Delew, Dalton, Xu, and/or Kramer. Such a feature was known to be used during ranging and other operations for PONs. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

> (2) It would have been obvious to modify any primary reference to "open[] a quiet window used for the ranging for the ONU according to the RTD to perform the ranging on this ONU" and "determining a required period T during performing the ranging on the ONU according to the RTD" (Claims 1, 3)

To the extent Iarnach contends that any reference charted in Exhibits A-1 to A-7 and Appendix A—Secondary does not disclose "opening a quiet window used for the ranging for the ONU according to the RTD to perform the ranging on this ONU" or "determining a required period T during performing the ranging on the ONU according to the RTD" it would have been obvious to combine such well-known features with any of the references charted in Exhibits A-1 to A-7 and Appendix A—Secondary. POSITA would have known and been motivated to employ or implement opening a quiet window for ranging and having the duration of the quiet window be based, in whole or part, on the RTD. *See, e.g.*, Miguel, G.984.3, G.983.1, Delew, Dalton, Xu, and/or Kramer. Such features were known to be used during ranging operations for PONs. Little or no complexity would have been involved in including these features, as adding these features would have fit together with the other features and functionalities like pieces of a puzzle.

> (3) It would have been obvious to modify any primary reference to "obtain an open time of the quiet window according to the determined required period T during performing the ranging on the ONU and a preset adjustment time Δt." (Claims 1, 3)

To the extent Iarnach contends that any reference charted in Exhibits A-1 to A-7 and Appendix A—Secondary does not disclose "obtaining an open time of the quiet window according

to the determined required period T during performing the ranging on the ONU and a preset adjustment time Δt," it would have been obvious to combine such well-known features with any of the references charted in Exhibits A-1 to A-7 and Appendix A—Secondary, particularly in view of Iarnach's infringement theories and under Iarnach's implied construction. POSITA would have been motivated to employ or implement obtaining an open time of the quiet window based on a required period T and preset adjustment time. *See, e.g.*, Miguel, G.984.3, G.983.1, Delew, Dalton, Xu, and/or Kramer. Such a feature was known to be used when determining the duration of a quiet window in a PON, including with respect to ranging operations. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

> (4) It would have been obvious to modify any primary reference for "when the ONU is in a ranging state, sending a ranging request to the ONU, and opening the quiet window used for performing the ranging on the ONU simultaneously, wherein the quiet window includes the open time of the quiet window." (Claims 1, 3)

To the extent Iarnach contends that any reference charted in Exhibits A-1 to A-7 and Appendix A—Secondary does not disclose "when the ONU is in a ranging state, sending a ranging request to the ONU, and opening the quiet window used for performing the ranging on the ONU simultaneously, wherein the quiet window includes the open time of the quiet window," it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits A-1 to A-7 and Appendix A—Secondary. POSITA would have known and been motivated to employ or implement opening the quiet window and sending a ranging request to the ONU simultaneously, particularly in view of Iarnach's infringement theories and under Iarnach's implied construction. *See, e.g.*, Miguel, G.984.3, G.983.1, Delew, Dalton, Xu, and/or Kramer. Such a feature was known to be used when opening a quiet window in a PON. Little or no

complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

> (5) It would have been obvious to modify any primary reference to "receiv[e] a ranging response within the open time of the quiet window." (Claims 1, 3).

To the extent Iarnach contends that any reference charted in Exhibits A-1 to A-7 and Appendix A—Secondary does not disclose "receiving a ranging response within the open time of the quiet window," it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits A-1 to A-7 and Appendix A—Secondary. POSITA would have known and been motivated to employ or implement receiving a ranging response within the open time of the quiet window. *See, e.g.*, Miguel, G.984.3, G.983.1, Delew, Dalton, Xu, and/or Kramer. Indeed, the point of opening a quiet window during ranging is to receive a ranging response from the ONU that is being ranged. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

> (6) It would have been obvious to modify any primary reference to "obtain[] an Equalization Delay (EqD) of the ONU that is in the ranging state and send[] the EqD to the ONU that is in the ranging state." (Claims 1, 3)

To the extent Iarnach contends that any reference charted in Exhibits A-1 to A-7 and Appendix A—Secondary does not disclose "obtaining an Equalization Delay (EqD) of the ONU that is in the ranging state and sending the EqD to the ONU that is in the ranging state," it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits A-1 to A-7 and Appendix A—Secondary. POSITA would have known and been motivated to employ or implement obtaining an ONU's EqD and sending it to the ONU. *See, e.g.*, Miguel, G.984.3, G.983.1, Delew, Dalton, Xu, and/or Kramer. Such a feature was known to be

used in PON systems, including to equalize varying distances to a shared OLT among ONUs. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

> (7) It would have been obvious to modify any primary reference to "obtain[] the RTD of a round trip between the OLT and the ONU according to the sending time of the serial number request message, the receiving time of the serial number response message, a random delay of the ONU, and a pre-assigned delay and a start time that are preset by the OLT for the ONU responding to the serial number request." (Claim 2)

To the extent Iarnach contends that any reference charted in Exhibits A-1 to A-7 and Appendix A—Secondary does not disclose "obtaining the RTD of a round trip between the OLT and the ONU according to the sending time of the serial number request message, the receiving time of the serial number response message, a random delay of the ONU, and a pre-assigned delay and a start time that are preset by the OLT for the ONU responding to the serial number request," it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits A-1 to A-7 and Appendix A—Secondary. POSITA knew and would have been motivated to employ or implement sending and receiving serial number messages to obtain the RTD. *See, e.g.*, Miguel, G.984.3, G.983.1, Delew, Dalton, Xu, and/or Kramer. Moreover, POSITA knew that a RTD could be based on sending and receiving time of serial number requests and responses, respectively, random ONU delays, as well as pre-assigned delays and start times that are preset by the OLT for the ONU responding to the serial number request. Such a feature was known to be used for PONs, including during serial number registration and ranging states. It also would have been known to receive or record such times, as recited in limitation 2[B]. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(8) It would have been obvious to modify any primary reference to have a "required period T during performing ranging on the ONU [which is] is a sum of the round trip delay and one or more of following delays: a pre-assigned delay when the ONU that is in the ranging state responds to the ranging request and a start time of sending the ranging response." (Claims 4, 6)

To the extent Iarnach contends that any reference charted in Exhibits A-1 to A-7 and Appendix A—Secondary does not disclose a "required period T during performing ranging on the ONU [which is] is a sum of the round trip delay and one or more of following delays: a pre-assigned delay when the ONU that is in the ranging state responds to the ranging request and a start time of sending the ranging response," it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits A-1 to A-7 and Appendix A—Secondary. POSITA knew and would have been motivated to employ or implement sending a ranging window that included round trip delay and at least one of pre-assigned delay or a start time of sending a ranging response. *See, e.g.*, Miguel, G.984.3, G.983.1, Delew, Dalton, Xu, and/or Kramer. Such a feature was known to be used for ranging windows on PONs. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(9) It would have been obvious to modify any primary reference for "when the ranging on the ONU is successful, reducing a value of the adjustment time Δt; when the ranging on the ONU is failed, increasing the value of the adjustment time Δt." (Claims 5, 7)

To the extent Iarnach contends that any reference charted in Exhibits A-1 to A-7 and Appendix A—Secondary does not disclose "when the ranging on the ONU is successful, reducing a value of the adjustment time Δt; when the ranging on the ONU is failed, increasing the value of the adjustment time Δt," it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits A-1 to A-7 and Appendix A—Secondary. POSITA would

have known and been motivated to employ or implement increasing or decreasing an adjustment time on the basis of ranging success or failure. *See, e.g.*, Miguel, G.984.3, G.983.1, Delew, Dalton, Xu, and/or Kramer. In particular, it would have been obvious that a ranging window may be reduced if ranging was a success, and that a ranging window may be increased if ranging operations failed. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

e) Additional Reasons to Combine.

In addition to the information contained elsewhere in these invalidity contentions, including in Exhibits A-1 to A-7 and Appendix A—Secondary, Defendants have identified additional motivations and reasons to combine the various references. Defendants note that in *KSR Int'l Co. v. Teleflex Inc.*, the Supreme Court held that "[i]n determining whether the subject matter of a patent claim is obvious, neither the particular motivation nor the avowed purpose of the patentee controls. What matters is the objective reach of the claim. If the claim extends to what is obvious, it is invalid under § 103." 127 S. Ct. 1727, 1742 (2007).

KSR further illustrated several ways in which the subject matter of a patent claim may be shown to have been obvious. For instance, "[o]ne of the ways in which a patent's subject matter can be proved obvious is by noting that there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent's claims." *KSR*, 127 S. Ct. at 1742. The Supreme Court held that it was error to "look only to the problem the patentee was trying to solve." *Id*. As the Court explained, "[t]he question is not whether the combination was obvious to the patentee but whether the combination was obvious to a person with ordinary skill in the art. Under the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the

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manner claimed." *Id*. Further, "[c]ommon sense teaches … that familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle." *Id.* Further, a showing that a combination of elements was "obvious to try" may demonstrate that it was obvious under § 103. *Id.* For instance, the Supreme Court held that "predictable solutions" using a combination of "known options" may render the subject matter of a patent claim obvious. *Id.*

When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product was not of innovation but of ordinary skill and common sense. *Id.* The ways in which the subject matter of a patent claim may be shown to be obvious, identified by *KSR*, are merely illustrative. A core thrust of *KSR* was that "[r]igid preventative rules that deny factfinders recourse to common sense are neither necessary under our case law nor consistent with it." *KSR*, 127 S. Ct. at 1742-43 (quoting *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1367 (Fed. Cir. 2006) ("Our suggestion test is in actuality quite flexible and not only permits, but requires, consideration of common knowledge and common sense"), and *Alza Corp. v. Mylan Labs., Inc.*, 464 F.3d 1286, 1291 (Fed. Cir. 2006) ("There is flexibility in our obviousness jurisprudence because a motivation may be found *implicitly* in the prior art. We do not have a rigid test that requires an actual teaching to combine ...").

Although Defendants note that there is no longer a rigid requirement regarding motivation to combine under *KSR*, Defendants provide the following statements regarding motivation to combine. Multiple teachings, suggestions, and/or reasons to modify any of the references and/or to combine any two or more of the references in Exhibits A-1 to A-7 and Appendix A—Secondary

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come from many sources, including the prior art (specific and as a whole), common knowledge, common sense, predictability, expectations, industry trends, design incentives or need, market demands or pressure, market forces, obvious to try, the nature of the problem faced, and/or knowledge possessed by one of ordinary skill. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field of endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one.

The combination of prior art references identified in these contentions would have been obvious because the combination represents the known potential options with a reasonable expectation of success. Additionally, one of ordinary skill in the art would have been motivated to create combinations identified in these contentions using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or teaching, suggestion, or motivation in the prior art generally. Also, market forces in the industry, and the desire to improve features and performance, would motivate the addition of features to systems as they became available, became less expensive, became more commonly used, provided better performance, reduced costs, size or weight, or predictably achieved other desirable results.

C. Other Grounds for Invalidity

Defendants identify the following additional grounds for invalidity of the Asserted Claims of the ’242 Patent. Defendants reserve the right to supplement these disclosures based on further investigation and discovery.

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1. Invalidity of the ’242 Patent Based on 35 U.S.C. § 112, ¶ 1 (Enablement and Written Description)

Based on Defendants’ present understanding of Iarnach’s asserted scope of the claims of the ’242 Patent, to the extent such positions can be understood from Iarnach’s Preliminary Infringement Contentions, the Asserted Claims of the ’242 Patent are invalid for reciting at least the following claim terms, phrases, or limitations that lack enablement or sufficient written description:

- “opening a quiet window used for the ranging for the ONU according to the RTD” (Claim 1[C])
- “wherein the step of opening the quiet window for the ranging for the ONU according to the RTD to perform the ranging on this ONU comprises: determining a required period T during performing the ranging on the ONU according to the RTD” (Claim 1[D]-1[E]).

These claim terms, phrases, and limitations, as apparently construed by Iarnach, fail to satisfy the enablement and/or written description requirements of 35 U.S.C. § 112. This is at least because the specifications of the ’242 Patent demonstrate that the patentee neither conceived of nor demonstrated possession of all that Iarnach now contends the claims cover. In addition, based on Defendant’s present understanding of Iarnach’s Preliminary Infringement Contentions, each of the Asserted Claims of the ’242 Patent in which these claim terms, phrases, and limitations appear is invalid because the specification fails to provide sufficient disclosure to enable a person of ordinary skill in the art to which the alleged invention pertains, or with which it is most nearly connected, to implement the alleged invention without undue experimentation.

2. Invalidity of the ’242 Patent Based on 35 U.S.C. § 112, ¶ 2 (Indefiniteness)

Based on the Defendants’ present understanding of Iarnach’s asserted scope of the claims of the ’242 Patent, to the extent such positions can be understood from Iarnach’s Preliminary

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Infringement Contentions, the Defendants assert that the Asserted Claims of the '242 Patent are invalid for reciting at least the following indefinite claim terms, phrases, or limitations:

- "obtaining the RTD of a round trip between the OLT and the ONU" (claim 2)
- "according to the determined required period T" / "obtaining an open time of the quiet window according to the determined required period T" (claim 3)
- "obtaining an open time of the quiet window" (claim 3)
- "wherein the quiet window includes the open time of the quiet window" (claim 3)
- "receiving a ranging response within the open time of the quiet window" (claim 3).
- "within the open time of the quiet window" (claim 3)
- "obtaining an Equalization Delay (EdQ) of the ONU" (claim 3)
- "sending the EqD to the ONU . . . ." (claim 3)
- "wherein the determined required period T" (claim 4)
- "the round trip delay" (claim 4).
- "the adjustment time Δt" (claim 5)

These claim terms, phrases, and limitations, as apparently construed by Iarnach, violate the definiteness requirements of 35 U.S.C. § 112.

Based on Defendants' present understanding of Iarnach's Preliminary Infringement Contentions, these claim terms, phrases, and limitations are indefinite because they are inconsistent with and broader than the alleged invention disclosed in the specification and during prosecution. And given Iarnach's apparent constructions of the claim terms, phrases, and limitations, POSITA at the time of the invention would not have understood what is claimed with reasonable certainty, even when the claims are read in light of the specification and prosecution history.

3. Additional Grounds for Invalidity of the ’242 Patent

In addition to the preceding invalidity contentions, Defendants reserve the right to assert that the Asserted Claims are invalid under 35 U.S.C. § 102(f) and/or § 102(g) in the event that Defendants obtain evidence that the named inventor of the ’242 Patent did not invent (either alone or in conjunction with other parties) the subject matter claimed in the ’242 Patent. Should Defendants obtain such evidence, Defendants will provide the name of the person(s) from whom and the circumstances under which the invention or any part of it was derived, and/or the circumstances surrounding the making of the invention before the patent application.

4. Double Patenting

The ’242 Patent is invalid due to statutory double patenting. In particular, it appears that Claims 2 and 3 cover identical scope. By virtue of Claim 3’s dependency on Claim 2, and by Claim 2’s dependence on Claim 1, Claim 3 contains each of Claim 1-2’s limitations. To the extent Claim 3 is not indefinite, however, each of the additional limitations it purports to add are the same as already present in Claim 1: limitation 3[A] from Iarnach’s Preliminary Infringement Contentions is the same as limitations 1[D] and 1[E]; limitation 3[B] is the same as limitation 1[F]; limitation 3[C] is the same as limitation 1[G]; limitation 3[D] is the same as limitation 1[H]; and limitation 3[E] is the same as limitation 1[I]. Accordingly, Claims 2-3 appear to cover the same scope. To the extent that Iarnach does not cancel at least one of them, the ’242 Patent is invalid for statutory double patenting.

5. Collateral Estoppel

In the event the PTAB or any other judicial body issues an applicable decision or ruling such as, but not limited to, a ruling in Inter Partes Review, Iarnach is estopped from asserting the claims of the ’242 Patent in view of such decisions or rulings.

Defendants reserve the right to supplement these disclosures based on further investigation and discovery.

6. Secondary Considerations

There are no objective indicia of non-obviousness evidencing the validity of any of the Asserted Claims. If Iarnach identifies any alleged objective indicia of non-obviousness or secondary considerations supporting the validity of any Asserted Claims, Defendants reserve the right to supplement these contentions to respond to any such evidence. Further, to the extent any products allegedly practicing the claims have been successful, there is no nexus between the claimed inventions and the products' alleged success.

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IV. THE ’359 PATENT IS INVALID.

A. Identification of Prior Art

Defendants contend that the prior art references described and charted in Exhibits B-1 – B-15 and Appendix B-Secondary anticipate and/or render obvious, alone or in combination, one or more of the Asserted Claims of the ’359 Patent.

B. The Asserted Claims Are Anticipated and/or Rendered Obvious.

Iarnach asserts claims 1-3 and 5-9 of U.S. Patent No. 8,934,359 (the “’359 Patent”) against the Defendants in this lawsuit. These claims are invalid because the ’359 Patent fails to meet one or more of the requirements for patentability. The individual bases for invalidity are provided below and in Exhibits B-1 – B-15 and Appendix B-Secondary. Each of the prior art references, the underlying work, and/or the underlying apparatus or method qualifies as prior art under one or more sections of 35 U.S.C. §§ 102 and/or 103.

In an effort to focus the issues, the Defendants have cited representative portions of identified references, even where a reference may contain additional disclosures or support for a particular claim element. Each and every disclosure of the same limitation in the same reference is not necessarily identified. In addition, persons of ordinary skill in the art generally read a prior art reference as a whole and in the context of other publications and literature and in the context of their knowledge as POSITA. Thus, to understand and interpret any specific statement or disclosure within a prior art reference, such persons would rely on other information within the reference, along with other publications and their general scientific knowledge and experience in the field. Thus, each prior art reference identified herein should be understood in the context of the reference itself, in conjunction with anything incorporated by reference or described as relevant technology by the reference, any documents that are referred to for further understanding by the reference, any system embodying the reference, and any testimony by those with knowledge of

the reference, such as the named authors and inventors. The Defendants may rely on uncited portions of the prior art references and on other publications and expert testimony to provide context, and as aids to understanding and interpreting the portions that are cited. The Defendants may also rely on uncited portions of the prior art references, other disclosed publications, and the testimony of experts to establish that a person of ordinary skill in the art would have been motivated to modify or combine certain of the cited references so as to render the claims obvious.

1. The '359 Patent Priority Date.

Iarnach's Preliminary Infringement Contentions allege that the Asserted Claims of the '359 Patent are entitled at least to the priority date of November 4, 2009. To the extent Iarnach alleges that any prior art relied on in these invalidity contentions does not qualify as prior art to an Asserted Patent, Defendants reserve the right to rebut those allegations (*e.g.*, by demonstrating an earlier relevant date for the challenged prior art and/or a later priority date for the Asserted Patent and/or Asserted Claim).

2. The '359 Patent Is Anticipated and/or Rendered Obvious by the Prior Art.

Some or all of the Asserted Claims of the '359 Patent are invalid as anticipated and/or rendered obvious under 35 U.S.C. §§ 102 and/or 103 in view of each of the primary prior art references identified in the claim charts included in Exhibits B-1 – B-14, which identify specific examples of where each limitation of the Asserted Claims is found in the prior art references. As explained above, the cited portions of prior art references identified in the attached claim charts are exemplary in nature and representative of the content and teaching of the prior art references, and should be understood in the context of the reference as a whole and as they would be understood by a person of ordinary skill in the art.

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Some or all of the Asserted Claims of the ’359 Patent are invalid as anticipated and/or rendered obvious under 35 U.S.C. §§ 102 and/or 103 in view of each of the primary prior art references identified in the claim charts included in Exhibits B-1 – B-15, which identify specific examples of where each limitation of the Asserted Claims is found in the prior art references. As explained above, the cited portions of prior art references identified in the attached claim charts are exemplary in nature and representative of the content and teaching of the prior art references, and should be understood in the context of the reference as a whole and as they would be understood by a person of ordinary skill in the art.

Defendants identify the following references as anticipating and/or rendering obvious one or more of the Asserted Claims of the ’359 Patent under 35 U.S.C. §§ 102 and/or 103. The table of anticipating and/or rending obvious references below is exemplary, and it does not constitute an admission that any reference not listed below does not also anticipate and/or render obvious the claims of the ’359 Patent. Further, Defendants contend that any prior art reference in the attached charts that is charted for each limitation of any given claim, anticipates that claim, regardless of whether that prior art reference is listed in the following table.

Exhibit	**Primary Prior Art**	**Date**[2]
B-1	U.S. 2010/0316381 to Wijngaarden (“Wijngaarden ’381”)	June 10, 2009
B-2	U.S. 2011/0305455 Andersen et al. (“Andersen ’455”)	February 24, 2009
B-3	U.S. 2006/0222362 to Krimmel (“Krimmel ’362”)	October 5, 2006
B-4	U.S. 2007/0127923 to Dalton et al. (“Dalton ’923”)	June 7, 2007

[2] Defendants reserve the right to identify additional bases for qualification as prior art for each of the identified references in the event that it is determined that the Asserted Patents are not entitled to the claimed priority date.

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Exhibit	Primary Prior Art	Date[2]
B-5	U.S. 2010/0061729 to Weeber ("Weeber '729")	September 2, 2009
B-6	Gigabit-capable passive optical networks standard ("G-PON Standard")[3] • G.984.1 (03/2008) • G.984.2 (03/2008) • G.984.3 (03/2008) • G.984.4 (06/2009)	March 2008, June 2009, respectively
B-7	U.S. 2010/0098413 to Li et al. ("Li '413")	October 14, 2009
B-8	U.S. 2008/0260378 to Khermosh ("Khermosh '378")	October 23, 2008
B-9	U.S. 2010/0021158 to Kanno et al. ("Kanno '158")	July 22, 2009
B-10	U.S. 2010/0316380 to Wijngaarden ("Wijngaarden '380")	June 10, 2009
B-11	U.S. 8,718,087 to Johnston et al. ("Johnston '087")	October 23, 2007
B-12	U.S. 2005/0149822 to Lee et al. ("Lee '822")	July 7, 2005
B-13	10-Gigabit-capable passive optical network standard ("XG-PON Standard")[4]	January 2010, October 2010, respectively

[3] A POSITA would have understood each publication describes the different requirements of the G-PON Standard and, as such, a POSITA would have considered the entirety of the publications necessary to describe the G-PON Standard. Defendants, therefore, assert that, for purposes of invalidity, the publications should be treated as a single reference under 35 U.S.C. § 102 as each is necessary to fully describe the G-PON Standard. To the extent Iarnach contends each publication is a separate reference, a POSITA would have been motivated to combine each reference because each reference is necessary to understand the different requirements of the G-PON Standard and each publication cites to, and references, portions of the other publications.

[4] A POSITA would have understood each publication describes the different requirements of the XG-PON Standard and, as such, a POSITA would have considered the entirety of the publications necessary to describe the XG-PON Standard. Defendants, therefore, assert that, for purposes of invalidity, the publications should be treated as a single reference under 35 U.S.C. § 102 as each is necessary to fully describe the G-PON Standard. To the extent Iarnach contends each publication is a separate reference, a POSITA would have been motivated to combine each reference

Exhibit	Primary Prior Art	Date[2]
	• G.987 (Jan. 2010) • G.987.1 (Jan. 2010) • G.987.2 (Jan. 2010) • G.987.3 (Oct. 2010) • G.988 (Oct. 2010)	
B-14	ITU-T Study Group 15, TDR3 (PLEN/15), Questions: 2/15, 10-Gigabit-capable Passive Optical Networks (XG-PON): Physical Media Dependent (PMD) layer specification (for consent) [published as document T09-SG15-090928-TD-PLEN-0130R3!!MSW-E] ("G.987.2 Rev 3")	October 1, 2009
B-15	Draft ITU-T Recommendation G.987.3: XG-PON TC Layer Specification, ITU-T Study Group 15, TD 272 Rev.2 (PLEN/15), Question(s) 2/15 [published as document T09-SG15-100531-TD-PLEN-0272!R2!MSW-E] ("G.987.3 Draft")	June 9, 2010

To the extent any item of prior art cited above is deemed not to disclose and/or render obvious, explicitly or inherently, any limitation of an Asserted Claim of the '359 Patent, Defendants reserve the right to argue that any difference between that prior art and the corresponding patent claim would have been either inherent in the art or obvious to a person of ordinary skill in the art, even if Defendants have not specifically denoted that the art is to be combined with the knowledge of a person of ordinary skill in the art.

3. The '359 Patent Is Obvious Over the Prior Art.

To the extent Iarnach argues that any limitation of the Asserted Claims of the '359 Patent is not explicitly disclosed and/or rendered obvious by an item of prior art identified above and in Exhibits B-1 – B-15 and Appendix B-Secondary, any purported differences are such that the

because each reference is necessary to understand the different requirements of the XG-PON Standard and each publication cites to, and references, portions of the other publications.

claimed subject matter as a whole would have been obvious to one skilled in the art at the time of the alleged invention, in view of the state of the art and knowledge of those skilled in the art. The item of prior art would, therefore, render such claims invalid as obvious under 35 U.S.C. § 103.

a) The Claims Are Obvious Over the Primary References in Light of One or More Secondary References.

To the extent the foregoing references are found not to anticipate and/or render obvious the Asserted Claims of the ’359 Patent, the foregoing references render the Asserted Claims obvious, either alone or in combination with one or more of the other references identified above. One of ordinary skill in the art would have been motivated to combine the various references cited above and herein so as to disclose each and every limitation of the Asserted Claims of the ’359 Patent.

Prior art references rendering the Asserted Claims of the ’359 Patent obvious, either alone or in combination with other references in Exhibits B-1 – B-15 and Appendix B-Secondary, are provided in the tables above and below and in Exhibits B-1 – B-15 and Appendix B-Secondary. The prior art identified in Exhibits B-1 – B-15 render one or more Asserted Claims of the ’359 Patent obvious when the references are read in combination with one or more of each other, when read in combination with any of the prior art identified in Appendix B-Secondary, and/or when read in view of the state of the art and knowledge of those skilled in the art.

Ex. B-Secondary References	**Date**
U.S. 2010/0239247 (“Kani ’247”)	September 18, 2008
U.S. 2010/0278533 (“Julien ’533”)	April 30, 2009
U.S. 2009/0263132 (“Rafel ’132”)	October 22, 2009
U.S. 2008/0181248 (“Haran ’248”)	July 31, 2008
U.S. 2007/0143645 (“Haran ’645”)	June 21, 2007
U.S. 2008/0050116 (“Nakaishi ’116”)	February 28, 2008

Ex. B-Secondary References	Date
U.S. 2008/0056720 (“Sitton ’720”)	March 6, 2008
U.S. 2005/0213674 (“Kobayashi ’674”)	September 29, 2005
U.S. 2009/0238562 (“Matsuyama ’562”)	September 24, 2009
Japanese Patent Appl. Pub. No. 2002185485A (“Yuji ’485”)	June 28, 2002
Japanese Patent Appl. Pub. No. 2007116400A (“Nagura ’400”)	May 10, 2007
Japanese Patent Appl. Pub. No. 2000278281A (“Mitsuyama ’281”)	October 6, 2000
Chinese Patent Pub. No. CN101415129A (“Hu ’129”)	April 22, 2009
Chinese Patent Pub. No. CN101047470A (“He ’470”)	October 3, 2007
Chinese Patent Pub. No. CN101346958A (“Higuchi ’958”)	January 14, 2009

To the extent Iarnach argues that any Asserted Claim of the ’359 Patent is not disclosed or rendered obvious by any Exhibits B-1 – B-15 and Appendix B-Secondary reference, the Asserted Claims nevertheless would have been obvious in light of one or more other Exhibits B-1 – B-15 references and/or one or more references identified and charted in Appendix B-Secondary and in view of the knowledge, experience, and understanding of persons of ordinary skill in the art.

Each and every reference identified is also relevant to the state of the art at the time of the alleged invention. Any of the references disclosed above may be combined with another to render obvious (and therefore invalid) each of Iarnach’s Asserted Claims. Defendants may rely on a subset of (or all of) the above-identified references, including all references in Exhibits B-1 – B-15 and Appendix B-Secondary, for purposes of obviousness in view of the Court’s claim construction, positions taken by Iarnach during this litigation, and further investigation and discovery.

b) Exemplary Combinations of the Prior Art.

The table below provides an identification of exemplary combinations of prior art references that, based on Defendants' present understanding of Iarnach's Preliminary Infringement Contentions and apparent reading of the Asserted Claims, render obvious one or more of the Asserted Claims of the '359 Patent. The combinations of references identified below are non-exhaustive, and additional examples are apparent from other combinations of references addressed in Exhibits B-1 – B-15 and Appendix B-Secondary. Defendants expressly note that, although certain references charted in Exhibits B-1 – B-15 are listed variously in the left or right column below, Defendants do not thereby imply any restriction as to which Exhibits B-1 – B-15 reference is primary and which Exhibits B-1 – B-15 reference is secondary in such a combination. Defendants reserve the right to rely on either identified reference in the identified combinations as a primary and/or secondary reference.

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Reference	Combination References
U.S. 2010/0316381 to Wijngaarden ("Wijngaarden '381")	Andersen '455, Krimmel '362, Dalton '923, Weeber '729, G-PON Standard, Li '413, Khermosh '378, Kanno '158, Wijngaarden '380, Johnston '087, Lee '822, XG-PON Standard, G.987.2 Rev 3, G.987.3 Draft, and/or Appendix B-Secondary
U.S. 2011/0305455 Andersen et al. ("Andersen '455")	Wijngaarden '381, Krimmel '362, Dalton '923, Weeber '729, G-PON Standard, Li '413, Khermosh '378, Kanno '158, Wijngaarden '380, Johnston '087, Lee '822, XG-PON Standard, G.987.2 Rev 3, G.987.3 Draft, and/or Appendix B-Secondary
U.S. 2006/0222362 to Krimmel ("Krimmel '362")	Wijngaarden '381, Andersen '455, Dalton '923, Weeber '729, G-PON Standard, Li '413, Khermosh '378, Kanno '158, Wijngaarden '380, Johnston '087, Lee '822, XG-PON Standard, G.987.2 Rev 3, G.987.3 Draft, and/or Appendix B-Secondary
U.S. 2007/0127923 to Dalton et al. ("Dalton '923")	Wijngaarden '381, Andersen '455, Krimmel '362, Weeber '729, G-PON Standard, Li '413, Khermosh '378, Kanno '158, Wijngaarden '380, Johnston '087, Lee '822, XG-PON Standard, G.987.2 Rev 3, G.987.3 Draft, and/or Appendix B-Secondary
U.S. 2010/0061729 to Weeber ("Weeber '729")	Wijngaarden '381, Andersen '455, Krimmel '362, Dalton '923, G-PON Standard, Li '413, Khermosh '378, Kanno '158, Wijngaarden '380, Johnston '087, Lee '822, XG-PON Standard, G.987.2 Rev 3, G.987.3 Draft, and/or Appendix B-Secondary
Gigabit-capable passive optical networks standard ("G-PON Standard")[5] • G.984.1 (03/2008) • G.984.2 (03/2008) • G.984.3 (03/2008) • G.984.4 (06/2009)	Wijngaarden '381, Andersen '455, Krimmel '362, Dalton '923, Weeber '729, Li '413, Khermosh '378, Kanno '158, Wijngaarden '380, Johnston '087, Lee '822, XG-PON Standard, G.987.2 Rev 3, G.987.3 Draft, and/or Appendix B-Secondary

[5] A POSITA would have understood each publication describes the different requirements of the G-PON Standard and, as such, a POSITA would have considered the entirety of the publications necessary to describe the G-PON

Standard. Defendants, therefore, assert that, for purposes of invalidity, the publications should be treated as a single reference under 35 U.S.C. § 102 as each is necessary to fully describe the G-PON Standard. To the extent Iarnach contends each publication is a separate reference, a POSITA would have been motivated to combine each reference because each reference is necessary to understand the different requirements of the G-PON Standard and each publication cites to, and references, portions of the other publications.

U.S. 2010/0098413 to Li et al. ("Li '413")	Wijngaarden '381, Andersen '455, Krimmel '362, Dalton '923, Weeber '729, G-PON Standard, Khermosh '378, Kanno '158, Wijngaarden '380, Johnston '087, Lee '822, XG-PON Standard, G.987.2 Rev 3, G.987.3 Draft, and/or Appendix B-Secondary
U.S. 2008/0260378 to Khermosh ("Khermosh '378")	Wijngaarden '381, Andersen '455, Krimmel '362, Dalton '923, Weeber '729, G-PON Standard, Li '413, Kanno '158, Wijngaarden '380, Johnston '087, Lee '822, XG-PON Standard, G.987.2 Rev 3, G.987.3 Draft, and/or Appendix B-Secondary
U.S. 2010/0021158 to Kanno et al. ("Kanno '158")	Wijngaarden '381, Andersen '455, Krimmel '362, Dalton '923, Weeber '729, G-PON Standard, Li '413, Khermosh '378, Wijngaarden '380, Johnston '087, Lee '822, XG-PON Standard, G.987.2 Rev 3, G.987.3 Draft, and/or Appendix B-Secondary
U.S. 2010/0316380 to Wijngaarden ("Wijngaarden '380")	Wijngaarden '381, Andersen '455, Krimmel '362, Dalton '923, Weeber '729, G-PON Standard, Li '413, Khermosh '378, Kanno '158, Johnston '087, Lee '822, XG-PON Standard, G.987.2 Rev 3, G.987.3 Draft, and/or Appendix B-Secondary
U.S. 8,718,087 to Johnston et al. ("Johnston '087")	Wijngaarden '381, Andersen '455, Krimmel '362, Dalton '923, Weeber '729, G-PON Standard, Li '413, Khermosh '378, Kanno '158, Wijngaarden '380, Lee '822, XG-PON Standard, G.987.2 Rev 3, G.987.3 Draft, and/or Appendix B-Secondary
U.S. 2005/0149822 to Lee et al. ("Lee '822")	Wijngaarden '381, Andersen '455, Krimmel '362, Dalton '923, Weeber '729, G-PON Standard, Li '413, Khermosh '378, Kanno '158, Wijngaarden '380, Johnston '087, XG-PON Standard, and/or Appendix B-Secondary

10-Gigabit-capable passive optical network standard ("XG-PON Standard")[6] • G.987 (Jan. 2010) • G.987.1 (Jan. 2010) • G.987.2 (Jan. 2010) • G.987.3 (Oct. 2010) • G.988 (Oct. 2010)	Wijngaarden '381, Andersen '455, Krimmel '362, Dalton '923, Weeber '729, G-PON Standard, Li '413, Khermosh '378, Kanno '158, Wijngaarden '380, Johnston '087, Lee '822, G.987.2 Rev 3, G.987.3 Draft, and/or Appendix B-Secondary
ITU-T Study Group 15, TDR3 (PLEN/15), Questions: 2/15, 10-Gigabit-capable Passive Optical Networks (XG-PON): Physical Media Dependent (PMD) layer specification (for consent) [published as document T09-SG15-090928-TD-PLEN-0130R3!!MSW-E] ("G.987.2 Rev 3")	Wijngaarden '381, Andersen '455, Krimmel '362, Dalton '923, Weeber '729, G-PON Standard, Li '413, Khermosh '378, Kanno '158, Wijngaarden '380, Johnston '087, Lee '822, XG-PON Standard, G.987.3 Draft, and/or Appendix B-Secondary
Draft ITU-T Recommendation G.987.3: XG-PON TC Layer Specification, ITU-T Study Group 15, TD 272 Rev.2 (PLEN/15), Question(s) 2/15 [published as document T09-SG15-100531-TD-PLEN-0272!R2!MSW-E] ("G.987.3 Draft")	Wijngaarden '381, Andersen '455, Krimmel '362, Dalton '923, Weeber '729, G-PON Standard, Li '413, Khermosh '378, Kanno '158, Wijngaarden '380, Johnston '087, Lee '822, XG-PON Standard, G.987.2 Rev 3, and/or Appendix B-Secondary

It would have been obvious to combine these references for reasons that are readily apparent to one of ordinary skill in the art, and for reasons explained herein.

c) Prior Art Solutions

In addition to the exemplary combinations provided above, to the extent Iarnach alleges the references in Exhibits B-1 – B-15 and Appendix B-Secondary do not disclose any particular limitation of the Asserted Claims of the '359 Patent, either expressly or inherently, it would have been obvious to a person of ordinary skill in the art as of the alleged invention date of the '359

[6] A POSITA would have understood each publication describes the different requirements of the XG-PON Standard and, as such, a POSITA would have considered the entirety of the publications necessary to describe the XG-PON Standard. Defendants, therefore, assert that, for purposes of invalidity, the publications should be treated as a single reference under 35 U.S.C. § 102 as each is necessary to fully describe the G-PON Standard. To the extent Iarnach contends each publication is a separate reference, a POSITA would have been motivated to combine each reference because each reference is necessary to understand the different requirements of the XG-PON Standard and each publication cites to, and references, portions of the other publications.

Patent to modify the references in Exhibits B-1 – B-15 and Appendix B-Secondary and/or combine the teachings of the references in Exhibits B-1 – B-15 and Appendix B-Secondary with the other prior art references in Exhibits B-1 – B-15 and Appendix B-Secondary in a manner that would have rendered the Asserted Claims invalid as obvious. The Defendants provide examples of such combinations below. The exemplary combinations below are non-exhaustive, and the Defendants reserve the right to rely on additional combinations as may be apparent from the prior art references in Exhibits B-1 – B-15 and Appendix B-Secondary. These obviousness combinations should not be construed to suggest that any reference included in any combination is not anticipatory in its own right.

(1) Exemplary Wijngaarden ’381 Solutions

A person of ordinary skill in the art would be motivated to combine Wijngaarden ’381 with Andersen ’455 for many reasons. For example, Wijngaarden ’381 describes, “[i]n a passive optical network, an upstream transmission rate from an ONT to an OLT can be optimized by matching a transmission scheme for a channel to the upstream transmission characteristics of the channel” including monitoring the BER and adjusting FEC accordingly. *See, e.g.*, Wijngaarden ’381 at abstract, [0022]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wijngaarden ’381 to implement the details of “determining a momentary parameter value of at least one scheduling control parameter (PS) of a set of different scheduling control parameters” taught by Andersen ’455 because, it is also directed at helping manage upstream burst overhead parameters. Andersen ’455 at [0001], [0064]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data transfer. Andersen ’455 at [0005]. In addition, a person of ordinary skill in the art would be motivated to combine Wijngaarden ’381 with Andersen ’455 because (a) Wijngaarden ’381 and Andersen ’455 disclose similar products, methods, and solutions; and (b) both references

are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Andersen '455's teachings with those of Wijngaarden '381. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wijngaarden '381 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wijngaarden '381 with Krimmel '362 for many reasons. For example, Wijngaarden '381 describes, "[i]n a passive optical network, an upstream transmission rate from an ONT to an OLT can be optimized by matching a transmission scheme for a channel to the upstream transmission characteristics of the channel" including monitoring the BER and adjusting FEC accordingly. *See, e.g.*, Wijngaarden '381 at abstract, [0022]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wijngaarden '381 to implement the details of "operating a passive optical network that is capable to consider changes of the transmission quality of a link" taught by Krimmel '362 because, it is also directed at helping manage upstream burst overhead parameters. Krimmel '362 at [0007], [0035]-[0037]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing the transmission rate. Krimmel '362 at [0044]. In addition, a person of ordinary skill in the art would be motivated to combine Wijngaarden '381 with Krimmel '362 because (a) Wijngaarden '381 and Krimmel '362 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Krimmel '362's teachings with those of Wijngaarden '381. For similar reasons, a

person of ordinary skill in the art would be motivated to combine Wijngaarden ’381 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wijngaarden ’381 with Dalton ’923 for many reasons. For example, Wijngaarden ’381 describes, “[i]n a passive optical network, an upstream transmission rate from an ONT to an OLT can be optimized by matching a transmission scheme for a channel to the upstream transmission characteristics of the channel” including monitoring the BER and adjusting FEC accordingly. *See, e.g.*, Wijngaarden ’381 at abstract, [0022]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wijngaarden ’381 to implement the details of “optical power control in a passive optical network (PON) and, more specifically, to adjusting a burst-mode data transmission preamble in response to power measurement” taught by Dalton ’923 because, it is also directed at helping manage upstream burst overhead parameters. Dalton ’923 at [0002]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as maximizing the available bandwidth. Dalton ’923 at [0011], [0024]. In addition, a person of ordinary skill in the art would be motivated to combine Wijngaarden ’381 with Dalton ’923 because (a) Wijngaarden ’381 and Dalton ’923 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Dalton ’923’s teachings with those of Wijngaarden ’381. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wijngaarden ’381 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wijngaarden '381 with Weeber '729 for many reasons. For example, Wijngaarden '381 describes, "[i]n a passive optical network, an upstream transmission rate from an ONT to an OLT can be optimized by matching a transmission scheme for a channel to the upstream transmission characteristics of the channel" including monitoring the BER and adjusting FEC accordingly. *See, e.g.*, Wijngaarden '381 at abstract, [0022]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wijngaarden '381 to implement the details of a "bandwidth mapper 255 for managing transmissions in the upstream direction" taught by Weeber '729 because, it is also directed at helping manage upstream burst overhead parameters. Weeber '729 at [0056], [0068]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as enhancing upstream capacity. Weeber '729 at [0056]. In addition, a person of ordinary skill in the art would be motivated to combine Wijngaarden '381 with Weeber '729 because (a) Wijngaarden '381 and Weeber '729 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Weeber '729's teachings with those of Wijngaarden '381. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wijngaarden '381 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wijngaarden '381 with the G-PON Standard for many reasons. For example, Wijngaarden '381 describes, "[i]n a passive optical network, an upstream transmission rate from an ONT to an OLT can be optimized by matching a transmission scheme for a channel to the upstream transmission characteristics of the

channel" including monitoring the BER and adjusting FEC accordingly. *See, e.g.*, Wijngaarden '381 at abstract, [0022]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wijngaarden '381 to implement the details of "gigabit-capable passive optical networks [GPON]" including where the "OLTs set the desired ONU FEC encoding status (on/off)" as taught by the G-PON Standard because, it is also directed at helping manage upstream burst overhead parameters. G-PON Standard, G.984.3 at i, 36-38, 92-93. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as improving data transfer. G-PON Standard, G.984.3 at 36-38, 92-93. In addition, a person of ordinary skill in the art would be motivated to combine Wijngaarden '381 with the G-PON Standard because (a) Wijngaarden '381 and the G-PON Standard disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the G-PON Standard's teachings with those of Wijngaarden '381. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wijngaarden '381 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wijngaarden '381 with Li '413 for many reasons. For example, Wijngaarden '381 describes, "[i]n a passive optical network, an upstream transmission rate from an ONT to an OLT can be optimized by matching a transmission scheme for a channel to the upstream transmission characteristics of the channel" including monitoring the BER and adjusting FEC accordingly. *See, e.g.*, Wijngaarden '381 at abstract, [0022]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wijngaarden '381 to implement the details of "a performance

monitoring mechanism configured to monitor performance of the PON based on received optical signals" that includes "BER-based performance monitoring" taught by Li '413 because, it is also directed at helping manage upstream burst overhead parameters. Li '413 at abstract, [0060]-[0064]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as better monitoring the link quality. Li '413 at [0038]. In addition, a person of ordinary skill in the art would be motivated to combine Wijngaarden '381 with Li '413 because (a) Wijngaarden '381 and Li '413 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Li '413's teachings with those of Wijngaarden '381. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wijngaarden '381 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wijngaarden '381 with Khermosh '378 for many reasons. For example, Wijngaarden '381 describes, "[i]n a passive optical network, an upstream transmission rate from an ONT to an OLT can be optimized by matching a transmission scheme for a channel to the upstream transmission characteristics of the channel" including monitoring the BER and adjusting FEC accordingly. *See, e.g.*, Wijngaarden '381 at abstract, [0022]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wijngaarden '381 to implement the details of "managing forward error correction" by "monitoring communications quality from the optical network unit… [or] from the optical line terminal" taught by Khermosh '378 because, it is also directed at helping manage upstream burst overhead parameters. Khermosh '378 at [0011]-[0012]. A person of

ordinary skill in the art would be motivated by the advantages of such functionality, such as reducing the error rate during data transfer. Khermosh '378 at [0006], [0008]-[0012]. In addition, a person of ordinary skill in the art would be motivated to combine Wijngaarden '381 with Khermosh '378 because (a) Wijngaarden '381 and Khermosh '378 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Khermosh '378's teachings with those of Wijngaarden '381. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wijngaarden '381 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wijngaarden '381 with Kanno '158 for many reasons. For example, Wijngaarden '381 describes, "[i]n a passive optical network, an upstream transmission rate from an ONT to an OLT can be optimized by matching a transmission scheme for a channel to the upstream transmission characteristics of the channel" including monitoring the BER and adjusting FEC accordingly. *See, e.g.*, Wijngaarden '381 at abstract, [0022]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wijngaarden '381 to implement the details of "counting, in each of the plurality of subscriber terminating units, an error count … and determining, in the office terminal unit, based on the received error count, an error correction method or an error correction disuse which is used in each of the plurality of subscriber terminating units" taught by Kanno '158 because, it is also directed at helping manage upstream burst overhead parameters. Kanno '158 at [0015], [0060]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing the length of the overhead in a parity for the error correction in

the up-link direction. Kanno ’158 at [0060]. In addition, a person of ordinary skill in the art would be motivated to combine Wijngaarden ’381 with Kanno ’158 because (a) Wijngaarden ’381 and Kanno ’158 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kanno ’158’s teachings with those of Wijngaarden ’381. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wijngaarden ’381 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wijngaarden ’381 with Wijngaarden ’380 for many reasons. For example, Wijngaarden ’381 describes, “[i]n a passive optical network, an upstream transmission rate from an ONT to an OLT can be optimized by matching a transmission scheme for a channel to the upstream transmission characteristics of the channel” including monitoring the BER and adjusting FEC accordingly. *See, e.g.*, Wijngaarden ’381 at abstract, [0022]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wijngaarden ’381 to implement the details of “a downstream transmission rate from an OLT to multiple ONTs can be optimized by matching a transmission scheme for frames addressed to a channel to the downstream transmission characteristics of the channel” taught by Wijngaarden ’380 because, it is also directed at helping manage upstream burst overhead parameters. Wijngaarden ’380 at [0035], Fig. 3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as minimizing error rates during data transfer while also minimizing overhead. Wijngaarden ’380 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine Wijngaarden ’381 with Wijngaarden

’380 because (a) Wijngaarden ’381 and Wijngaarden ’380 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wijngaarden ’380’s teachings with those of Wijngaarden ’381. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wijngaarden ’381 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wijngaarden ’381 with Johnston ’087 for many reasons. For example, Wijngaarden ’381 describes, “[i]n a passive optical network, an upstream transmission rate from an ONT to an OLT can be optimized by matching a transmission scheme for a channel to the upstream transmission characteristics of the channel” including monitoring the BER and adjusting FEC accordingly. *See, e.g.*, Wijngaarden ’381 at abstract, [0022]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wijngaarden ’381 to implement the details of “a superframe counter [that] provides error checking for potential dropped frames” taught by Johnston ’087 because, it is also directed at helping manage upstream burst overhead parameters. Johnston ’087 at 6:63-7:17, 7:18-29, Figs. 2-3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing upstream data transfer. Johnston ’087 at 4:36-5:3. In addition, a person of ordinary skill in the art would be motivated to combine Wijngaarden ’381 with Johnston ’087 because (a) Wijngaarden ’381 and Johnston ’087 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating

Johnston ’087’s teachings with those of Wijngaarden ’381. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wijngaarden ’381 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wijngaarden ’381 with Lee ’822 for many reasons. For example, Wijngaarden ’381 describes, “[i]n a passive optical network, an upstream transmission rate from an ONT to an OLT can be optimized by matching a transmission scheme for a channel to the upstream transmission characteristics of the channel” including monitoring the BER and adjusting FEC accordingly. *See, e.g.*, Wijngaarden ’381 at abstract, [0022]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wijngaarden ’381 to implement the details of “controlling effective FEC of an ONU and an OLT without changing an RTT based on optical link quality” taught by Lee ’822 because, it is also directed at helping manage upstream burst overhead parameters. Lee ’822 at abstract, [0029]-[0030], Fig. 4. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data throughout. Lee ’822 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine Wijngaarden ’381 with Lee ’822 because (a) Wijngaarden ’381 and Lee ’822 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Lee ’822’s teachings with those of Wijngaarden ’381. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wijngaarden ’381 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wijngaarden '381 with the XG-PON Standard for many reasons. For example, Wijngaarden '381 describes, "[i]n a passive optical network, an upstream transmission rate from an ONT to an OLT can be optimized by matching a transmission scheme for a channel to the upstream transmission characteristics of the channel" including monitoring the BER and adjusting FEC accordingly. *See, e.g.*, Wijngaarden '381 at abstract, [0022]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wijngaarden '381 to implement the details of "10-gigabit-capable passive optical networks" including where "[t]he OLT dynamically activates or deactivates the FEC functionality for a given ONU in the upstream direction by selecting the appropriate burst profile" as taught by the XG-PON Standard because, it is also directed at helping manage upstream burst overhead parameters. XG-PON Standard, G.987.3 at i, 33, G.987.2 at 22. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as dynamically adjusting the burst profile. XG-PON Standard, G.987.2 at 22. In addition, a person of ordinary skill in the art would be motivated to combine Wijngaarden '381 with the XG-PON Standard because (a) Wijngaarden '381 and the XG-PON Standard disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the XG-PON Standard's teachings with those of Wijngaarden '381. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wijngaarden '381 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wijngaarden '381 with G.987.2 Rev 3 for many reasons. For example, Wijngaarden '381 describes, "[i]n a passive optical

network, an upstream transmission rate from an ONT to an OLT can be optimized by matching a transmission scheme for a channel to the upstream transmission characteristics of the channel" including monitoring the BER and adjusting FEC accordingly. *See, e.g.*, Wijngaarden '381 at abstract, [0022]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wijngaarden '381 to implement the details of controlling "a burst profile" based on "operationally dependent factors" as taught by G.987.2 Rev 3 because, it is also directed at helping manage upstream burst overhead parameters. G.987.2 Rev 3 at 43-44. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as adjusting the burst overhead based on operationally dependent factors. G.987.2 Rev 3 at 43-44. In addition, a person of ordinary skill in the art would be motivated to combine Wijngaarden '381 with G.987.2 Rev 3 because (a) Wijngaarden '381 and G.987.2 Rev 3 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.2 Rev 3's teachings with those of Wijngaarden '381. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wijngaarden '381 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wijngaarden '381 with G.987.3 Draft for many reasons. For example, Wijngaarden '381 describes, "[i]n a passive optical network, an upstream transmission rate from an ONT to an OLT can be optimized by matching a transmission scheme for a channel to the upstream transmission characteristics of the channel" including monitoring the BER and adjusting FEC accordingly. *See, e.g.*, Wijngaarden '381 at abstract, [0022]. A person having ordinary skill in the art would have been motivated to modify

the method and/or device of Wijngaarden ’381 to implement the details of “the draft ITU_T Recommendation G.987.3 that describes the Transmission Convergence layer for 10-Gigabit-capable Optical Network systems” as taught by G.987.3 Draft because, it is also directed at helping efficiently manage upstream burst overhead parameters. G.987.3 Draft at 1, 135. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as adjusting the burst overhead based on link quality. G.987.3 Draft at 49. In addition, a person of ordinary skill in the art would be motivated to combine Wijngaarden ’381 with G.987.3 Draft because (a) Wijngaarden ’381 and G.987.3 Draft disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3 Draft’s teachings with those of Wijngaarden ’381. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wijngaarden ’381 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

(2) Exemplary Andersen ’455 Solutions

A person of ordinary skill in the art would be motivated to combine Andersen ’455 with Wijngaarden ’381 for many reasons. For example, Andersen ’455 describes, “determining a momentary parameter value of at least one scheduling control parameter (PS) of a set of different scheduling control parameters.” *See, e.g.*, Andersen ’455 at [0001], [0064]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Andersen ’455 to implement the details of “[i]n a passive optical network, an upstream transmission rate from an ONT to an OLT can be optimized by matching a transmission scheme for a channel to the upstream transmission characteristics of the channel” including monitoring the BER and adjusting FEC accordingly taught by Wijngaarden ’381 because, it is also directed at

helping manage upstream burst overhead parameters. Wijngaarden ’381 at abstract, [0022]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data transfer with minimal overhead. Wijngaarden ’381 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine Andersen ’455 with Wijngaarden ’381 because (a) Andersen ’455 and Wijngaarden ’381 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wijngaarden ’381’s teachings with those of Andersen ’455. For similar reasons, a person of ordinary skill in the art would be motivated to combine Andersen ’455 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Andersen ’455 with Krimmel ’362 for many reasons. For example, Andersen ’455 describes, “determining a momentary parameter value of at least one scheduling control parameter (PS) of a set of different scheduling control parameters.” *See, e.g.*, Andersen ’455 at [0001], [0064]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Andersen ’455 to implement the details of “operating a passive optical network that is capable to consider changes of the transmission quality of a link” taught by Krimmel ’362 because, it is also directed at helping manage upstream burst overhead parameters. Krimmel ’362 at [0007], [0035]-[0037]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing the transmission rate. Krimmel ’362 at [0044]. In addition, a person of ordinary skill in the art would be motivated to combine Andersen ’455 with Krimmel ’362 because (a) Andersen ’455 and Krimmel ’362 disclose similar products, methods, and

solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Krimmel '362's teachings with those of Andersen '455. For similar reasons, a person of ordinary skill in the art would be motivated to combine Andersen '455 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Andersen '455 with Dalton '923 for many reasons. For example, Andersen '455 describes, "determining a momentary parameter value of at least one scheduling control parameter (PS) of a set of different scheduling control parameters." *See, e.g.*, Andersen '455 at [0001], [0064]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Andersen '455 to implement the details of "optical power control in a passive optical network (PON) and, more specifically, to adjusting a burst-mode data transmission preamble in response to power measurement" taught by Dalton '923 because, it is also directed at helping manage upstream burst overhead parameters. Dalton '923 at [0002]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as maximizing the available bandwidth. Dalton '923 at [0011], [0024]. In addition, a person of ordinary skill in the art would be motivated to combine Andersen '455 with Dalton '923 because (a) Andersen '455 and Dalton '923 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Dalton '923's teachings with those of Andersen '455. For similar reasons, a

person of ordinary skill in the art would be motivated to combine Andersen '455 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Andersen '455 with Weeber '729 for many reasons. For example, Andersen '455 describes, "determining a momentary parameter value of at least one scheduling control parameter (PS) of a set of different scheduling control parameters." *See, e.g.*, Andersen '455 at [0001], [0064]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Andersen '455 to implement the details of a "bandwidth mapper 255 for managing transmissions in the upstream direction" taught by Weeber '729 because, it is also directed at helping manage upstream burst overhead parameters. Weeber '729 at [0056], [0068]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as enhancing upstream capacity. Weeber '729 at [0056]. In addition, a person of ordinary skill in the art would be motivated to combine Andersen '455 with Weeber '729 because (a) Andersen '455 and Weeber '729 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Weeber '729's teachings with those of Andersen '455. For similar reasons, a person of ordinary skill in the art would be motivated to combine Andersen '455 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Andersen '455 with the G-PON Standard for many reasons. For example, Andersen '455 describes, "determining a momentary parameter value of at least one scheduling control parameter (PS) of a set of different scheduling control parameters." *See, e.g.*, Andersen '455 at [0001], [0064]. A person having

ordinary skill in the art would have been motivated to modify the method and/or device of Andersen '455 to implement the details of "gigabit-capable passive optical networks [GPON]" including where the "OLTs set the desired ONU FEC encoding status (on/off)" as taught by the G-PON Standard because, it is also directed at helping manage upstream burst overhead parameters. G-PON Standard, G.984.3 at i, 36-38, 92-93. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as improving data transfer. G-PON Standard, G.984.3 at 36-38, 92-93. In addition, a person of ordinary skill in the art would be motivated to combine Andersen '455 with the G-PON Standard because (a) Andersen '455 and the G-PON Standard disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the G-PON Standard's teachings with those of Andersen '455. For similar reasons, a person of ordinary skill in the art would be motivated to combine Andersen '455 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Andersen '455 with Li '413 for many reasons. For example, Andersen '455 describes, "determining a momentary parameter value of at least one scheduling control parameter (PS) of a set of different scheduling control parameters." *See, e.g.*, Andersen '455 at [0001], [0064]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Andersen '455 to implement the details of "a performance monitoring mechanism configured to monitor performance of the PON based on received optical signals" that includes "BER-based performance monitoring" taught by Li '413 because, it is also directed at helping manage upstream burst

overhead parameters. Li ’413 at abstract, [0060]-[0064]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as better monitoring the link quality. Li ’413 at [0038]. In addition, a person of ordinary skill in the art would be motivated to combine Andersen ’455 with Li ’413 because (a) Andersen ’455 and Li ’413 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Li ’413’s teachings with those of Andersen ’455. For similar reasons, a person of ordinary skill in the art would be motivated to combine Andersen ’455 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Andersen ’455 with Khermosh ’378 for many reasons. For example, Andersen ’455 describes, “determining a momentary parameter value of at least one scheduling control parameter (PS) of a set of different scheduling control parameters.” *See, e.g.*, Andersen ’455 at [0001], [0064]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Andersen ’455 to implement the details of “managing forward error correction” by “monitoring communications quality from the optical network unit… [or] from the optical line terminal” taught by Khermosh ’378 because, it is also directed at helping manage upstream burst overhead parameters. Khermosh ’378 at [0011]-[0012]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as reducing the error rate during data transfer. Khermosh ’378 at [0006], [0008]-[0012]. In addition, a person of ordinary skill in the art would be motivated to combine Andersen ’455 with Khermosh ’378 because (a) Andersen ’455 and Khermosh ’378 disclose similar products, methods, and solutions; and (b) both references are

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analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Khermosh ’378’s teachings with those of Andersen ’455. For similar reasons, a person of ordinary skill in the art would be motivated to combine Andersen ’455 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Andersen ’455 with Kanno ’158 for many reasons. For example, Andersen ’455 describes, “determining a momentary parameter value of at least one scheduling control parameter (PS) of a set of different scheduling control parameters.” *See, e.g.*, Andersen ’455 at [0001], [0064]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Andersen ’455 to implement the details of “counting, in each of the plurality of subscriber terminating units, an error count … and determining, in the office terminal unit, based on the received error count, an error correction method or an error correction disuse which is used in each of the plurality of subscriber terminating units” taught by Kanno ’158 because, it is also directed at helping manage upstream burst overhead parameters. Kanno ’158 at [0015], [0060]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing the length of the overhead in a parity for the error correction in the up-link direction. Kanno ’158 at [0060]. In addition, a person of ordinary skill in the art would be motivated to combine Andersen ’455 with Kanno ’158 because (a) Andersen ’455 and Kanno ’158 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kanno ’158’s

teachings with those of Andersen ’455. For similar reasons, a person of ordinary skill in the art would be motivated to combine Andersen ’455 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Andersen ’455 with Wijngaarden ’380 for many reasons. For example, Andersen ’455 describes, “determining a momentary parameter value of at least one scheduling control parameter (PS) of a set of different scheduling control parameters.” *See, e.g.*, Andersen ’455 at [0001], [0064]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Andersen ’455 to implement the details of “a downstream transmission rate from an OLT to multiple ONTs can be optimized by matching a transmission scheme for frames addressed to a channel to the downstream transmission characteristics of the channel” taught by Wijngaarden ’380 because, it is also directed at helping manage upstream burst overhead parameters. Wijngaarden ’380 at [0035], Fig. 3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as minimizing error rates during data transfer while also minimizing overhead. Wijngaarden ’380 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine Andersen ’455 with Wijngaarden ’380 because (a) Andersen ’455 and Wijngaarden ’380 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wijngaarden ’380’s teachings with those of Andersen ’455. For similar reasons, a person of ordinary skill in the art would be motivated to combine Andersen ’455 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Andersen '455 with Johnston '087 for many reasons. For example, Andersen '455 describes, "determining a momentary parameter value of at least one scheduling control parameter (PS) of a set of different scheduling control parameters." *See, e.g.*, Andersen '455 at [0001], [0064]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Andersen '455 to implement the details of "a superframe counter [that] provides error checking for potential dropped frames" taught by Johnston '087 because, it is also directed at helping manage upstream burst overhead parameters. Johnston '087 at 6:63-7:17, 7:18-29, Figs. 2-3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing upstream data transfer. Johnston '087 at 4:36-5:3. In addition, a person of ordinary skill in the art would be motivated to combine Andersen '455 with Johnston '087 because (a) Andersen '455 and Johnston '087 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Johnston '087's teachings with those of Andersen '455. For similar reasons, a person of ordinary skill in the art would be motivated to combine Andersen '455 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Andersen '455 with Lee '822 for many reasons. For example, Andersen '455 describes, "determining a momentary parameter value of at least one scheduling control parameter (PS) of a set of different scheduling control parameters." *See, e.g.*, Andersen '455 at [0001], [0064]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Andersen '455 to

implement the details of "controlling effective FEC of an ONU and an OLT without changing an RTT based on optical link quality" taught by Lee '822 because, it is also directed at helping manage upstream burst overhead parameters. Lee '822 at abstract, [0029]-[0030], Fig. 4. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data throughout. Lee '822 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine Andersen '455 with Lee '822 because (a) Andersen '455 and Lee '822 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Lee '822's teachings with those of Andersen '455. For similar reasons, a person of ordinary skill in the art would be motivated to combine Andersen '455 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Andersen '455 with the XG-PON Standard for many reasons. For example, Andersen '455 describes, "determining a momentary parameter value of at least one scheduling control parameter (PS) of a set of different scheduling control parameters." *See, e.g.*, Andersen '455 at [0001], [0064]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Andersen '455 to implement the details of "10-gigabit-capable passive optical networks" including where "[t]he OLT dynamically activates or deactivates the FEC functionality for a given ONU in the upstream direction by selecting the appropriate burst profile" as taught by the XG-PON Standard because, it is also directed at helping manage upstream burst overhead parameters. XG-PON Standard, G.987.3 at i, 33, G.987.2 at 22. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as dynamically adjusting the burst profile.

XG-PON Standard, G.987.2 at 22. In addition, a person of ordinary skill in the art would be motivated to combine Andersen '455 with the XG-PON Standard because (a) Andersen '455 and the XG-PON Standard disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the XG-PON Standard's teachings with those of Andersen '455. For similar reasons, a person of ordinary skill in the art would be motivated to combine Andersen '455 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Andersen '455 with G.987.2 Rev 3 for many reasons. For example, Andersen '455 describes, "determining a momentary parameter value of at least one scheduling control parameter (PS) of a set of different scheduling control parameters." *See, e.g.*, Andersen '455 at [0001], [0064]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Andersen '455 to implement the details of "a burst profile" based on "operationally dependent factors" as taught by G.987.2 Rev 3 because, it is also directed at helping manage upstream burst overhead parameters. G.987.2 Rev 3 at 43-44. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as adjusting the burst overhead based on operationally dependent factors. G.987.2 Rev 3 at 43-44. In addition, a person of ordinary skill in the art would be motivated to combine Andersen '455 with G.987.2 Rev 3 because (a) Andersen '455 and G.987.2 Rev 3 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a

reasonable expectation of success in incorporating G.987.2 Rev 3's teachings with those of Andersen '455. For similar reasons, a person of ordinary skill in the art would be motivated to combine Andersen '455 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Andersen '455 with G.987.3 Draft for many reasons. For example, Andersen '455 describes, "determining a momentary parameter value of at least one scheduling control parameter (PS) of a set of different scheduling control parameters." *See, e.g.*, Andersen '455 at [0001], [0064]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Andersen '455 to implement the details of "the draft ITU_T Recommendation G.987.3 that describes the Transmission Convergence layer for 10-Gigabit-capable Optical Network systems" as taught by G.987.3 Draft because, it is also directed at helping efficiently manage upstream burst overhead parameters. G.987.3 Draft at 1, 135. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as adjusting the burst overhead based on link quality. G.987.3 Draft at 49. In addition, a person of ordinary skill in the art would be motivated to combine Andersen '455 with G.987.3 Draft because (a) Andersen '455 and G.987.3 Draft disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3 Draft's teachings with those of Andersen '455. For similar reasons, a person of ordinary skill in the art would be motivated to combine Andersen '455 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

(3) Exemplary Krimmel ’362 Solutions

A person of ordinary skill in the art would be motivated to combine Krimmel ’362 with Wijngaarden ’381 for many reasons. For example, Krimmel ’362 describes, “operating a passive optical network that is capable to consider changes of the transmission quality of a link.” *See, e.g.*, Krimmel ’362 at [0007], [0035]-[0037]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Krimmel ’362 to implement the details of “[i]n a passive optical network, an upstream transmission rate from an ONT to an OLT can be optimized by matching a transmission scheme for a channel to the upstream transmission characteristics of the channel” including monitoring the BER and adjusting FEC accordingly taught by Wijngaarden ’381 because, it is also directed at helping manage upstream burst overhead parameters. Wijngaarden ’381 at abstract, [0022]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data transfer with minimal overhead. Wijngaarden ’381 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine Krimmel ’362 with Wijngaarden ’381 because (a) Krimmel ’362 and Wijngaarden ’381 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wijngaarden ’381’s teachings with those of Krimmel ’362. For similar reasons, a person of ordinary skill in the art would be motivated to combine Krimmel ’362 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Krimmel ’362 with Andersen ’455 for many reasons. For example, Krimmel ’362 describes, “operating a passive optical network that is capable to consider changes of the transmission quality of a link.” *See, e.g.*,

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Krimmel ’362 at [0007], [0035]-[0037]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Krimmel ’362 to implement the details of “determining a momentary parameter value of at least one scheduling control parameter (PS) of a set of different scheduling control parameters” taught by Andersen ’455 because, it is also directed at helping manage upstream burst overhead parameters. Andersen ’455 at [0001], [0064]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data transfer. Andersen ’455 at [0005]. In addition, a person of ordinary skill in the art would be motivated to combine Krimmel ’362 with Andersen ’455 because (a) Krimmel ’362 and Andersen ’455 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Andersen ’455’s teachings with those of Krimmel ’362. For similar reasons, a person of ordinary skill in the art would be motivated to combine Krimmel ’362 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Krimmel ’362 with Dalton ’923 for many reasons. For example, Krimmel ’362 describes, “operating a passive optical network that is capable to consider changes of the transmission quality of a link.” *See, e.g.*, Krimmel ’362 at [0007], [0035]-[0037]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Krimmel ’362 to implement the details of “optical power control in a passive optical network (PON) and, more specifically, to adjusting a burst-mode data transmission preamble in response to power measurement” taught by Dalton ’923 because, it is also directed at helping manage upstream burst overhead parameters. Dalton ’923 at

[0002]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as maximizing the available bandwidth. Dalton '923 at [0011], [0024]. In addition, a person of ordinary skill in the art would be motivated to combine Krimmel '362 with Dalton '923 because (a) Krimmel '362 and Dalton '923 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Dalton '923's teachings with those of Krimmel '362. For similar reasons, a person of ordinary skill in the art would be motivated to combine Krimmel '362 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Krimmel '362 with Weeber '729 for many reasons. For example, Krimmel '362 describes, "operating a passive optical network that is capable to consider changes of the transmission quality of a link." *See, e.g.*, Krimmel '362 at [0007], [0035]-[0037]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Krimmel '362 to implement the details of a "bandwidth mapper 255 for managing transmissions in the upstream direction" taught by Weeber '729 because, it is also directed at helping manage upstream burst overhead parameters. Weeber '729 at [0056], [0068]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as enhancing upstream capacity. Weeber '729 at [0056]. In addition, a person of ordinary skill in the art would be motivated to combine Krimmel '362 with Weeber '729 because (a) Krimmel '362 and Weeber '729 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would

have had a reasonable expectation of success in incorporating Weeber '729's teachings with those of Krimmel '362. For similar reasons, a person of ordinary skill in the art would be motivated to combine Krimmel '362 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Krimmel '362 with the G-PON Standard for many reasons. For example, Krimmel '362 describes, "operating a passive optical network that is capable to consider changes of the transmission quality of a link." *See, e.g.*, Krimmel '362 at [0007], [0035]-[0037]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Krimmel '362 to implement the details of "gigabit-capable passive optical networks [GPON]" including where the "OLTs set the desired ONU FEC encoding status (on/off)" as taught by the G-PON Standard because, it is also directed at helping manage upstream burst overhead parameters. G-PON Standard, G.984.3 at i, 36-38, 92-93. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as improving data transfer. G-PON Standard, G.984.3 at 36-38, 92-93. In addition, a person of ordinary skill in the art would be motivated to combine Krimmel '362 with the G-PON Standard because (a) Krimmel '362 and the G-PON Standard disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the G-PON Standard's teachings with those of Krimmel '362. For similar reasons, a person of ordinary skill in the art would be motivated to combine Krimmel '362 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

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A person of ordinary skill in the art would be motivated to combine Krimmel '362 with Li '413 for many reasons. For example, Krimmel '362 describes, "operating a passive optical network that is capable to consider changes of the transmission quality of a link." *See, e.g.*, Krimmel '362 at [0007], [0035]-[0037]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Krimmel '362 to implement the details of "a performance monitoring mechanism configured to monitor performance of the PON based on received optical signals" that includes "BER-based performance monitoring" taught by Li '413 because, it is also directed at helping manage upstream burst overhead parameters. Li '413 at abstract, [0060]-[0064]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as better monitoring the link quality. Li '413 at [0038]. In addition, a person of ordinary skill in the art would be motivated to combine Krimmel '362 with Li '413 because (a) Krimmel '362 and Li '413 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Li '413's teachings with those of Krimmel '362. For similar reasons, a person of ordinary skill in the art would be motivated to combine Krimmel '362 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Krimmel '362 with Khermosh '378 for many reasons. For example, Krimmel '362 describes, "operating a passive optical network that is capable to consider changes of the transmission quality of a link." *See, e.g.*, Krimmel '362 at [0007], [0035]-[0037]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Krimmel '362 to implement the details of "managing forward error correction" by "monitoring communications quality from the optical

network unit… [or] from the optical line terminal" taught by Khermosh '378 because, it is also directed at helping manage upstream burst overhead parameters. Khermosh '378 at [0011]-[0012]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as reducing the error rate during data transfer. Khermosh '378 at [0006], [0008]-[0012]. In addition, a person of ordinary skill in the art would be motivated to combine Krimmel '362 with Khermosh '378 because (a) Krimmel '362 and Khermosh '378 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Khermosh '378's teachings with those of Krimmel '362. For similar reasons, a person of ordinary skill in the art would be motivated to combine Krimmel '362 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Krimmel '362 with Kanno '158 for many reasons. For example, Krimmel '362 describes, "operating a passive optical network that is capable to consider changes of the transmission quality of a link." *See, e.g.*, Krimmel '362 at [0007], [0035]-[0037]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Krimmel '362 to implement the details of "counting, in each of the plurality of subscriber terminating units, an error count … and determining, in the office terminal unit, based on the received error count, an error correction method or an error correction disuse which is used in each of the plurality of subscriber terminating units" taught by Kanno '158 because, it is also directed at helping manage upstream burst overhead parameters. Kanno '158 at [0015], [0060]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing the length of the overhead in a parity

for the error correction in the up-link direction. Kanno ’158 at [0060]. In addition, a person of ordinary skill in the art would be motivated to combine Krimmel ’362 with Kanno ’158 because (a) Krimmel ’362 and Kanno ’158 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kanno ’158’s teachings with those of Krimmel ’362. For similar reasons, a person of ordinary skill in the art would be motivated to combine Krimmel ’362 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Krimmel ’362 with Wijngaarden ’380 for many reasons. For example, Krimmel ’362 describes, “operating a passive optical network that is capable to consider changes of the transmission quality of a link.” *See, e.g.*, Krimmel ’362 at [0007], [0035]-[0037]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Krimmel ’362 to implement the details of “a downstream transmission rate from an OLT to multiple ONTs can be optimized by matching a transmission scheme for frames addressed to a channel to the downstream transmission characteristics of the channel” taught by Wijngaarden ’380 because, it is also directed at helping manage upstream burst overhead parameters. Wijngaarden ’380 at [0035], Fig. 3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as minimizing error rates during data transfer while also minimizing overhead. Wijngaarden ’380 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine Krimmel ’362 with Wijngaarden ’380 because (a) Krimmel ’362 and Wijngaarden ’380 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field

of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wijngaarden ’380’s teachings with those of Krimmel ’362. For similar reasons, a person of ordinary skill in the art would be motivated to combine Krimmel ’362 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Krimmel ’362 with Johnston ’087 for many reasons. For example, Krimmel ’362 describes, “operating a passive optical network that is capable to consider changes of the transmission quality of a link.” *See, e.g.*, Krimmel ’362 at [0007], [0035]-[0037]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Krimmel ’362 to implement the details of “a superframe counter [that] provides error checking for potential dropped frames” taught by Johnston ’087 because, it is also directed at helping manage upstream burst overhead parameters. Johnston ’087 at 6:63-7:17, 7:18-29, Figs. 2-3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing upstream data transfer. Johnston ’087 at 4:36-5:3. In addition, a person of ordinary skill in the art would be motivated to combine Krimmel ’362 with Johnston ’087 because (a) Krimmel ’362 and Johnston ’087 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Johnston ’087’s teachings with those of Krimmel ’362. For similar reasons, a person of ordinary skill in the art would be motivated to combine Krimmel ’362 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Krimmel '362 with Lee '822 for many reasons. For example, Krimmel '362 describes, "operating a passive optical network that is capable to consider changes of the transmission quality of a link." *See, e.g.*, Krimmel '362 at [0007], [0035]-[0037]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Krimmel '362 to implement the details of "controlling effective FEC of an ONU and an OLT without changing an RTT based on optical link quality" taught by Lee '822 because, it is also directed at helping manage upstream burst overhead parameters. Lee '822 at abstract, [0029]-[0030], Fig. 4. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data throughout. Lee '822 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine Krimmel '362 with Lee '822 because (a) Krimmel '362 and Lee '822 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Lee '822's teachings with those of Krimmel '362. For similar reasons, a person of ordinary skill in the art would be motivated to combine Krimmel '362 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Krimmel '362 with the XG-PON Standard for many reasons. For example, Krimmel '362 describes, "operating a passive optical network that is capable to consider changes of the transmission quality of a link." *See, e.g.*, Krimmel '362 at [0007], [0035]-[0037]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Krimmel '362 to implement the details of "10-gigabit-capable passive optical networks" including where "[t]he OLT dynamically activates or

deactivates the FEC functionality for a given ONU in the upstream direction by selecting the appropriate burst profile" as taught by the XG-PON Standard because, it is also directed at helping manage upstream burst overhead parameters. XG-PON Standard, G.987.3 at i, 33, G.987.2 at 22. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as dynamically adjusting the burst profile. XG-PON Standard, G.987.2 at 22. In addition, a person of ordinary skill in the art would be motivated to combine Krimmel '362 with the XG-PON Standard because (a) Krimmel '362 and the XG-PON Standard disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the XG-PON Standard's teachings with those of Krimmel '362. For similar reasons, a person of ordinary skill in the art would be motivated to combine Krimmel '362 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Krimmel '362 with G.987.2 Rev 3 for many reasons. For example, Krimmel '362 describes, "operating a passive optical network that is capable to consider changes of the transmission quality of a link." *See, e.g.*, Krimmel '362 at [0007], [0035]-[0037]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Krimmel '362 to implement the details of "a burst profile" based on "operationally dependent factors" as taught by G.987.2 Rev 3 because, it is also directed at helping manage upstream burst overhead parameters. G.987.2 Rev 3 at 43-44. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as adjusting the burst overhead based on operationally dependent factors. G.987.2 Rev 3 at 43-44. In addition, a person of ordinary skill in the art would be motivated to combine Krimmel

’362 with G.987.2 Rev 3 because (a) Krimmel ’362 and G.987.2 Rev 3 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.2 Rev 3’s teachings with those of Krimmel ’362. For similar reasons, a person of ordinary skill in the art would be motivated to combine Krimmel ’362 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Krimmel ’362 with G.987.3 Draft for many reasons. For example, Krimmel ’362 describes, “operating a passive optical network that is capable to consider changes of the transmission quality of a link.” *See, e.g.*, Krimmel ’362 at [0007], [0035]-[0037]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Krimmel ’362 to implement the details of “the draft ITU_T Recommendation G.987.3 that describes the Transmission Convergence layer for 10-Gigabit-capable Optical Network systems” as taught by G.987.3 Draft because, it is also directed at helping efficiently manage upstream burst overhead parameters. G.987.3 Draft at 1, 135. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as adjusting the burst overhead based on link quality. G.987.3 Draft at 49. In addition, a person of ordinary skill in the art would be motivated to combine Krimmel ’362 with G.987.3 Draft because (a) Krimmel ’362 and G.987.3 Draft disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3 Draft’s teachings with those of Krimmel ’362. For similar reasons, a person of ordinary skill in the art would be motivated to

combine Krimmel ’362 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

(4) Exemplary Dalton ’923 Solutions

A person of ordinary skill in the art would be motivated to combine Dalton ’923 with Wijngaarden ’381 for many reasons. For example, Dalton ’923 describes, “optical power control in a passive optical network (PON) and, more specifically, to adjusting a burst-mode data transmission preamble in response to power measurement.” *See, e.g.*, Dalton ’923 at [0002]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Dalton ’923 to implement the details of “[i]n a passive optical network, an upstream transmission rate from an ONT to an OLT can be optimized by matching a transmission scheme for a channel to the upstream transmission characteristics of the channel” including monitoring the BER and adjusting FEC accordingly taught by Wijngaarden ’381 because, it is also directed at helping manage upstream burst overhead parameters. Wijngaarden ’381 at abstract, [0022]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data transfer with minimal overhead. Wijngaarden ’381 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine Dalton ’923 with Wijngaarden ’381 because (a) Dalton ’923 and Wijngaarden ’381 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wijngaarden ’381’s teachings with those of Dalton ’923. For similar reasons, a person of ordinary skill in the art would be motivated to combine Dalton ’923 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

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A person of ordinary skill in the art would be motivated to combine Dalton '923 with Andersen '455 for many reasons. For example, Dalton '923 describes, "optical power control in a passive optical network (PON) and, more specifically, to adjusting a burst-mode data transmission preamble in response to power measurement." *See, e.g.*, Dalton '923 at [0002]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Dalton '923 to implement the details of "determining a momentary parameter value of at least one scheduling control parameter (PS) of a set of different scheduling control parameters" taught by Andersen '455 because, it is also directed at helping manage upstream burst overhead parameters. Andersen '455 at [0001], [0064]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data transfer. Andersen '455 at [0005]. In addition, a person of ordinary skill in the art would be motivated to combine Dalton '923 with Andersen '455 because (a) Dalton '923 and Andersen '455 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Andersen '455's teachings with those of Dalton '923. For similar reasons, a person of ordinary skill in the art would be motivated to combine Dalton '923 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Dalton '923 with Krimmel '362 for many reasons. For example, Dalton '923 describes, "optical power control in a passive optical network (PON) and, more specifically, to adjusting a burst-mode data transmission preamble in response to power measurement." *See, e.g.*, Dalton '923 at [0002]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Dalton

’923 to implement the details of “operating a passive optical network that is capable to consider changes of the transmission quality of a link” taught by Krimmel ’362 because, it is also directed at helping manage upstream burst overhead parameters. Krimmel ’362 at [0007], [0035]-[0037]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing the transmission rate. Krimmel ’362 at [0044]. In addition, a person of ordinary skill in the art would be motivated to combine Dalton ’923 with Krimmel ’362 because (a) Dalton ’923 and Krimmel ’362 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Krimmel ’362’s teachings with those of Dalton ’923. For similar reasons, a person of ordinary skill in the art would be motivated to combine Dalton ’923 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Dalton ’923 with Weeber ’729 for many reasons. For example, Dalton ’923 describes, “optical power control in a passive optical network (PON) and, more specifically, to adjusting a burst-mode data transmission preamble in response to power measurement.” *See, e.g.*, Dalton ’923 at [0002]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Dalton ’923 to implement the details of a “bandwidth mapper 255 for managing transmissions in the upstream direction” taught by Weeber ’729 because, it is also directed at helping manage upstream burst overhead parameters. Weeber ’729 at [0056], [0068]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as enhancing upstream capacity. Weeber ’729 at [0056]. In addition, a person of ordinary skill in the art would be motivated to

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combine Dalton ’923 with Weeber ’729 because (a) Dalton ’923 and Weeber ’729 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Weeber ’729’s teachings with those of Dalton ’923. For similar reasons, a person of ordinary skill in the art would be motivated to combine Dalton ’923 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Dalton ’923 with the G-PON Standard for many reasons. For example, Dalton ’923 describes, “optical power control in a passive optical network (PON) and, more specifically, to adjusting a burst-mode data transmission preamble in response to power measurement.” *See, e.g.*, Dalton ’923 at [0002]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Dalton ’923 to implement the details of “gigabit-capable passive optical networks [GPON]” including where the “OLTs set the desired ONU FEC encoding status (on/off)” as taught by the G-PON Standard because, it is also directed at helping manage upstream burst overhead parameters. G-PON Standard, G.984.3 at i, 36-38, 92-93. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as improving data transfer. G-PON Standard, G.984.3 at 36-38, 92-93. In addition, a person of ordinary skill in the art would be motivated to combine Dalton ’923 with the G-PON Standard because (a) Dalton ’923 and the G-PON Standard disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the G-PON Standard’s teachings with those of Dalton ’923.

For similar reasons, a person of ordinary skill in the art would be motivated to combine Dalton '923 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Dalton '923 with Li '413 for many reasons. For example, Dalton '923 describes, "optical power control in a passive optical network (PON) and, more specifically, to adjusting a burst-mode data transmission preamble in response to power measurement." *See, e.g.*, Dalton '923 at [0002]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Dalton '923 to implement the details of "a performance monitoring mechanism configured to monitor performance of the PON based on received optical signals" that includes "BER-based performance monitoring" taught by Li '413 because, it is also directed at helping manage upstream burst overhead parameters. Li '413 at abstract, [0060]-[0064]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as better monitoring the link quality. Li '413 at [0038]. In addition, a person of ordinary skill in the art would be motivated to combine Dalton '923 with Li '413 because (a) Dalton '923 and Li '413 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Li '413's teachings with those of Dalton '923. For similar reasons, a person of ordinary skill in the art would be motivated to combine Dalton '923 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Dalton '923 with Khermosh '378 for many reasons. For example, Dalton '923 describes, "optical power control in

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a passive optical network (PON) and, more specifically, to adjusting a burst-mode data transmission preamble in response to power measurement." *See, e.g.*, Dalton '923 at [0002]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Dalton '923 to implement the details of "managing forward error correction" by "monitoring communications quality from the optical network unit… [or] from the optical line terminal" taught by Khermosh '378 because, it is also directed at helping manage upstream burst overhead parameters. Khermosh '378 at [0011]-[0012]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as reducing the error rate during data transfer. Khermosh '378 at [0006], [0008]-[0012]. In addition, a person of ordinary skill in the art would be motivated to combine Dalton '923 with Khermosh '378 because (a) Dalton '923 and Khermosh '378 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Khermosh '378's teachings with those of Dalton '923. For similar reasons, a person of ordinary skill in the art would be motivated to combine Dalton '923 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Dalton '923 with Kanno '158 for many reasons. For example, Dalton '923 describes, "optical power control in a passive optical network (PON) and, more specifically, to adjusting a burst-mode data transmission preamble in response to power measurement." *See, e.g.*, Dalton '923 at [0002]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Dalton '923 to implement the details of "counting, in each of the plurality of subscriber terminating units, an error count … and determining, in the office terminal unit, based on the received error count,

an error correction method or an error correction disuse which is used in each of the plurality of subscriber terminating units" taught by Kanno '158 because, it is also directed at helping manage upstream burst overhead parameters. Kanno '158 at [0015], [0060]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing the length of the overhead in a parity for the error correction in the up-link direction. Kanno '158 at [0060]. In addition, a person of ordinary skill in the art would be motivated to combine Dalton '923 with Kanno '158 because (a) Dalton '923 and Kanno '158 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kanno '158's teachings with those of Dalton '923. For similar reasons, a person of ordinary skill in the art would be motivated to combine Dalton '923 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Dalton '923 with Wijngaarden '380 for many reasons. For example, Dalton '923 describes, "optical power control in a passive optical network (PON) and, more specifically, to adjusting a burst-mode data transmission preamble in response to power measurement." *See, e.g.*, Dalton '923 at [0002]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Dalton '923 to implement the details of "a downstream transmission rate from an OLT to multiple ONTs can be optimized by matching a transmission scheme for frames addressed to a channel to the downstream transmission characteristics of the channel" taught by Wijngaarden '380 because, it is also directed at helping manage upstream burst overhead parameters. Wijngaarden '380 at [0035], Fig. 3. A person of ordinary skill in the art would be motivated by

the advantages of such functionality, such as minimizing error rates during data transfer while also minimizing overhead. Wijngaarden '380 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine Dalton '923 with Wijngaarden '380 because (a) Dalton '923 and Wijngaarden '380 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wijngaarden '380's teachings with those of Dalton '923. For similar reasons, a person of ordinary skill in the art would be motivated to combine Dalton '923 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Dalton '923 with Johnston '087 for many reasons. For example, Dalton '923 describes, "optical power control in a passive optical network (PON) and, more specifically, to adjusting a burst-mode data transmission preamble in response to power measurement." *See, e.g.*, Dalton '923 at [0002]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Dalton '923 to implement the details of "a superframe counter [that] provides error checking for potential dropped frames" taught by Johnston '087 because, it is also directed at helping manage upstream burst overhead parameters. Johnston '087 at 6:63-7:17, 7:18-29, Figs. 2-3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing upstream data transfer. Johnston '087 at 4:36-5:3. In addition, a person of ordinary skill in the art would be motivated to combine Dalton '923 with Johnston '087 because (a) Dalton '923 and Johnston '087 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping

manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Johnston ’087’s teachings with those of Dalton ’923. For similar reasons, a person of ordinary skill in the art would be motivated to combine Dalton ’923 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Dalton ’923 with Lee ’822 for many reasons. For example, Dalton ’923 describes, “optical power control in a passive optical network (PON) and, more specifically, to adjusting a burst-mode data transmission preamble in response to power measurement.” *See, e.g.*, Dalton ’923 at [0002]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Dalton ’923 to implement the details of “controlling effective FEC of an ONU and an OLT without changing an RTT based on optical link quality” taught by Lee ’822 because, it is also directed at helping manage upstream burst overhead parameters. Lee ’822 at abstract, [0029]-[0030], Fig. 4. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data throughout. Lee ’822 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine Dalton ’923 with Lee ’822 because (a) Dalton ’923 and Lee ’822 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Lee ’822’s teachings with those of Dalton ’923. For similar reasons, a person of ordinary skill in the art would be motivated to combine Dalton ’923 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Dalton ’923 with the XG-PON Standard for many reasons. For example, Dalton ’923 describes, “optical power control

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in a passive optical network (PON) and, more specifically, to adjusting a burst-mode data transmission preamble in response to power measurement." *See, e.g.*, Dalton '923 at [0002]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Dalton '923 to implement the details of "10-gigabit-capable passive optical networks" including where "[t]he OLT dynamically activates or deactivates the FEC functionality for a given ONU in the upstream direction by selecting the appropriate burst profile" as taught by the XG-PON Standard because, it is also directed at helping manage upstream burst overhead parameters. XG-PON Standard, G.987.3 at i, 33, G.987.2 at 22. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as dynamically adjusting the burst profile. XG-PON Standard, G.987.2 at 22. In addition, a person of ordinary skill in the art would be motivated to combine Dalton '923 with the XG-PON Standard because (a) Dalton '923 and the XG-PON Standard disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the XG-PON Standard's teachings with those of Dalton '923. For similar reasons, a person of ordinary skill in the art would be motivated to combine Dalton '923 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Dalton '923 with G.987.2 Rev 3 for many reasons. For example, Dalton '923 describes, "optical power control in a passive optical network (PON) and, more specifically, to adjusting a burst-mode data transmission preamble in response to power measurement." *See, e.g.*, Dalton '923 at [0002]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Dalton

’923 to implement the details of “a burst profile” based on “operationally dependent factors” as taught by G.987.2 Rev 3 because, it is also directed at helping manage upstream burst overhead parameters. G.987.2 Rev 3 at 43-44. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as adjusting the burst overhead based on operationally dependent factors. G.987.2 Rev 3 at 43-44. In addition, a person of ordinary skill in the art would be motivated to combine Dalton ’923 with G.987.2 Rev 3 because (a) Dalton ’923 and G.987.2 Rev 3 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.2 Rev 3’s teachings with those of Dalton ’923. For similar reasons, a person of ordinary skill in the art would be motivated to combine Dalton ’923 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Dalton ’923 with G.987.3 Draft for many reasons. For example, Dalton ’923 describes, “optical power control in a passive optical network (PON) and, more specifically, to adjusting a burst-mode data transmission preamble in response to power measurement.” *See, e.g.*, Dalton ’923 at [0002]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Dalton ’923 to implement the details of “the draft ITU_T Recommendation G.987.3 that describes the Transmission Convergence layer for 10-Gigabit-capable Optical Network systems” as taught by G.987.3 Draft because, it is also directed at helping efficiently manage upstream burst overhead parameters. G.987.3 Draft at 1, 135. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as adjusting the burst overhead based on link quality. G.987.3 Draft at 49. In addition, a person of ordinary skill in the art would be motivated to combine

Dalton ’923 with G.987.3 Draft because (a) Dalton ’923 and G.987.3 Draft disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3 Draft’s teachings with those of Dalton ’923. For similar reasons, a person of ordinary skill in the art would be motivated to combine Dalton ’923 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

(5) Exemplary Weeber ’729 Solutions

A person of ordinary skill in the art would be motivated to combine Weeber ’729 with Wijngaarden ’381 for many reasons. For example, Weeber ’729 describes, “bandwidth mapper 255 for managing transmissions in the upstream direction.” *See, e.g.*, Weeber ’729 at [0056], [0068]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Weeber ’729 to implement the details of “[i]n a passive optical network, an upstream transmission rate from an ONT to an OLT can be optimized by matching a transmission scheme for a channel to the upstream transmission characteristics of the channel” including monitoring the BER and adjusting FEC accordingly taught by Wijngaarden ’381 because, it is also directed at helping manage upstream burst overhead parameters. Wijngaarden ’381 at abstract, [0022]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data transfer with minimal overhead. Wijngaarden ’381 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine Weeber ’729 with Wijngaarden ’381 because (a) Weeber ’729 and Wijngaarden ’381 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in

incorporating Wijngaarden ’381’s teachings with those of Weeber ’729. For similar reasons, a person of ordinary skill in the art would be motivated to combine Weeber ’729 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Weeber ’729 with Andersen ’455 for many reasons. For example, Weeber ’729 describes, “bandwidth mapper 255 for managing transmissions in the upstream direction.” *See, e.g.*, Weeber ’729 at [0056], [0068]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Weeber ’729 to implement the details of “determining a momentary parameter value of at least one scheduling control parameter (PS) of a set of different scheduling control parameters” taught by Andersen ’455 because, it is also directed at helping manage upstream burst overhead parameters. Andersen ’455 at [0001], [0064]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data transfer. Andersen ’455 at [0005]. In addition, a person of ordinary skill in the art would be motivated to combine Weeber ’729 with Andersen ’455 because (a) Weeber ’729 and Andersen ’455 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Andersen ’455’s teachings with those of Weeber ’729. For similar reasons, a person of ordinary skill in the art would be motivated to combine Weeber ’729 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Weeber ’729 with Krimmel ’362 for many reasons. For example, Weeber ’729 describes, “bandwidth mapper 255 for managing transmissions in the upstream direction.” *See, e.g.*, Weeber ’729 at [0056], [0068].

A person having ordinary skill in the art would have been motivated to modify the method and/or device of Weeber ’729 to implement the details of “operating a passive optical network that is capable to consider changes of the transmission quality of a link” taught by Krimmel ’362 because, it is also directed at helping manage upstream burst overhead parameters. Krimmel ’362 at [0007], [0035]-[0037]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing the transmission rate. Krimmel ’362 at [0044]. In addition, a person of ordinary skill in the art would be motivated to combine Weeber ’729 with Krimmel ’362 because (a) Weeber ’729 and Krimmel ’362 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Krimmel ’362’s teachings with those of Weeber ’729. For similar reasons, a person of ordinary skill in the art would be motivated to combine Weeber ’729 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Weeber ’729 and Dalton ’923 for many reasons. For example, Weeber ’729 describes, “bandwidth mapper 255 for managing transmissions in the upstream direction.” *See, e.g.*, Weeber ’729 at [0056], [0068]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Weeber ’729 to implement the details of a “optical power control in a passive optical network (PON) and, more specifically, to adjusting a burst-mode data transmission preamble in response to power measurement” taught by Dalton ’923 because, it is also directed at helping manage upstream burst overhead parameters. Dalton ’923 at [0002]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as maximizing the

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available bandwidth. Dalton ’923 at [0011], [0024]. In addition, a person of ordinary skill in the art would be motivated to combine Weeber ’729 with Dalton ’923 because (a) Weeber ’729 and Dalton ’923 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Dalton ’923’s teachings with those of Weeber ’729. For similar reasons, a person of ordinary skill in the art would be motivated to combine Weeber ’729 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Weeber ’729 with the G-PON Standard for many reasons. For example, Weeber ’729 describes, “bandwidth mapper 255 for managing transmissions in the upstream direction.” *See, e.g.*, Weeber ’729 at [0056], [0068]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Weeber ’729 to implement the details of “gigabit-capable passive optical networks [GPON]” including where the “OLTs set the desired ONU FEC encoding status (on/off)” as taught by the G-PON Standard because, it is also directed at helping manage upstream burst overhead parameters. G-PON Standard, G.984.3 at i, 36-38, 92-93. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as improving data transfer. G-PON Standard, G.984.3 at 36-38, 92-93. In addition, a person of ordinary skill in the art would be motivated to combine Weeber ’729 with the G-PON Standard because (a) Weeber ’729 and the G-PON Standard disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the G-PON Standard’s teachings with those of Weeber

’729. For similar reasons, a person of ordinary skill in the art would be motivated to combine Weeber ’729 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Weeber ’729 with Li ’413 for many reasons. For example, Weeber ’729 describes, “bandwidth mapper 255 for managing transmissions in the upstream direction.” *See, e.g.*, Weeber ’729 at [0056], [0068]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Weeber ’729 to implement the details of “a performance monitoring mechanism configured to monitor performance of the PON based on received optical signals” that includes “BER-based performance monitoring” taught by Li ’413 because, it is also directed at helping manage upstream burst overhead parameters. Li ’413 at abstract, [0060]-[0064]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as better monitoring the link quality. Li ’413 at [0038]. In addition, a person of ordinary skill in the art would be motivated to combine Weeber ’729 with Li ’413 because (a) Weeber ’729 and Li ’413 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Li ’413’s teachings with those of Weeber ’729. For similar reasons, a person of ordinary skill in the art would be motivated to combine Weeber ’729 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Weeber ’729 with Khermosh ’378 for many reasons. For example, Weeber ’729 describes, “bandwidth mapper 255 for managing transmissions in the upstream direction.” *See, e.g.*, Weeber ’729 at [0056], [0068].

A person having ordinary skill in the art would have been motivated to modify the method and/or device of Weeber ’729 to implement the details of “managing forward error correction” by “monitoring communications quality from the optical network unit… [or] from the optical line terminal” taught by Khermosh ’378 because, it is also directed at helping manage upstream burst overhead parameters. Khermosh ’378 at [0011]-[0012]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as reducing the error rate during data transfer. Khermosh ’378 at [0006], [0008]-[0012]. In addition, a person of ordinary skill in the art would be motivated to combine Weeber ’729 with Khermosh ’378 because (a) Weeber ’729 and Khermosh ’378 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Khermosh ’378’s teachings with those of Weeber ’729. For similar reasons, a person of ordinary skill in the art would be motivated to combine Weeber ’729 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Weeber ’729 with Kanno ’158 for many reasons. For example, Weeber ’729 describes, “bandwidth mapper 255 for managing transmissions in the upstream direction.” *See, e.g.*, Weeber ’729 at [0056], [0068]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Weeber ’729 to implement the details of “counting, in each of the plurality of subscriber terminating units, an error count … and determining, in the office terminal unit, based on the received error count, an error correction method or an error correction disuse which is used in each of the plurality of subscriber terminating units” taught by Kanno ’158 because, it is also directed

at helping manage upstream burst overhead parameters. Kanno ’158 at [0015], [0060]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing the length of the overhead in a parity for the error correction in the up-link direction. Kanno ’158 at [0060]. In addition, a person of ordinary skill in the art would be motivated to combine Weeber ’729 with Kanno ’158 because (a) Weeber ’729 and Kanno ’158 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kanno ’158’s teachings with those of Weeber ’729. For similar reasons, a person of ordinary skill in the art would be motivated to combine Weeber ’729 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Weeber ’729 with Wijngaarden ’380 for many reasons. For example, Weeber ’729 describes, “bandwidth mapper 255 for managing transmissions in the upstream direction.” *See, e.g.*, Weeber ’729 at [0056], [0068]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Weeber ’729 to implement the details of “a downstream transmission rate from an OLT to multiple ONTs can be optimized by matching a transmission scheme for frames addressed to a channel to the downstream transmission characteristics of the channel” taught by Wijngaarden ’380 because, it is also directed at helping manage upstream burst overhead parameters. Wijngaarden ’380 at [0035], Fig. 3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as minimizing error rates during data transfer while also minimizing overhead. Wijngaarden ’380 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine Weeber ’729 with Wijngaarden ’380

because (a) Weeber ’729 and Wijngaarden ’380 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wijngaarden ’380’s teachings with those of Weeber ’729. For similar reasons, a person of ordinary skill in the art would be motivated to combine Weeber ’729 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Weeber ’729 with Johnston ’087 for many reasons. For example, Weeber ’729 describes, “bandwidth mapper 255 for managing transmissions in the upstream direction.” *See, e.g.*, Weeber ’729 at [0056], [0068]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Weeber ’729 to implement the details of “a superframe counter [that] provides error checking for potential dropped frames” taught by Johnston ’087 because, it is also directed at helping manage upstream burst overhead parameters. Johnston ’087 at 6:63-7:17, 7:18-29, Figs. 2-3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing upstream data transfer. Johnston ’087 at 4:36-5:3. In addition, a person of ordinary skill in the art would be motivated to combine Weeber ’729 with Johnston ’087 because (a) Weeber ’729 and Johnston ’087 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Johnston ’087’s teachings with those of Weeber ’729. For similar reasons, a person of ordinary skill in the art would be motivated to

combine Weeber ’729 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Weeber ’729 with Lee ’822 for many reasons. For example, Weeber ’729 describes, “bandwidth mapper 255 for managing transmissions in the upstream direction.” *See, e.g.*, Weeber ’729 at [0056], [0068]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Weeber ’729 to implement the details of “controlling effective FEC of an ONU and an OLT without changing an RTT based on optical link quality” taught by Lee ’822 because, it is also directed at helping manage upstream burst overhead parameters. Lee ’822 at abstract, [0029]-[0030], Fig. 4. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data throughout. Lee ’822 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine Weeber ’729 with Lee ’822 because (a) Weeber ’729 and Lee ’822 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Lee ’822’s teachings with those of Weeber ’729. For similar reasons, a person of ordinary skill in the art would be motivated to combine Weeber ’729 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Weeber ’729 with the XG-PON Standard for many reasons. For example, Weeber ’729 describes, “bandwidth mapper 255 for managing transmissions in the upstream direction.” *See, e.g.*, Weeber ’729 at [0056], [0068]. A person having ordinary skill in the art would have been motivated to modify the method

and/or device of Weeber ’729 to implement the details of “10-gigabit-capable passive optical networks” including where “[t]he OLT dynamically activates or deactivates the FEC functionality for a given ONU in the upstream direction by selecting the appropriate burst profile” as taught by the XG-PON Standard because, it is also directed at helping manage upstream burst overhead parameters. XG-PON Standard, G.987.3 at i, 33, G.987.2 at 22. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as dynamically adjusting the burst profile. XG-PON Standard, G.987.2 at 22. In addition, a person of ordinary skill in the art would be motivated to combine Weeber ’729 with the XG-PON Standard because (a) Weeber ’729 and the XG-PON Standard disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the XG-PON Standard’s teachings with those of Weeber ’729. For similar reasons, a person of ordinary skill in the art would be motivated to combine Weeber ’729 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Weeber ’729 with G.987.2 Rev 3 for many reasons. For example, Weeber ’729 describes, “bandwidth mapper 255 for managing transmissions in the upstream direction.” *See, e.g.*, Weeber ’729 at [0056], [0068]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Weeber ’729 to implement the details of “a burst profile” based on “operationally dependent factors” as taught by G.987.2 Rev 3 because, it is also directed at helping manage upstream burst overhead parameters. G.987.2 Rev 3 at 43-44. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as adjusting the burst overhead

based on operationally dependent factors. G.987.2 Rev 3 at 43-44. In addition, a person of ordinary skill in the art would be motivated to combine Weeber '729 with G.987.2 Rev 3 because (a) Weeber '729 and G.987.2 Rev 3 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.2 Rev 3's teachings with those of Weeber '729. For similar reasons, a person of ordinary skill in the art would be motivated to combine Weeber '729 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Weeber '729 with G.987.3 Draft for many reasons. For example, Weeber '729 describes, "bandwidth mapper 255 for managing transmissions in the upstream direction." *See, e.g.*, Weeber '729 at [0056], [0068]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Weeber '729 to implement the details of "the draft ITU_T Recommendation G.987.3 that describes the Transmission Convergence layer for 10-Gigabit-capable Optical Network systems" as taught by G.987.3 Draft because, it is also directed at helping efficiently manage upstream burst overhead parameters. G.987.3 Draft at 1, 135. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as adjusting the burst overhead based on link quality. G.987.3 Draft at 49. In addition, a person of ordinary skill in the art would be motivated to combine Weeber '729 with G.987.3 Draft because (a) Weeber '729 and G.987.3 Draft disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable

expectation of success in incorporating G.987.3 Draft's teachings with those of Weeber '729. For similar reasons, a person of ordinary skill in the art would be motivated to combine Weeber '729 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

(6) Exemplary G-PON Standard Solutions

A person of ordinary skill in the art would be motivated to combine the G-PON Standard with Wijngaarden '381 for many reasons. For example, the G-PON Standard describes, "gigabit-capable passive optical networks [GPON]" including where the "OLTs set the desired ONU FEC encoding status (on/off)." *See, e.g.*, G-PON Standard, G.984.3 at i, 36-38, 92-93. A person having ordinary skill in the art would have been motivated to modify the method and/or device of the G-PON Standard to implement the details of "[i]n a passive optical network, an upstream transmission rate from an ONT to an OLT can be optimized by matching a transmission scheme for a channel to the upstream transmission characteristics of the channel" including monitoring the BER and adjusting FEC accordingly taught by Wijngaarden '381 because, it is also directed at helping manage upstream burst overhead parameters. Wijngaarden '381 at abstract, [0022]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data transfer with minimal overhead. Wijngaarden '381 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine the G-PON Standard with Wijngaarden '381 because (a) the G-PON Standard and Wijngaarden '381 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wijngaarden '381's teachings with those of the G-PON Standard. For similar reasons, a person of ordinary skill in the art would be motivated to combine the G-PON Standard with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine the G-PON Standard with Andersen '455 for many reasons. For example, the G-PON Standard describes, "gigabit-capable passive optical networks [GPON]" including where the "OLTs set the desired ONU FEC encoding status (on/off)." *See, e.g.*, G-PON Standard, G.984.3 at i, 36-38, 92-93. A person having ordinary skill in the art would have been motivated to modify the method and/or device of the G-PON Standard to implement the details of "determining a momentary parameter value of at least one scheduling control parameter (PS) of a set of different scheduling control parameters" taught by Andersen '455 because, it is also directed at helping manage upstream burst overhead parameters. Andersen '455 at [0001], [0064]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data transfer. Andersen '455 at [0005]. In addition, a person of ordinary skill in the art would be motivated to combine the G-PON Standard with Andersen '455 because (a) the G-PON Standard and Andersen '455 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Andersen '455's teachings with those of the G-PON Standard. For similar reasons, a person of ordinary skill in the art would be motivated to combine the G-PON Standard with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine the G-PON Standard with Krimmel '362 for many reasons. For example, the G-PON Standard describes, "gigabit-capable passive optical networks [GPON]" including where the "OLTs set the desired ONU FEC encoding status (on/off)." *See, e.g.*, G-PON Standard, G.984.3 at i, 36-38, 92-93. A person having ordinary skill in the art would have been motivated to modify the method and/or device of the G-

PON Standard to implement the details of "operating a passive optical network that is capable to consider changes of the transmission quality of a link" taught by Krimmel '362 because, it is also directed at helping manage upstream burst overhead parameters. Krimmel '362 at [0007], [0035]-[0037]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing the transmission rate. Krimmel '362 at [0044]. In addition, a person of ordinary skill in the art would be motivated to combine the G-PON Standard with Krimmel '362 because (a) the G-PON Standard and Krimmel '362 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Krimmel '362's teachings with those of the G-PON Standard. For similar reasons, a person of ordinary skill in the art would be motivated to combine the G-PON Standard with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine the G-PON Standard and Dalton '923 for many reasons. For example, the G-PON Standard describes, "gigabit-capable passive optical networks [GPON]" including where the "OLTs set the desired ONU FEC encoding status (on/off)." *See, e.g.*, G-PON Standard, G.984.3 at i, 36-38, 92-93. A person having ordinary skill in the art would have been motivated to modify the method and/or device of the G-PON Standard to implement the details of a "optical power control in a passive optical network (PON) and, more specifically, to adjusting a burst-mode data transmission preamble in response to power measurement" taught by Dalton '923 because, it is also directed at helping manage upstream burst overhead parameters. Dalton '923 at [0002]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as maximizing the available bandwidth.

Dalton ’923 at [0011], [0024]. In addition, a person of ordinary skill in the art would be motivated to combine the G-PON Standard with Dalton ’923 because (a) the G-PON Standard and Dalton ’923 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Dalton ’923’s teachings with those of the G-PON Standard. For similar reasons, a person of ordinary skill in the art would be motivated to combine the G-PON Standard with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine the G-PON Standard with Weeber ’729 for many reasons. For example, the G-PON Standard describes, “gigabit-capable passive optical networks [GPON]” including where the “OLTs set the desired ONU FEC encoding status (on/off).” *See, e.g.*, G-PON Standard, G.984.3 at i, 36-38, 92-93. A person having ordinary skill in the art would have been motivated to modify the method and/or device of the G-PON Standard to implement the details of “bandwidth mapper 255 for managing transmissions in the upstream direction” taught by Weeber ’729 because, it is also directed at helping manage upstream burst overhead parameters. Weeber ’729 at [0056], [0068]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as enhancing upstream capacity. Weeber ’729 at [0056]. In addition, a person of ordinary skill in the art would be motivated to combine the G-PON Standard with Weeber ’729 because (a) the G-PON Standard and Weeber ’729 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable

expectation of success in incorporating Weeber '729's teachings with those of the G-PON Standard. For similar reasons, a person of ordinary skill in the art would be motivated to combine the G-PON Standard with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine the G-PON Standard with Li '413 for many reasons. For example, the G-PON Standard describes, "gigabit-capable passive optical networks [GPON]" including where the "OLTs set the desired ONU FEC encoding status (on/off)." *See, e.g.*, G-PON Standard, G.984.3 at i, 36-38, 92-93. A person having ordinary skill in the art would have been motivated to modify the method and/or device of the G-PON Standard to implement the details of "a performance monitoring mechanism configured to monitor performance of the PON based on received optical signals" that includes "BER-based performance monitoring" taught by Li '413 because, it is also directed at helping manage upstream burst overhead parameters. Li '413 at abstract, [0060]-[0064]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as better monitoring the link quality. Li '413 at [0038]. In addition, a person of ordinary skill in the art would be motivated to combine the G-PON Standard with Li '413 because (a) the G-PON Standard and Li '413 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Li '413's teachings with those of the G-PON Standard. For similar reasons, a person of ordinary skill in the art would be motivated to combine the G-PON Standard with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine the G-PON Standard with Khermosh '378 for many reasons. For example, the G-PON Standard describes, "gigabit-capable passive optical networks [GPON]" including where the "OLTs set the desired ONU FEC encoding status (on/off)." *See, e.g.*, G-PON Standard, G.984.3 at i, 36-38, 92-93. A person having ordinary skill in the art would have been motivated to modify the method and/or device of the G-PON Standard to implement the details of "managing forward error correction" by "monitoring communications quality from the optical network unit… [or] from the optical line terminal" taught by Khermosh '378 because, it is also directed at helping manage upstream burst overhead parameters. Khermosh '378 at [0011]-[0012]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as reducing the error rate during data transfer. Khermosh '378 at [0006], [0008]-[0012]. In addition, a person of ordinary skill in the art would be motivated to combine the G-PON Standard with Khermosh '378 because (a) the G-PON Standard and Khermosh '378 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Khermosh '378's teachings with those of the G-PON Standard. For similar reasons, a person of ordinary skill in the art would be motivated to combine the G-PON Standard with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine the G-PON Standard with Kanno '158 for many reasons. For example, the G-PON Standard describes, "gigabit-capable passive optical networks [GPON]" including where the "OLTs set the desired ONU FEC encoding status (on/off)." *See, e.g.*, G-PON Standard, G.984.3 at i, 36-38, 92-93. A person having ordinary

skill in the art would have been motivated to modify the method and/or device of the G-PON Standard to implement the details of "counting, in each of the plurality of subscriber terminating units, an error count … and determining, in the office terminal unit, based on the received error count, an error correction method or an error correction disuse which is used in each of the plurality of subscriber terminating units" taught by Kanno '158 because, it is also directed at helping manage upstream burst overhead parameters. Kanno '158 at [0015], [0060]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing the length of the overhead in a parity for the error correction in the up-link direction. Kanno '158 at [0060]. In addition, a person of ordinary skill in the art would be motivated to combine the G-PON Standard with Kanno '158 because (a) the G-PON Standard and Kanno '158 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kanno '158's teachings with those of the G-PON Standard. For similar reasons, a person of ordinary skill in the art would be motivated to combine the G-PON Standard with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine the G-PON Standard with Wijngaarden '380 for many reasons. For example, the G-PON Standard describes, "gigabit-capable passive optical networks [GPON]" including where the "OLTs set the desired ONU FEC encoding status (on/off)." *See, e.g.*, G-PON Standard, G.984.3 at i, 36-38, 92-93. A person having ordinary skill in the art would have been motivated to modify the method and/or device of the G-PON Standard to implement the details of "a downstream transmission rate from an OLT to multiple ONTs can be optimized by matching a transmission scheme for frames addressed to a

channel to the downstream transmission characteristics of the channel" taught by Wijngaarden '380 because, it is also directed at helping manage upstream burst overhead parameters. Wijngaarden '380 at [0035], Fig. 3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as minimizing error rates during data transfer while also minimizing overhead. Wijngaarden '380 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine the G-PON Standard with Wijngaarden '380 because (a) the G-PON Standard and Wijngaarden '380 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wijngaarden '380's teachings with those of the G-PON Standard. For similar reasons, a person of ordinary skill in the art would be motivated to combine the G-PON Standard with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine the G-PON Standard with Johnston '087 for many reasons. For example, the G-PON Standard describes, "gigabit-capable passive optical networks [GPON]" including where the "OLTs set the desired ONU FEC encoding status (on/off)." *See, e.g.*, G-PON Standard, G.984.3 at i, 36-38, 92-93. A person having ordinary skill in the art would have been motivated to modify the method and/or device of the G-PON Standard to implement the details of "a superframe counter [that] provides error checking for potential dropped frames" taught by Johnston '087 because, it is also directed at helping manage upstream burst overhead parameters. Johnston '087 at 6:63-7:17, 7:18-29, Figs. 2-3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing upstream data transfer. Johnston '087 at 4:36-5:3. In addition, a person of ordinary skill

in the art would be motivated to combine the G-PON Standard with Johnston ’087 because (a) the G-PON Standard and Johnston ’087 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Johnston ’087’s teachings with those of the G-PON Standard. For similar reasons, a person of ordinary skill in the art would be motivated to combine the G-PON Standard with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine the G-PON Standard with Lee ’822 for many reasons. For example, the G-PON Standard describes, “gigabit-capable passive optical networks [GPON]” including where the “OLTs set the desired ONU FEC encoding status (on/off).” *See, e.g.*, G-PON Standard, G.984.3 at i, 36-38, 92-93. A person having ordinary skill in the art would have been motivated to modify the method and/or device of the G-PON Standard to implement the details of “controlling effective FEC of an ONU and an OLT without changing an RTT based on optical link quality” taught by Lee ’822 because, it is also directed at helping manage upstream burst overhead parameters. Lee ’822 at abstract, [0029]-[0030], Fig. 4. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data throughout. Lee ’822 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine the G-PON Standard with Lee ’822 because (a) the G-PON Standard and Lee ’822 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Lee ’822’s teachings with those of the G-PON

Standard. For similar reasons, a person of ordinary skill in the art would be motivated to combine the G-PON Standard with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine the G-PON Standard with the XG-PON Standard for many reasons. For example, the G-PON Standard describes, "gigabit-capable passive optical networks [GPON]" including where the "OLTs set the desired ONU FEC encoding status (on/off)." *See, e.g.*, G-PON Standard, G.984.3 at i, 36-38, 92-93. A person having ordinary skill in the art would have been motivated to modify the method and/or device of the G-PON Standard to implement the details of "10-gigabit-capable passive optical networks" including where "[t]he OLT dynamically activates or deactivates the FEC functionality for a given ONU in the upstream direction by selecting the appropriate burst profile" as taught by the XG-PON Standard because, it is also directed at helping manage upstream burst overhead parameters. XG-PON Standard, G.987.3 at i, 33, G.987.2 at 22. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as dynamically adjusting the burst profile. XG-PON Standard, G.987.2 at 22. In addition, a person of ordinary skill in the art would be motivated to combine the G-PON Standard with the XG-PON Standard because (a) the G-PON Standard and the XG-PON Standard disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the XG-PON Standard's teachings with those of the G-PON Standard. For similar reasons, a person of ordinary skill in the art would be motivated to combine the G-PON Standard with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine the G-PON Standard with G.987.2 Rev 3 for many reasons. For example, the G-PON Standard describes, "gigabit-capable passive optical networks [GPON]" including where the "OLTs set the desired ONU FEC encoding status (on/off)." *See, e.g.*, G-PON Standard, G.984.3 at i, 36-38, 92-93. A person having ordinary skill in the art would have been motivated to modify the method and/or device of the G-PON Standard to implement the details of "a burst profile" based on "operationally dependent factors" as taught by G.987.2 Rev 3 because, it is also directed at helping manage upstream burst overhead parameters. G.987.2 Rev 3 at 43-44. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as adjusting the burst overhead based on operationally dependent factors. G.987.2 Rev 3 at 43-44. In addition, a person of ordinary skill in the art would be motivated to combine the G-PON Standard with G.987.2 Rev 3 because (a) the G-PON Standard and G.987.2 Rev 3 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.2 Rev 3's teachings with those of the G-PON Standard. For similar reasons, a person of ordinary skill in the art would be motivated to combine the G-PON Standard with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine the G-PON Standard with G.987.3 Draft for many reasons. For example, the G-PON Standard describes, "gigabit-capable passive optical networks [GPON]" including where the "OLTs set the desired ONU FEC encoding status (on/off)." *See, e.g.*, G-PON Standard, G.984.3 at i, 36-38, 92-93. A person having ordinary skill in the art would have been motivated to modify the method and/or device of the G-

PON Standard to implement the details of "the draft ITU_T Recommendation G.987.3 that describes the Transmission Convergence layer for 10-Gigabit-capable Optical Network systems" as taught by G.987.3 Draft because, it is also directed at helping efficiently manage upstream burst overhead parameters. G.987.3 Draft at 1, 135. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as adjusting the burst overhead based on link quality. G.987.3 Draft at 49. In addition, a person of ordinary skill in the art would be motivated to combine the G-PON Standard with G.987.3 Draft because (a) the G-PON Standard and G.987.3 Draft disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3 Draft's teachings with those of the G-PON Standard. For similar reasons, a person of ordinary skill in the art would be motivated to combine the G-PON Standard with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

(7) Exemplary Li '413 Solutions

A person of ordinary skill in the art would be motivated to combine Li '413 with Wijngaarden '381 for many reasons. For example, Li '413 describes, "a performance monitoring mechanism configured to monitor performance of the PON based on received optical signals" that includes "BER-based performance monitoring." *See, e.g.*, Li '413 at abstract, [0060]-[0064]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Li '413 to implement the details of "[i]n a passive optical network, an upstream transmission rate from an ONT to an OLT can be optimized by matching a transmission scheme for a channel to the upstream transmission characteristics of the channel" including monitoring the BER and adjusting FEC accordingly taught by Wijngaarden '381 because, it is also directed at

helping manage upstream burst overhead parameters. Wijngaarden ’381 at abstract, [0022]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data transfer with minimal overhead. Wijngaarden ’381 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine Li ’413 with Wijngaarden ’381 because (a) Li ’413 and Wijngaarden ’381 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wijngaarden ’381’s teachings with those of Li ’413. For similar reasons, a person of ordinary skill in the art would be motivated to combine Li ’413 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Li ’413 with Andersen ’455 for many reasons. For example, Li ’413 describes, “a performance monitoring mechanism configured to monitor performance of the PON based on received optical signals” that includes “BER-based performance monitoring.” *See, e.g.*, Li ’413 at abstract, [0060]-[0064]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Li ’413 to implement the details of “determining a momentary parameter value of at least one scheduling control parameter (PS) of a set of different scheduling control parameters” taught by Andersen ’455 because, it is also directed at helping manage upstream burst overhead parameters. Andersen ’455 at [0001], [0064]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data transfer. Andersen ’455 at [0005]. In addition, a person of ordinary skill in the art would be motivated to combine Li ’413 with Andersen ’455 because (a) Li ’413 and Andersen ’455 disclose similar products, methods, and solutions; and

(b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Andersen '455's teachings with those of Li '413. For similar reasons, a person of ordinary skill in the art would be motivated to combine Li '413 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Li '413 with Krimmel '362 for many reasons. For example, Li '413 describes, "a performance monitoring mechanism configured to monitor performance of the PON based on received optical signals" that includes "BER-based performance monitoring." *See, e.g.*, Li '413 at abstract, [0060]-[0064]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Li '413 to implement the details of "operating a passive optical network that is capable to consider changes of the transmission quality of a link" taught by Krimmel '362 because, it is also directed at helping manage upstream burst overhead parameters. Krimmel '362 at [0007], [0035]-[0037]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing the transmission rate. Krimmel '362 at [0044]. In addition, a person of ordinary skill in the art would be motivated to combine Li '413 with Krimmel '362 because (a) Li '413 and Krimmel '362 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Krimmel '362's teachings with those of Li '413. For similar reasons, a person of ordinary skill in the art would be motivated to combine Li '413 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

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A person of ordinary skill in the art would be motivated to combine Li '413 and Dalton '923 for many reasons. For example, Li '413 describes, "a performance monitoring mechanism configured to monitor performance of the PON based on received optical signals" that includes "BER-based performance monitoring." *See, e.g.*, Li '413 at abstract, [0060]-[0064]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Li '413 to implement the details of a "optical power control in a passive optical network (PON) and, more specifically, to adjusting a burst-mode data transmission preamble in response to power measurement" taught by Dalton '923 because, it is also directed at helping manage upstream burst overhead parameters. Dalton '923 at [0002]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as maximizing the available bandwidth. Dalton '923 at [0011], [0024]. In addition, a person of ordinary skill in the art would be motivated to combine Li '413 with Dalton '923 because (a) Li '413 and Dalton '923 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Dalton '923's teachings with those of Li '413. For similar reasons, a person of ordinary skill in the art would be motivated to combine Li '413 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Li '413 with Weeber '729 for many reasons. For example, Li '413 describes, "a performance monitoring mechanism configured to monitor performance of the PON based on received optical signals" that includes "BER-based performance monitoring." *See, e.g.*, Li '413 at abstract, [0060]-[0064]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of

Li ’413 to implement the details of “bandwidth mapper 255 for managing transmissions in the upstream direction” taught by Weeber ’729 because, it is also directed at helping manage upstream burst overhead parameters. Weeber ’729 at [0056], [0068]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as enhancing upstream capacity. Weeber ’729 at [0056]. In addition, a person of ordinary skill in the art would be motivated to combine Li ’413 with Weeber ’729 because (a) Li ’413 and Weeber ’729 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Weeber ’729’s teachings with those of Li ’413. For similar reasons, a person of ordinary skill in the art would be motivated to combine Li ’413 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Li ’413 with the G-PON Standard for many reasons. For example, Li ’413 describes, “a performance monitoring mechanism configured to monitor performance of the PON based on received optical signals” that includes “BER-based performance monitoring.” *See, e.g.*, Li ’413 at abstract, [0060]-[0064]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Li ’413 to implement the details of “gigabit-capable passive optical networks [GPON]” including where the “OLTs set the desired ONU FEC encoding status (on/off)” as taught by the G-PON Standard because, it is also directed at helping manage upstream burst overhead parameters. G-PON Standard, G.984.3 at i, 36-38, 92-93. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as improving data transfer. G-PON Standard, G.984.3 at 36-38, 92-93. In addition, a person of ordinary skill in the art would be

motivated to combine Li '413 with the G-PON Standard because (a) Li '413 and the G-PON Standard disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the G-PON Standard's teachings with those of Li '413. For similar reasons, a person of ordinary skill in the art would be motivated to combine Li '413 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Li '413 with Khermosh '378 for many reasons. For example, Li '413 describes, "a performance monitoring mechanism configured to monitor performance of the PON based on received optical signals" that includes "BER-based performance monitoring." *See, e.g.*, Li '413 at abstract, [0060]-[0064]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Li '413 to implement the details of "managing forward error correction" by "monitoring communications quality from the optical network unit… [or] from the optical line terminal" taught by Khermosh '378 because, it is also directed at helping manage upstream burst overhead parameters. Khermosh '378 at [0011]-[0012]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as reducing the error rate during data transfer. Khermosh '378 at [0006], [0008]-[0012]. In addition, a person of ordinary skill in the art would be motivated to combine Li '413 with Khermosh '378 because (a) Li '413 and Khermosh '378 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Khermosh '378's teachings with those of Li '413. For

similar reasons, a person of ordinary skill in the art would be motivated to combine Li '413 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Li '413 with Kanno '158 for many reasons. For example, Li '413 describes, "a performance monitoring mechanism configured to monitor performance of the PON based on received optical signals" that includes "BER-based performance monitoring." *See, e.g.*, Li '413 at abstract, [0060]-[0064]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Li '413 to implement the details of "counting, in each of the plurality of subscriber terminating units, an error count … and determining, in the office terminal unit, based on the received error count, an error correction method or an error correction disuse which is used in each of the plurality of subscriber terminating units" taught by Kanno '158 because, it is also directed at helping manage upstream burst overhead parameters. Kanno '158 at [0015], [0060]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing the length of the overhead in a parity for the error correction in the up-link direction. Kanno '158 at [0060]. In addition, a person of ordinary skill in the art would be motivated to combine Li '413 with Kanno '158 because (a) Li '413 and Kanno '158 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kanno '158's teachings with those of Li '413. For similar reasons, a person of ordinary skill in the art would be motivated to combine Li '413 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

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A person of ordinary skill in the art would be motivated to combine Li '413 with Wijngaarden '380 for many reasons. For example, Li '413 describes, "a performance monitoring mechanism configured to monitor performance of the PON based on received optical signals" that includes "BER-based performance monitoring." *See, e.g.*, Li '413 at abstract, [0060]-[0064]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Li '413 to implement the details of "a downstream transmission rate from an OLT to multiple ONTs can be optimized by matching a transmission scheme for frames addressed to a channel to the downstream transmission characteristics of the channel" taught by Wijngaarden '380 because, it is also directed at helping manage upstream burst overhead parameters. Wijngaarden '380 at [0035], Fig. 3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as minimizing error rates during data transfer while also minimizing overhead. Wijngaarden '380 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine Li '413 with Wijngaarden '380 because (a) Li '413 and Wijngaarden '380 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wijngaarden '380's teachings with those of Li '413. For similar reasons, a person of ordinary skill in the art would be motivated to combine Li '413 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Li '413 with Johnston '087 for many reasons. For example, Li '413 describes, "a performance monitoring mechanism configured to monitor performance of the PON based on received optical signals" that includes "BER-based performance monitoring." *See, e.g.*, Li '413 at abstract, [0060]-[0064]. A person

having ordinary skill in the art would have been motivated to modify the method and/or device of Li '413 to implement the details of "a superframe counter [that] provides error checking for potential dropped frames" taught by Johnston '087 because, it is also directed at helping manage upstream burst overhead parameters. Johnston '087 at 6:63-7:17, 7:18-29, Figs. 2-3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing upstream data transfer. Johnston '087 at 4:36-5:3. In addition, a person of ordinary skill in the art would be motivated to combine Li '413 with Johnston '087 because (a) Li '413 and Johnston '087 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Johnston '087's teachings with those of Li '413. For similar reasons, a person of ordinary skill in the art would be motivated to combine Li '413 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Li '413 with Lee '822 for many reasons. For example, Li '413 describes, "a performance monitoring mechanism configured to monitor performance of the PON based on received optical signals" that includes "BER-based performance monitoring." *See, e.g.*, Li '413 at abstract, [0060]-[0064]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Li '413 to implement the details of "controlling effective FEC of an ONU and an OLT without changing an RTT based on optical link quality" taught by Lee '822 because, it is also directed at helping manage upstream burst overhead parameters. Lee '822 at abstract, [0029]-[0030], Fig. 4. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data throughout. Lee '822 at abstract. In addition, a person of ordinary skill in

the art would be motivated to combine Li '413 with Lee '822 because (a) Li '413 and Lee '822 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Lee '822's teachings with those of Li '413. For similar reasons, a person of ordinary skill in the art would be motivated to combine Li '413 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Li '413 with the XG-PON Standard for many reasons. For example, Li '413 describes, "a performance monitoring mechanism configured to monitor performance of the PON based on received optical signals" that includes "BER-based performance monitoring." *See, e.g.*, Li '413 at abstract, [0060]-[0064]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Li '413 to implement the details of "10-gigabit-capable passive optical networks" including where "[t]he OLT dynamically activates or deactivates the FEC functionality for a given ONU in the upstream direction by selecting the appropriate burst profile" as taught by the XG-PON Standard because, it is also directed at helping manage upstream burst overhead parameters. XG-PON Standard, G.987.3 at i, 33, G.987.2 at 22. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as dynamically adjusting the burst profile. XG-PON Standard, G.987.2 at 22. In addition, a person of ordinary skill in the art would be motivated to combine Li '413 with the XG-PON Standard because (a) Li '413 and the XG-PON Standard disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable

expectation of success in incorporating the XG-PON Standard's teachings with those of Li '413. For similar reasons, a person of ordinary skill in the art would be motivated to combine Li '413 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Li '413 with G.987.2 Rev 3 for many reasons. For example, Li '413 describes, "a performance monitoring mechanism configured to monitor performance of the PON based on received optical signals" that includes "BER-based performance monitoring." *See, e.g.*, Li '413 at abstract, [0060]-[0064]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Li '413 to implement the details of "a burst profile" based on "operationally dependent factors" as taught by G.987.2 Rev 3 because, it is also directed at helping manage upstream burst overhead parameters. G.987.2 Rev 3 at 43-44. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as adjusting the burst overhead based on operationally dependent factors. G.987.2 Rev 3 at 43-44. In addition, a person of ordinary skill in the art would be motivated to combine Li '413 with G.987.2 Rev 3 because (a) Li '413 and G.987.2 Rev 3 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.2 Rev 3's teachings with those of Li '413. For similar reasons, a person of ordinary skill in the art would be motivated to combine Li '413 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Li '413 with G.987.3 Draft for many reasons. For example, Li '413 describes, "a performance monitoring mechanism configured to monitor performance of the PON based on received optical signals" that includes

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"BER-based performance monitoring." *See, e.g.*, Li '413 at abstract, [0060]-[0064]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Li '413 to implement the details of "the draft ITU_T Recommendation G.987.3 that describes the Transmission Convergence layer for 10-Gigabit-capable Optical Network systems" as taught by G.987.3 Draft because, it is also directed at helping efficiently manage upstream burst overhead parameters. G.987.3 Draft at 1, 135. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as adjusting the burst overhead based on link quality. G.987.3 Draft at 49. In addition, a person of ordinary skill in the art would be motivated to combine Li '413 with G.987.3 Draft because (a) Li '413 and G.987.3 Draft disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3 Draft's teachings with those of Li '413. For similar reasons, a person of ordinary skill in the art would be motivated to combine Li '413 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

(8) Exemplary Khermosh '378 Solutions

A person of ordinary skill in the art would be motivated to combine Khermosh '378 with Wijngaarden '381 for many reasons. For example, Khermosh '378 describes, "managing forward error correction" by "monitoring communications quality from the optical network unit… [or] from the optical line terminal." *See, e.g.*, Khermosh '378 at [0011]-[0012]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Khermosh '378 to implement the details of "[i]n a passive optical network, an upstream transmission rate from an ONT to an OLT can be optimized by matching a transmission scheme for a channel to the upstream transmission characteristics of the channel" including monitoring the

BER and adjusting FEC accordingly taught by Wijngaarden ’381 because, it is also directed at helping manage upstream burst overhead parameters. Wijngaarden ’381 at abstract, [0022]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data transfer with minimal overhead. Wijngaarden ’381 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine Khermosh ’378 with Wijngaarden ’381 because (a) Khermosh ’378 and Wijngaarden ’381 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wijngaarden ’381’s teachings with those of Khermosh ’378. For similar reasons, a person of ordinary skill in the art would be motivated to combine Khermosh ’378 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Khermosh ’378 with Andersen ’455 for many reasons. For example, Khermosh ’378 describes, “managing forward error correction” by “monitoring communications quality from the optical network unit… [or] from the optical line terminal.” *See, e.g.*, Khermosh ’378 at [0011]-[0012]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Khermosh ’378 to implement the details of “determining a momentary parameter value of at least one scheduling control parameter (PS) of a set of different scheduling control parameters” taught by Andersen ’455 because, it is also directed at helping manage upstream burst overhead parameters. Andersen ’455 at [0001], [0064]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data transfer. Andersen ’455 at [0005]. In addition, a person of ordinary skill in the art would be motivated to combine

Khermosh ’378 with Andersen ’455 because (a) Khermosh ’378 and Andersen ’455 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Andersen ’455’s teachings with those of Khermosh ’378. For similar reasons, a person of ordinary skill in the art would be motivated to combine Khermosh ’378 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Khermosh ’378 with Krimmel ’362 for many reasons. For example, Khermosh ’378 describes, “managing forward error correction” by “monitoring communications quality from the optical network unit… [or] from the optical line terminal.” *See, e.g.*, Khermosh ’378 at [0011]-[0012]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Khermosh ’378 to implement the details of “operating a passive optical network that is capable to consider changes of the transmission quality of a link” taught by Krimmel ’362 because, it is also directed at helping manage upstream burst overhead parameters. Krimmel ’362 at [0007], [0035]-[0037]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing the transmission rate. Krimmel ’362 at [0044]. In addition, a person of ordinary skill in the art would be motivated to combine Khermosh ’378 with Krimmel ’362 because (a) Khermosh ’378 and Krimmel ’362 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Krimmel ’362’s teachings with those of Khermosh ’378. For similar reasons, a person of ordinary skill in the art would be motivated to

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combine Khermosh ’378 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Khermosh ’378 and Dalton ’923 for many reasons. For example, Khermosh ’378 describes, “managing forward error correction” by “monitoring communications quality from the optical network unit… [or] from the optical line terminal.” *See, e.g.*, Khermosh ’378 at [0011]-[0012]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Khermosh ’378 to implement the details of a “optical power control in a passive optical network (PON) and, more specifically, to adjusting a burst-mode data transmission preamble in response to power measurement” taught by Dalton ’923 because, it is also directed at helping manage upstream burst overhead parameters. Dalton ’923 at [0002]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as maximizing the available bandwidth. Dalton ’923 at [0011], [0024]. In addition, a person of ordinary skill in the art would be motivated to combine Khermosh ’378 with Dalton ’923 because (a) Khermosh ’378 and Dalton ’923 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Dalton ’923’s teachings with those of Khermosh ’378. For similar reasons, a person of ordinary skill in the art would be motivated to combine Khermosh ’378 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Khermosh ’378 with Weeber ’729 for many reasons. For example, Khermosh ’378 describes, “managing forward error correction” by “monitoring communications quality from the optical network unit… [or] from the

optical line terminal." *See, e.g.*, Khermosh '378 at [0011]-[0012]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Khermosh '378 to implement the details of "bandwidth mapper 255 for managing transmissions in the upstream direction" taught by Weeber '729 because, it is also directed at helping manage upstream burst overhead parameters. Weeber '729 at [0056], [0068]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as enhancing upstream capacity. Weeber '729 at [0056]. In addition, a person of ordinary skill in the art would be motivated to combine Khermosh '378 with Weeber '729 because (a) Khermosh '378 and Weeber '729 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Weeber '729's teachings with those of Khermosh '378. For similar reasons, a person of ordinary skill in the art would be motivated to combine Khermosh '378 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Khermosh '378 with the G-PON Standard for many reasons. For example, Khermosh '378 describes, "managing forward error correction" by "monitoring communications quality from the optical network unit… [or] from the optical line terminal." *See, e.g.*, Khermosh '378 at [0011]-[0012]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Khermosh '378 to implement the details of "gigabit-capable passive optical networks [GPON]" including where the "OLTs set the desired ONU FEC encoding status (on/off)" as taught by the G-PON Standard because, it is also directed at helping manage upstream burst overhead parameters. G-PON Standard, G.984.3 at i, 36-38, 92-93. A person of ordinary skill in the art

would be motivated by the advantages of such functionality, such as improving data transfer. G-PON Standard, G.984.3 at 36-38, 92-93. In addition, a person of ordinary skill in the art would be motivated to combine Khermosh '378 with the G-PON Standard because (a) Khermosh '378 and the G-PON Standard disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the G-PON Standard's teachings with those of Khermosh '378. For similar reasons, a person of ordinary skill in the art would be motivated to combine Khermosh '378 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Khermosh '378 with Li '413 for many reasons. For example, Khermosh '378 describes, "managing forward error correction" by "monitoring communications quality from the optical network unit… [or] from the optical line terminal." *See, e.g.*, Khermosh '378 at [0011]-[0012]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Khermosh '378 to implement the details of "a performance monitoring mechanism configured to monitor performance of the PON based on received optical signals" that includes "BER-based performance monitoring" taught by Li '413 because, it is also directed at helping manage upstream burst overhead parameters. Li '413 at abstract, [0060]-[0064]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as better monitoring the link quality. Li '413 at [0038]. In addition, a person of ordinary skill in the art would be motivated to combine Khermosh '378 with Li '413 because (a) Khermosh '378 and Li '413 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor

as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Li '413's teachings with those of Khermosh '378. For similar reasons, a person of ordinary skill in the art would be motivated to combine Khermosh '378 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Khermosh '378 with Kanno '158 for many reasons. For example, Khermosh '378 describes, "managing forward error correction" by "monitoring communications quality from the optical network unit… [or] from the optical line terminal." *See, e.g.*, Khermosh '378 at [0011]-[0012]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Khermosh '378 to implement the details of "counting, in each of the plurality of subscriber terminating units, an error count … and determining, in the office terminal unit, based on the received error count, an error correction method or an error correction disuse which is used in each of the plurality of subscriber terminating units" taught by Kanno '158 because, it is also directed at helping manage upstream burst overhead parameters. Kanno '158 at [0015], [0060]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing the length of the overhead in a parity for the error correction in the up-link direction. Kanno '158 at [0060]. In addition, a person of ordinary skill in the art would be motivated to combine Khermosh '378 with Kanno '158 because (a) Khermosh '378 and Kanno '158 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kanno '158's teachings with those of Khermosh '378. For similar reasons, a person of ordinary skill in the art

would be motivated to combine Khermosh ’378 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Khermosh ’378 with Wijngaarden ’380 for many reasons. For example, Khermosh ’378 describes, “managing forward error correction” by “monitoring communications quality from the optical network unit… [or] from the optical line terminal.” *See, e.g.*, Khermosh ’378 at [0011]-[0012]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Khermosh ’378 to implement the details of “a downstream transmission rate from an OLT to multiple ONTs can be optimized by matching a transmission scheme for frames addressed to a channel to the downstream transmission characteristics of the channel” taught by Wijngaarden ’380 because, it is also directed at helping manage upstream burst overhead parameters. Wijngaarden ’380 at [0035], Fig. 3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as minimizing error rates during data transfer while also minimizing overhead. Wijngaarden ’380 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine Khermosh ’378 with Wijngaarden ’380 because (a) Khermosh ’378 and Wijngaarden ’380 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wijngaarden ’380’s teachings with those of Khermosh ’378. For similar reasons, a person of ordinary skill in the art would be motivated to combine Khermosh ’378 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Khermosh '378 with Johnston '087 for many reasons. For example, Khermosh '378 describes, "managing forward error correction" by "monitoring communications quality from the optical network unit… [or] from the optical line terminal." *See, e.g.*, Khermosh '378 at [0011]-[0012]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Khermosh '378 to implement the details of "a superframe counter [that] provides error checking for potential dropped frames" taught by Johnston '087 because, it is also directed at helping manage upstream burst overhead parameters. Johnston '087 at 6:63-7:17, 7:18-29, Figs. 2-3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing upstream data transfer. Johnston '087 at 4:36-5:3. In addition, a person of ordinary skill in the art would be motivated to combine Khermosh '378 with Johnston '087 because (a) Khermosh '378 and Johnston '087 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Johnston '087's teachings with those of Khermosh '378. For similar reasons, a person of ordinary skill in the art would be motivated to combine Khermosh '378 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Khermosh '378 with Lee '822 for many reasons. For example, Khermosh '378 describes, "managing forward error correction" by "monitoring communications quality from the optical network unit… [or] from the optical line terminal." *See, e.g.*, Khermosh '378 at [0011]-[0012]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Khermosh '378 to

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implement the details of "controlling effective FEC of an ONU and an OLT without changing an RTT based on optical link quality" taught by Lee '822 because, it is also directed at helping manage upstream burst overhead parameters. Lee '822 at abstract, [0029]-[0030], Fig. 4. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data throughout. Lee '822 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine Khermosh '378 with Lee '822 because (a) Khermosh '378 and Lee '822 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Lee '822's teachings with those of Khermosh '378. For similar reasons, a person of ordinary skill in the art would be motivated to combine Khermosh '378 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Khermosh '378 with the XG-PON Standard for many reasons. For example, Khermosh '378 describes, "managing forward error correction" by "monitoring communications quality from the optical network unit… [or] from the optical line terminal." *See, e.g.*, Khermosh '378 at [0011]-[0012]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Khermosh '378 to implement the details of "10-gigabit-capable passive optical networks" including where "[t]he OLT dynamically activates or deactivates the FEC functionality for a given ONU in the upstream direction by selecting the appropriate burst profile" as taught by the XG-PON Standard because, it is also directed at helping manage upstream burst overhead parameters. XG-PON Standard, G.987.3 at i, 33, G.987.2 at 22. A person of ordinary skill in the art would be

motivated by the advantages of such functionality, such as dynamically adjusting the burst profile. XG-PON Standard, G.987.2 at 22. In addition, a person of ordinary skill in the art would be motivated to combine Khermosh '378 with the XG-PON Standard because (a) Khermosh '378 and the XG-PON Standard disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the XG-PON Standard's teachings with those of Khermosh '378. For similar reasons, a person of ordinary skill in the art would be motivated to combine Khermosh '378 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Khermosh '378 with G.987.2 Rev 3 for many reasons. For example, Khermosh '378 describes, "managing forward error correction" by "monitoring communications quality from the optical network unit… [or] from the optical line terminal." *See, e.g.*, Khermosh '378 at [0011]-[0012]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Khermosh '378 to implement the details of "a burst profile" based on "operationally dependent factors" as taught by G.987.2 Rev 3 because, it is also directed at helping manage upstream burst overhead parameters. G.987.2 Rev 3 at 43-44. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as adjusting the burst overhead based on operationally dependent factors. G.987.2 Rev 3 at 43-44. In addition, a person of ordinary skill in the art would be motivated to combine Khermosh '378 with G.987.2 Rev 3 because (a) Khermosh '378 and G.987.2 Rev 3 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream

burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.2 Rev 3's teachings with those of Khermosh '378. For similar reasons, a person of ordinary skill in the art would be motivated to combine Khermosh '378 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Khermosh '378 with G.987.3 Draft for many reasons. For example, Khermosh '378 describes, "managing forward error correction" by "monitoring communications quality from the optical network unit… [or] from the optical line terminal." *See, e.g.*, Khermosh '378 at [0011]-[0012]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Khermosh '378 to implement the details of "the draft ITU_T Recommendation G.987.3 that describes the Transmission Convergence layer for 10-Gigabit-capable Optical Network systems" as taught by G.987.3 Draft because, it is also directed at helping efficiently manage upstream burst overhead parameters. G.987.3 Draft at 1, 135. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as adjusting the burst overhead based on link quality. G.987.3 Draft at 49. In addition, a person of ordinary skill in the art would be motivated to combine Khermosh '378 with G.987.3 Draft because (a) Khermosh '378 and G.987.3 Draft disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3 Draft's teachings with those of Khermosh '378. For similar reasons, a person of ordinary skill in the art would be motivated to combine Khermosh '378 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

(9) Exemplary Kanno ’158 Solutions

A person of ordinary skill in the art would be motivated to combine Kanno ’158 with Wijngaarden ’381 for many reasons. For example, Kanno ’158 describes, “counting, in each of the plurality of subscriber terminating units, an error count … and determining, in the office terminal unit, based on the received error count, an error correction method or an error correction disuse which is used in each of the plurality of subscriber terminating units.” *See, e.g.*, Kanno ’158 at [0015], [0060]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Kanno ’158 to implement the details of “[i]n a passive optical network, an upstream transmission rate from an ONT to an OLT can be optimized by matching a transmission scheme for a channel to the upstream transmission characteristics of the channel” including monitoring the BER and adjusting FEC accordingly taught by Wijngaarden ’381 because, it is also directed at helping manage upstream burst overhead parameters. Wijngaarden ’381 at abstract, [0022]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data transfer with minimal overhead. Wijngaarden ’381 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine Kanno ’158 with Wijngaarden ’381 because (a) Kanno ’158 and Wijngaarden ’381 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wijngaarden ’381’s teachings with those of Kanno ’158. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kanno ’158 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kanno ’158 with Andersen ’455 for many reasons. For example, Kanno ’158 describes, “counting, in each of the

plurality of subscriber terminating units, an error count … and determining, in the office terminal unit, based on the received error count, an error correction method or an error correction disuse which is used in each of the plurality of subscriber terminating units." *See, e.g.*, Kanno '158 at [0015], [0060]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Kanno '158 to implement the details of "determining a momentary parameter value of at least one scheduling control parameter (PS) of a set of different scheduling control parameters" taught by Andersen '455 because, it is also directed at helping manage upstream burst overhead parameters. Andersen '455 at [0001], [0064]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data transfer. Andersen '455 at [0005]. In addition, a person of ordinary skill in the art would be motivated to combine Kanno '158 with Andersen '455 because (a) Kanno '158 and Andersen '455 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Andersen '455's teachings with those of Kanno '158. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kanno '158 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kanno '158 with Krimmel '362 for many reasons. For example, Kanno '158 describes, "counting, in each of the plurality of subscriber terminating units, an error count … and determining, in the office terminal unit, based on the received error count, an error correction method or an error correction disuse which is used in each of the plurality of subscriber terminating units." *See, e.g.*, Kanno '158 at [0015], [0060]. A person having ordinary skill in the art would have been motivated to modify the

method and/or device of Kanno ’158 to implement the details of “operating a passive optical network that is capable to consider changes of the transmission quality of a link” taught by Krimmel ’362 because, it is also directed at helping manage upstream burst overhead parameters. Krimmel ’362 at [0007], [0035]-[0037]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing the transmission rate. Krimmel ’362 at [0044]. In addition, a person of ordinary skill in the art would be motivated to combine Kanno ’158 with Krimmel ’362 because (a) Kanno ’158 and Krimmel ’362 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Krimmel ’362’s teachings with those of Kanno ’158. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kanno ’158 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kanno ’158 and Dalton ’923 for many reasons. For example, Kanno ’158 describes, “counting, in each of the plurality of subscriber terminating units, an error count … and determining, in the office terminal unit, based on the received error count, an error correction method or an error correction disuse which is used in each of the plurality of subscriber terminating units.” *See, e.g.*, Kanno ’158 at [0015], [0060]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Kanno ’158 to implement the details of a “optical power control in a passive optical network (PON) and, more specifically, to adjusting a burst-mode data transmission preamble in response to power measurement” taught by Dalton ’923 because, it is also directed at helping manage upstream burst overhead parameters. Dalton ’923 at [0002]. A person of ordinary skill in

the art would be motivated by the advantages of such functionality, such as maximizing the available bandwidth. Dalton ’923 at [0011], [0024]. In addition, a person of ordinary skill in the art would be motivated to combine Kanno ’158 with Dalton ’923 because (a) Kanno ’158 and Dalton ’923 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Dalton ’923’s teachings with those of Kanno ’158. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kanno ’158 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kanno ’158 with Weeber ’729 for many reasons. For example, Kanno ’158 describes, “counting, in each of the plurality of subscriber terminating units, an error count … and determining, in the office terminal unit, based on the received error count, an error correction method or an error correction disuse which is used in each of the plurality of subscriber terminating units.” *See, e.g.*, Kanno ’158 at [0015], [0060]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Kanno ’158 to implement the details of “bandwidth mapper 255 for managing transmissions in the upstream direction” taught by Weeber ’729 because, it is also directed at helping manage upstream burst overhead parameters. Weeber ’729 at [0056], [0068]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as enhancing upstream capacity. Weeber ’729 at [0056]. In addition, a person of ordinary skill in the art would be motivated to combine Kanno ’158 with Weeber ’729 because (a) Kanno ’158 and Weeber ’729 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to

helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Weeber '729's teachings with those of Kanno '158. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kanno '158 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kanno '158 with the G-PON Standard for many reasons. For example, Kanno '158 describes, "counting, in each of the plurality of subscriber terminating units, an error count … and determining, in the office terminal unit, based on the received error count, an error correction method or an error correction disuse which is used in each of the plurality of subscriber terminating units." *See, e.g.*, Kanno '158 at [0015], [0060]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Kanno '158 to implement the details of "gigabit-capable passive optical networks [GPON]" including where the "OLTs set the desired ONU FEC encoding status (on/off)" as taught by the G-PON Standard because, it is also directed at helping manage upstream burst overhead parameters. G-PON Standard, G.984.3 at i, 36-38, 92-93. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as improving data transfer. G-PON Standard, G.984.3 at 36-38, 92-93. In addition, a person of ordinary skill in the art would be motivated to combine Kanno '158 with the G-PON Standard because (a) Kanno '158 and the G-PON Standard disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the G-PON Standard's teachings with those of Kanno '158. For similar reasons, a person of ordinary skill in the art would be motivated to

combine Kanno ’158 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kanno ’158 with Li ’413 for many reasons. For example, Kanno ’158 describes, “counting, in each of the plurality of subscriber terminating units, an error count … and determining, in the office terminal unit, based on the received error count, an error correction method or an error correction disuse which is used in each of the plurality of subscriber terminating units.” *See, e.g.*, Kanno ’158 at [0015], [0060]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Kanno ’158 to implement the details of “a performance monitoring mechanism configured to monitor performance of the PON based on received optical signals” that includes “BER-based performance monitoring” taught by Li ’413 because, it is also directed at helping manage upstream burst overhead parameters. Li ’413 at abstract, [0060]-[0064]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as better monitoring the link quality. Li ’413 at [0038]. In addition, a person of ordinary skill in the art would be motivated to combine Kanno ’158 with Li ’413 because (a) Kanno ’158 and Li ’413 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Li ’413’s teachings with those of Kanno ’158. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kanno ’158 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kanno ’158 with Khermosh ’378 for many reasons. For example, Kanno ’158 describes, “counting, in each of the

plurality of subscriber terminating units, an error count … and determining, in the office terminal unit, based on the received error count, an error correction method or an error correction disuse which is used in each of the plurality of subscriber terminating units." *See, e.g.*, Kanno '158 at [0015], [0060]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Kanno '158 to implement the details of "managing forward error correction" by "monitoring communications quality from the optical network unit… [or] from the optical line terminal" taught by Khermosh '378 because, it is also directed at helping manage upstream burst overhead parameters. Khermosh '378 at [0011]-[0012]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as reducing the error rate during data transfer. Khermosh '378 at [0006], [0008]-[0012]. In addition, a person of ordinary skill in the art would be motivated to combine Kanno '158 with Khermosh '378 because (a) Kanno '158 and Khermosh '378 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Khermosh '378's teachings with those of Kanno '158. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kanno '158 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kanno '158 with Wijngaarden '380 for many reasons. For example, Kanno '158 describes, "counting, in each of the plurality of subscriber terminating units, an error count … and determining, in the office terminal unit, based on the received error count, an error correction method or an error correction disuse which is used in each of the plurality of subscriber terminating units." *See, e.g.*, Kanno '158 at

[0015], [0060]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Kanno ’158 to implement the details of “a downstream transmission rate from an OLT to multiple ONTs can be optimized by matching a transmission scheme for frames addressed to a channel to the downstream transmission characteristics of the channel” taught by Wijngaarden ’380 because, it is also directed at helping manage upstream burst overhead parameters. Wijngaarden ’380 at [0035], Fig. 3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as minimizing error rates during data transfer while also minimizing overhead. Wijngaarden ’380 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine Kanno ’158 with Wijngaarden ’380 because (a) Kanno ’158 and Wijngaarden ’380 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wijngaarden ’380’s teachings with those of Kanno ’158. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kanno ’158 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kanno ’158 with Johnston ’087 for many reasons. For example, Kanno ’158 describes, “counting, in each of the plurality of subscriber terminating units, an error count … and determining, in the office terminal unit, based on the received error count, an error correction method or an error correction disuse which is used in each of the plurality of subscriber terminating units.” *See, e.g.*, Kanno ’158 at [0015], [0060]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Kanno ’158 to implement the details of “a superframe counter [that]

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provides error checking for potential dropped frames" taught by Johnston '087 because, it is also directed at helping manage upstream burst overhead parameters. Johnston '087 at 6:63-7:17, 7:18-29, Figs. 2-3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing upstream data transfer. Johnston '087 at 4:36-5:3. In addition, a person of ordinary skill in the art would be motivated to combine Kanno '158 with Johnston '087 because (a) Kanno '158 and Johnston '087 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Johnston '087's teachings with those of Kanno '158. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kanno '158 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kanno '158 with Lee '822 for many reasons. For example, Kanno '158 describes, "counting, in each of the plurality of subscriber terminating units, an error count … and determining, in the office terminal unit, based on the received error count, an error correction method or an error correction disuse which is used in each of the plurality of subscriber terminating units." *See, e.g.*, Kanno '158 at [0015], [0060]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Kanno '158 to implement the details of "controlling effective FEC of an ONU and an OLT without changing an RTT based on optical link quality" taught by Lee '822 because, it is also directed at helping manage upstream burst overhead parameters. Lee '822 at abstract, [0029]-[0030], Fig. 4. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data throughout. Lee '822 at abstract. In addition, a person of

ordinary skill in the art would be motivated to combine Kanno ’158 with Lee ’822 because (a) Kanno ’158 and Lee ’822 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Lee ’822’s teachings with those of Kanno ’158. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kanno ’158 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kanno ’158 with the XG-PON Standard for many reasons. For example, Kanno ’158 describes, “counting, in each of the plurality of subscriber terminating units, an error count … and determining, in the office terminal unit, based on the received error count, an error correction method or an error correction disuse which is used in each of the plurality of subscriber terminating units.” *See, e.g.*, Kanno ’158 at [0015], [0060]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Kanno ’158 to implement the details of “10-gigabit-capable passive optical networks” including where “[t]he OLT dynamically activates or deactivates the FEC functionality for a given ONU in the upstream direction by selecting the appropriate burst profile” as taught by the XG-PON Standard because, it is also directed at helping manage upstream burst overhead parameters. XG-PON Standard, G.987.3 at i, 33, G.987.2 at 22. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as dynamically adjusting the burst profile. XG-PON Standard, G.987.2 at 22. In addition, a person of ordinary skill in the art would be motivated to combine Kanno ’158 with the XG-PON Standard because (a) Kanno ’158 and the XG-PON Standard disclose similar products, methods, and solutions; and

(b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the XG-PON Standard's teachings with those of Kanno '158. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kanno '158 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kanno '158 with G.987.2 Rev 3 for many reasons. For example, Kanno '158 describes, "counting, in each of the plurality of subscriber terminating units, an error count … and determining, in the office terminal unit, based on the received error count, an error correction method or an error correction disuse which is used in each of the plurality of subscriber terminating units." *See, e.g.*, Kanno '158 at [0015], [0060]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Kanno '158 to implement the details of "a burst profile" based on "operationally dependent factors" as taught by G.987.2 Rev 3 because, it is also directed at helping manage upstream burst overhead parameters. G.987.2 Rev 3 at 43-44. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as adjusting the burst overhead based on operationally dependent factors. G.987.2 Rev 3 at 43-44. In addition, a person of ordinary skill in the art would be motivated to combine Kanno '158 with G.987.2 Rev 3 because (a) Kanno '158 and G.987.2 Rev 3 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.2 Rev 3's teachings with those of Kanno '158. For similar reasons, a person of ordinary skill in the art would be motivated to

combine Kanno ’158 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kanno ’158 with G.987.3 Draft for many reasons. For example, Kanno ’158 describes, “counting, in each of the plurality of subscriber terminating units, an error count … and determining, in the office terminal unit, based on the received error count, an error correction method or an error correction disuse which is used in each of the plurality of subscriber terminating units.” *See, e.g.*, Kanno ’158 at [0015], [0060]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Kanno ’158 to implement the details of “the draft ITU_T Recommendation G.987.3 that describes the Transmission Convergence layer for 10-Gigabit-capable Optical Network systems” as taught by G.987.3 Draft because, it is also directed at helping efficiently manage upstream burst overhead parameters. G.987.3 Draft at 1, 135. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as adjusting the burst overhead based on link quality. G.987.3 Draft at 49. In addition, a person of ordinary skill in the art would be motivated to combine Kanno ’158 with G.987.3 Draft because (a) Kanno ’158 and G.987.3 Draft disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3 Draft’s teachings with those of Kanno ’158. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kanno ’158 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

(10) Exemplary Wijngaarden ’380 Solutions

A person of ordinary skill in the art would be motivated to combine Wijngaarden ’380 with Wijngaarden ’381 for many reasons. For example, Wijngaarden ’380 describes, “a downstream transmission rate from an OLT to multiple ONTs can be optimized by matching a transmission scheme for frames addressed to a channel to the downstream transmission characteristics of the channel.” *See, e.g.*, Wijngaarden ’380 at [0035], Fig. 3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wijngaarden ’380 to implement the details of “[i]n a passive optical network, an upstream transmission rate from an ONT to an OLT can be optimized by matching a transmission scheme for a channel to the upstream transmission characteristics of the channel” including monitoring the BER and adjusting FEC accordingly taught by Wijngaarden ’381 because, it is also directed at helping manage upstream burst overhead parameters. Wijngaarden ’381 at abstract, [0022]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data transfer with minimal overhead. Wijngaarden ’381 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine Wijngaarden ’380 with Wijngaarden ’381 because (a) Wijngaarden ’380 and Wijngaarden ’381 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wijngaarden ’381’s teachings with those of Wijngaarden ’380. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wijngaarden ’380 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wijngaarden ’380 with Andersen ’455 for many reasons. For example, Wijngaarden ’380 describes, “a downstream

transmission rate from an OLT to multiple ONTs can be optimized by matching a transmission scheme for frames addressed to a channel to the downstream transmission characteristics of the channel." *See, e.g.*, Wijngaarden '380 at [0035], Fig. 3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wijngaarden '380 to implement the details of "determining a momentary parameter value of at least one scheduling control parameter (PS) of a set of different scheduling control parameters" taught by Andersen '455 because, it is also directed at helping manage upstream burst overhead parameters. Andersen '455 at [0001], [0064]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data transfer. Andersen '455 at [0005]. In addition, a person of ordinary skill in the art would be motivated to combine Wijngaarden '380 with Andersen '455 because (a) Wijngaarden '380 and Andersen '455 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Andersen '455's teachings with those of Wijngaarden '380. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wijngaarden '380 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wijngaarden '380 with Krimmel '362 for many reasons. For example, Wijngaarden '380 describes, "a downstream transmission rate from an OLT to multiple ONTs can be optimized by matching a transmission scheme for frames addressed to a channel to the downstream transmission characteristics of the channel." *See, e.g.*, Wijngaarden '380 at [0035], Fig. 3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wijngaarden '380 to implement

the details of "operating a passive optical network that is capable to consider changes of the transmission quality of a link" taught by Krimmel '362 because, it is also directed at helping manage upstream burst overhead parameters. Krimmel '362 at [0007], [0035]-[0037]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing the transmission rate. Krimmel '362 at [0044]. In addition, a person of ordinary skill in the art would be motivated to combine Wijngaarden '380 with Krimmel '362 because (a) Wijngaarden '380 and Krimmel '362 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Krimmel '362's teachings with those of Wijngaarden '380. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wijngaarden '380 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wijngaarden '380 and Dalton '923 for many reasons. For example, Wijngaarden '380 describes, "a downstream transmission rate from an OLT to multiple ONTs can be optimized by matching a transmission scheme for frames addressed to a channel to the downstream transmission characteristics of the channel." *See, e.g.*, Wijngaarden '380 at [0035], Fig. 3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wijngaarden '380 to implement the details of a "optical power control in a passive optical network (PON) and, more specifically, to adjusting a burst-mode data transmission preamble in response to power measurement" taught by Dalton '923 because, it is also directed at helping manage upstream burst overhead parameters. Dalton '923 at [0002]. A person of ordinary skill in the art would be motivated by the advantages

of such functionality, such as maximizing the available bandwidth. Dalton ’923 at [0011], [0024]. In addition, a person of ordinary skill in the art would be motivated to combine Wijngaarden ’380 with Dalton ’923 because (a) Wijngaarden ’380 and Dalton ’923 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Dalton ’923’s teachings with those of Wijngaarden ’380. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wijngaarden ’380 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wijngaarden ’380 with Weeber ’729 for many reasons. For example, Wijngaarden ’380 describes, “a downstream transmission rate from an OLT to multiple ONTs can be optimized by matching a transmission scheme for frames addressed to a channel to the downstream transmission characteristics of the channel.” *See, e.g.*, Wijngaarden ’380 at [0035], Fig. 3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wijngaarden ’380 to implement the details of “bandwidth mapper 255 for managing transmissions in the upstream direction” taught by Weeber ’729 because, it is also directed at helping manage upstream burst overhead parameters. Weeber ’729 at [0056], [0068]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as enhancing upstream capacity. Weeber ’729 at [0056]. In addition, a person of ordinary skill in the art would be motivated to combine Wijngaarden ’380 with Weeber ’729 because (a) Wijngaarden ’380 and Weeber ’729 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters.

Moreover, a POSITA would have had a reasonable expectation of success in incorporating Weeber '729's teachings with those of Wijngaarden '380. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wijngaarden '380 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wijngaarden '380 with the G-PON Standard for many reasons. For example, Wijngaarden '380 describes, "a downstream transmission rate from an OLT to multiple ONTs can be optimized by matching a transmission scheme for frames addressed to a channel to the downstream transmission characteristics of the channel." *See, e.g.*, Wijngaarden '380 at [0035], Fig. 3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wijngaarden '380 to implement the details of "gigabit-capable passive optical networks [GPON]" including where the "OLTs set the desired ONU FEC encoding status (on/off)" as taught by the G-PON Standard because, it is also directed at helping manage upstream burst overhead parameters. G-PON Standard, G.984.3 at i, 36-38, 92-93. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as improving data transfer. G-PON Standard, G.984.3 at 36-38, 92-93. In addition, a person of ordinary skill in the art would be motivated to combine Wijngaarden '380 with the G-PON Standard because (a) Wijngaarden '380 and the G-PON Standard disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the G-PON Standard's teachings with those of Wijngaarden '380. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wijngaarden '380 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

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A person of ordinary skill in the art would be motivated to combine Wijngaarden ’380 with Li ’413 for many reasons. For example, Wijngaarden ’380 describes, “a downstream transmission rate from an OLT to multiple ONTs can be optimized by matching a transmission scheme for frames addressed to a channel to the downstream transmission characteristics of the channel.” *See, e.g.*, Wijngaarden ’380 at [0035], Fig. 3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wijngaarden ’380 to implement the details of “a performance monitoring mechanism configured to monitor performance of the PON based on received optical signals” that includes “BER-based performance monitoring” taught by Li ’413 because, it is also directed at helping manage upstream burst overhead parameters. Li ’413 at abstract, [0060]-[0064]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as better monitoring the link quality. Li ’413 at [0038]. In addition, a person of ordinary skill in the art would be motivated to combine Wijngaarden ’380 with Li ’413 because (a) Wijngaarden ’380 and Li ’413 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Li ’413’s teachings with those of Wijngaarden ’380. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wijngaarden ’380 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wijngaarden ’380 with Khermosh ’378 for many reasons. For example, Wijngaarden ’380 describes, “a downstream transmission rate from an OLT to multiple ONTs can be optimized by matching a transmission scheme for frames addressed to a channel to the downstream transmission characteristics of the

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channel." *See, e.g.*, Wijngaarden '380 at [0035], Fig. 3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wijngaarden '380 to implement the details of "managing forward error correction" by "monitoring communications quality from the optical network unit… [or] from the optical line terminal" taught by Khermosh '378 because, it is also directed at helping manage upstream burst overhead parameters. Khermosh '378 at [0011]-[0012]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as reducing the error rate during data transfer. Khermosh '378 at [0006], [0008]-[0012]. In addition, a person of ordinary skill in the art would be motivated to combine Wijngaarden '380 with Khermosh '378 because (a) Wijngaarden '380 and Khermosh '378 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Khermosh '378's teachings with those of Wijngaarden '380. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wijngaarden '380 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wijngaarden '380 with Kanno '158 for many reasons. For example, Wijngaarden '380 describes, "a downstream transmission rate from an OLT to multiple ONTs can be optimized by matching a transmission scheme for frames addressed to a channel to the downstream transmission characteristics of the channel." *See, e.g.*, Wijngaarden '380 at [0035], Fig. 3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wijngaarden '380 to implement the details of "counting, in each of the plurality of subscriber terminating units, an error count … and determining, in the office terminal unit, based on the received error count, an error correction

method or an error correction disuse which is used in each of the plurality of subscriber terminating units" taught by Kanno '158 because, it is also directed at helping manage upstream burst overhead parameters. Kanno '158 at [0015], [0060]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing the length of the overhead in a parity for the error correction in the up-link direction. Kanno '158 at [0060]. In addition, a person of ordinary skill in the art would be motivated to combine Wijngaarden '380 with Kanno '158 because (a) Wijngaarden '380 and Kanno '158 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kanno '158's teachings with those of Wijngaarden '380. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wijngaarden '380 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wijngaarden '380 with Johnston '087 for many reasons. For example, Wijngaarden '380 describes, "a downstream transmission rate from an OLT to multiple ONTs can be optimized by matching a transmission scheme for frames addressed to a channel to the downstream transmission characteristics of the channel." *See, e.g.*, Wijngaarden '380 at [0035], Fig. 3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wijngaarden '380 to implement the details of "a superframe counter [that] provides error checking for potential dropped frames" taught by Johnston '087 because, it is also directed at helping manage upstream burst overhead parameters. Johnston '087 at 6:63-7:17, 7:18-29, Figs. 2-3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing upstream data

transfer. Johnston ’087 at 4:36-5:3. In addition, a person of ordinary skill in the art would be motivated to combine Wijngaarden ’380 with Johnston ’087 because (a) Wijngaarden ’380 and Johnston ’087 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Johnston ’087’s teachings with those of Wijngaarden ’380. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wijngaarden ’380 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wijngaarden ’380 with Lee ’822 for many reasons. For example, Wijngaarden ’380 describes, “a downstream transmission rate from an OLT to multiple ONTs can be optimized by matching a transmission scheme for frames addressed to a channel to the downstream transmission characteristics of the channel.” *See, e.g.*, Wijngaarden ’380 at [0035], Fig. 3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wijngaarden ’380 to implement the details of “controlling effective FEC of an ONU and an OLT without changing an RTT based on optical link quality” taught by Lee ’822 because, it is also directed at helping manage upstream burst overhead parameters. Lee ’822 at abstract, [0029]-[0030], Fig. 4. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data throughout. Lee ’822 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine Wijngaarden ’380 with Lee ’822 because (a) Wijngaarden ’380 and Lee ’822 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage

upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Lee '822's teachings with those of Wijngaarden '380. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wijngaarden '380 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wijngaarden '380 with the XG-PON Standard for many reasons. For example, Wijngaarden '380 describes, "a downstream transmission rate from an OLT to multiple ONTs can be optimized by matching a transmission scheme for frames addressed to a channel to the downstream transmission characteristics of the channel." *See, e.g.*, Wijngaarden '380 at [0035], Fig. 3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wijngaarden '380 to implement the details of "10-gigabit-capable passive optical networks" including where "[t]he OLT dynamically activates or deactivates the FEC functionality for a given ONU in the upstream direction by selecting the appropriate burst profile" as taught by the XG-PON Standard because, it is also directed at helping manage upstream burst overhead parameters. XG-PON Standard, G.987.3 at i, 33, G.987.2 at 22. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as dynamically adjusting the burst profile. XG-PON Standard, G.987.2 at 22. In addition, a person of ordinary skill in the art would be motivated to combine Wijngaarden '380 with the XG-PON Standard because (a) Wijngaarden '380 and the XG-PON Standard disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the XG-PON Standard's teachings with

those of Wijngaarden ’380. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wijngaarden ’380 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wijngaarden ’380 with G.987.2 Rev 3 for many reasons. For example, Wijngaarden ’380 describes, “a downstream transmission rate from an OLT to multiple ONTs can be optimized by matching a transmission scheme for frames addressed to a channel to the downstream transmission characteristics of the channel.” *See, e.g.*, Wijngaarden ’380 at [0035], Fig. 3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wijngaarden ’380 to implement the details of “a burst profile” based on “operationally dependent factors” as taught by G.987.2 Rev 3 because, it is also directed at helping manage upstream burst overhead parameters. G.987.2 Rev 3 at 43-44. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as adjusting the burst overhead based on operationally dependent factors. G.987.2 Rev 3 at 43-44. In addition, a person of ordinary skill in the art would be motivated to combine Wijngaarden ’380 with G.987.2 Rev 3 because (a) Wijngaarden ’380 and G.987.2 Rev 3 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.2 Rev 3’s teachings with those of Wijngaarden ’380. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wijngaarden ’380 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Wijngaarden ’380 with G.987.3 Draft for many reasons. For example, Wijngaarden ’380 describes, “a downstream

transmission rate from an OLT to multiple ONTs can be optimized by matching a transmission scheme for frames addressed to a channel to the downstream transmission characteristics of the channel." *See, e.g.*, Wijngaarden '380 at [0035], Fig. 3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Wijngaarden '380 to implement the details of "the draft ITU_T Recommendation G.987.3 that describes the Transmission Convergence layer for 10-Gigabit-capable Optical Network systems" as taught by G.987.3 Draft because, it is also directed at helping efficiently manage upstream burst overhead parameters. G.987.3 Draft at 1, 135. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as adjusting the burst overhead based on link quality. G.987.3 Draft at 49. In addition, a person of ordinary skill in the art would be motivated to combine Wijngaarden '380 with G.987.3 Draft because (a) Wijngaarden '380 and G.987.3 Draft disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3 Draft's teachings with those of Wijngaarden '380. For similar reasons, a person of ordinary skill in the art would be motivated to combine Wijngaarden '380 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

(11) Exemplary Johnston '087 Solutions

A person of ordinary skill in the art would be motivated to combine Johnston '087 with Wijngaarden '381 for many reasons. For example, Johnston '087 describes, "a superframe counter [that] provides error checking for potential dropped frames." *See, e.g.*, Johnston '087 at 6:63-7:17, 7:18-29, Figs. 2-3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Johnston '087 to implement the details of "[i]n a passive optical network, an upstream transmission rate from an ONT to an OLT can be optimized by matching a

transmission scheme for a channel to the upstream transmission characteristics of the channel" including monitoring the BER and adjusting FEC accordingly taught by Wijngaarden '381 because, it is also directed at helping manage upstream burst overhead parameters. Wijngaarden '381 at abstract, [0022]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data transfer with minimal overhead. Wijngaarden '381 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine Johnston '087 with Wijngaarden '381 because (a) Johnston '087 and Wijngaarden '381 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wijngaarden '381's teachings with those of Johnston '087. For similar reasons, a person of ordinary skill in the art would be motivated to combine Johnston '087 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Johnston '087 with Andersen '455 for many reasons. For example, Johnston '087 describes, "a superframe counter [that] provides error checking for potential dropped frames." *See, e.g.*, Johnston '087 at 6:63-7:17, 7:18-29, Figs. 2-3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Johnston '087 to implement the details of "determining a momentary parameter value of at least one scheduling control parameter (PS) of a set of different scheduling control parameters" taught by Andersen '455 because, it is also directed at helping manage upstream burst overhead parameters. Andersen '455 at [0001], [0064]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data transfer. Andersen '455 at [0005]. In addition, a person of ordinary skill in the art would be

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motivated to combine Johnston ’087 with Andersen ’455 because (a) Johnston ’087 and Andersen ’455 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Andersen ’455’s teachings with those of Johnston ’087. For similar reasons, a person of ordinary skill in the art would be motivated to combine Johnston ’087 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Johnston ’087 with Krimmel ’362 for many reasons. For example, Johnston ’087 describes, “a superframe counter [that] provides error checking for potential dropped frames.” *See, e.g.*, Johnston ’087 at 6:63-7:17, 7:18-29, Figs. 2-3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Johnston ’087 to implement the details of “operating a passive optical network that is capable to consider changes of the transmission quality of a link” taught by Krimmel ’362 because, it is also directed at helping manage upstream burst overhead parameters. Krimmel ’362 at [0007], [0035]-[0037]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing the transmission rate. Krimmel ’362 at [0044]. In addition, a person of ordinary skill in the art would be motivated to combine Johnston ’087 with Krimmel ’362 because (a) Johnston ’087 and Krimmel ’362 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Krimmel ’362’s teachings with those of Johnston ’087. For similar reasons, a person of ordinary

skill in the art would be motivated to combine Johnston ’087 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Johnston ’087 and Dalton ’923 for many reasons. For example, Johnston ’087 describes, “a superframe counter [that] provides error checking for potential dropped frames.” *See, e.g.*, Johnston ’087 at 6:63-7:17, 7:18-29, Figs. 2-3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Johnston ’087 to implement the details of a “optical power control in a passive optical network (PON) and, more specifically, to adjusting a burst-mode data transmission preamble in response to power measurement” taught by Dalton ’923 because, it is also directed at helping manage upstream burst overhead parameters. Dalton ’923 at [0002]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as maximizing the available bandwidth. Dalton ’923 at [0011], [0024]. In addition, a person of ordinary skill in the art would be motivated to combine Johnston ’087 with Dalton ’923 because (a) Johnston ’087 and Dalton ’923 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Dalton ’923’s teachings with those of Johnston ’087. For similar reasons, a person of ordinary skill in the art would be motivated to combine Johnston ’087 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Johnston ’087 with Weeber ’729 for many reasons. For example, Johnston ’087 describes, “a superframe counter [that] provides error checking for potential dropped frames.” *See, e.g.*, Johnston ’087 at 6:63-7:17, 7:18-29, Figs. 2-3. A person having ordinary skill in the art would have been motivated to modify the

method and/or device of Johnston ’087 to implement the details of “bandwidth mapper 255 for managing transmissions in the upstream direction” taught by Weeber ’729 because, it is also directed at helping manage upstream burst overhead parameters. Weeber ’729 at [0056], [0068]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as enhancing upstream capacity. Weeber ’729 at [0056]. In addition, a person of ordinary skill in the art would be motivated to combine Johnston ’087 with Weeber ’729 because (a) Johnston ’087 and Weeber ’729 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Weeber ’729’s teachings with those of Johnston ’087. For similar reasons, a person of ordinary skill in the art would be motivated to combine Johnston ’087 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Johnston ’087 with the G-PON Standard for many reasons. For example, Johnston ’087 describes, “a superframe counter [that] provides error checking for potential dropped frames.” *See, e.g.*, Johnston ’087 at 6:63-7:17, 7:18-29, Figs. 2-3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Johnston ’087 to implement the details of “gigabit-capable passive optical networks [GPON]” including where the “OLTs set the desired ONU FEC encoding status (on/off)” as taught by the G-PON Standard because, it is also directed at helping manage upstream burst overhead parameters. G-PON Standard, G.984.3 at i, 36-38, 92-93. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as improving data transfer. G-PON Standard, G.984.3 at 36-38, 92-93. In addition, a person of ordinary skill in the

art would be motivated to combine Johnston '087 with the G-PON Standard because (a) Johnston '087 and the G-PON Standard disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the G-PON Standard's teachings with those of Johnston '087. For similar reasons, a person of ordinary skill in the art would be motivated to combine Johnston '087 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Johnston '087 with Li '413 for many reasons. For example, Johnston '087 describes, "a superframe counter [that] provides error checking for potential dropped frames." *See, e.g.*, Johnston '087 at 6:63-7:17, 7:18-29, Figs. 2-3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Johnston '087 to implement the details of "a performance monitoring mechanism configured to monitor performance of the PON based on received optical signals" that includes "BER-based performance monitoring" taught by Li '413 because, it is also directed at helping manage upstream burst overhead parameters. Li '413 at abstract, [0060]-[0064]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as better monitoring the link quality. Li '413 at [0038]. In addition, a person of ordinary skill in the art would be motivated to combine Johnston '087 with Li '413 because (a) Johnston '087 and Li '413 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Li '413's teachings with those of Johnston '087. For similar

reasons, a person of ordinary skill in the art would be motivated to combine Johnston '087 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Johnston '087 with Khermosh '378 for many reasons. For example, Johnston '087 describes, "a superframe counter [that] provides error checking for potential dropped frames." *See, e.g.*, Johnston '087 at 6:63-7:17, 7:18-29, Figs. 2-3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Johnston '087 to implement the details of "managing forward error correction" by "monitoring communications quality from the optical network unit… [or] from the optical line terminal" taught by Khermosh '378 because, it is also directed at helping manage upstream burst overhead parameters. Khermosh '378 at [0011]-[0012]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as reducing the error rate during data transfer. Khermosh '378 at [0006], [0008]-[0012]. In addition, a person of ordinary skill in the art would be motivated to combine Johnston '087 with Khermosh '378 because (a) Johnston '087 and Khermosh '378 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Khermosh '378's teachings with those of Johnston '087. For similar reasons, a person of ordinary skill in the art would be motivated to combine Johnston '087 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Johnston '087 with Kanno '158 for many reasons. For example, Johnston '087 describes, "a superframe counter [that] provides error checking for potential dropped frames." *See, e.g.*, Johnston '087 at 6:63-7:17, 7:18-

29, Figs. 2-3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Johnston ’087 to implement the details of “counting, in each of the plurality of subscriber terminating units, an error count … and determining, in the office terminal unit, based on the received error count, an error correction method or an error correction disuse which is used in each of the plurality of subscriber terminating units” taught by Kanno ’158 because, it is also directed at helping manage upstream burst overhead parameters. Kanno ’158 at [0015], [0060]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing the length of the overhead in a parity for the error correction in the up-link direction. Kanno ’158 at [0060]. In addition, a person of ordinary skill in the art would be motivated to combine Johnston ’087 with Kanno ’158 because (a) Johnston ’087 and Kanno ’158 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kanno ’158’s teachings with those of Johnston ’087. For similar reasons, a person of ordinary skill in the art would be motivated to combine Johnston ’087 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Johnston ’087 with Wijngaarden ’380 for many reasons. For example, Johnston ’087 describes, “a superframe counter [that] provides error checking for potential dropped frames.” *See, e.g.*, Johnston ’087 at 6:63-7:17, 7:18-29, Figs. 2-3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Johnston ’087 to implement the details of “a downstream transmission rate from an OLT to multiple ONTs can be optimized by matching a transmission scheme for frames addressed to a channel to the downstream transmission characteristics of the channel”

taught by Wijngaarden ’380 because, it is also directed at helping manage upstream burst overhead parameters. Wijngaarden ’380 at [0035], Fig. 3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as minimizing error rates during data transfer while also minimizing overhead. Wijngaarden ’380 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine Johnston ’087 with Wijngaarden ’380 because (a) Johnston ’087 and Wijngaarden ’380 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wijngaarden ’380’s teachings with those of Johnston ’087. For similar reasons, a person of ordinary skill in the art would be motivated to combine Johnston ’087 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Johnston ’087 with Lee ’822 for many reasons. For example, Johnston ’087 describes, “a superframe counter [that] provides error checking for potential dropped frames.” *See, e.g.*, Johnston ’087 at 6:63-7:17, 7:18-29, Figs. 2-3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Johnston ’087 to implement the details of “controlling effective FEC of an ONU and an OLT without changing an RTT based on optical link quality” taught by Lee ’822 because, it is also directed at helping manage upstream burst overhead parameters. Lee ’822 at abstract, [0029]-[0030], Fig. 4. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data throughout. Lee ’822 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine Johnston ’087 with Lee ’822 because (a) Johnston ’087 and Lee ’822 disclose similar products, methods, and

solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Lee '822's teachings with those of Johnston '087. For similar reasons, a person of ordinary skill in the art would be motivated to combine Johnston '087 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Johnston '087 with the XG-PON Standard for many reasons. For example, Johnston '087 describes, "a superframe counter [that] provides error checking for potential dropped frames." *See, e.g.*, Johnston '087 at 6:63-7:17, 7:18-29, Figs. 2-3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Johnston '087 to implement the details of "10-gigabit-capable passive optical networks" including where "[t]he OLT dynamically activates or deactivates the FEC functionality for a given ONU in the upstream direction by selecting the appropriate burst profile" as taught by the XG-PON Standard because, it is also directed at helping manage upstream burst overhead parameters. XG-PON Standard, G.987.3 at i, 33, G.987.2 at 22. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as dynamically adjusting the burst profile. XG-PON Standard, G.987.2 at 22. In addition, a person of ordinary skill in the art would be motivated to combine Johnston '087 with the XG-PON Standard because (a) Johnston '087 and the XG-PON Standard disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the XG-PON Standard's teachings with those of Johnston '087. For similar reasons, a person of ordinary skill in the art

would be motivated to combine Johnston ’087 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Johnston ’087 with G.987.2 Rev 3 for many reasons. For example, Johnston ’087 describes, “a superframe counter [that] provides error checking for potential dropped frames.” *See, e.g.*, Johnston ’087 at 6:63-7:17, 7:18-29, Figs. 2-3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Johnston ’087 to implement the details of “a burst profile” based on “operationally dependent factors” as taught by G.987.2 Rev 3 because, it is also directed at helping manage upstream burst overhead parameters. G.987.2 Rev 3 at 43-44. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as adjusting the burst overhead based on operationally dependent factors. G.987.2 Rev 3 at 43-44. In addition, a person of ordinary skill in the art would be motivated to combine Johnston ’087 with G.987.2 Rev 3 because (a) Johnston ’087 and G.987.2 Rev 3 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.2 Rev 3’s teachings with those of Johnston ’087. For similar reasons, a person of ordinary skill in the art would be motivated to combine Johnston ’087 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Johnston ’087 with G.987.3 Draft for many reasons. For example, Johnston ’087 describes, “a superframe counter [that] provides error checking for potential dropped frames.” *See, e.g.*, Johnston ’087 at 6:63-7:17, 7:18-29, Figs. 2-3. A person having ordinary skill in the art would have been motivated to modify

the method and/or device of Johnston ’087 to implement the details of “the draft ITU_T Recommendation G.987.3 that describes the Transmission Convergence layer for 10-Gigabit-capable Optical Network systems” as taught by G.987.3 Draft because, it is also directed at helping efficiently manage upstream burst overhead parameters. G.987.3 Draft at 1, 135. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as adjusting the burst overhead based on link quality. G.987.3 Draft at 49. In addition, a person of ordinary skill in the art would be motivated to combine Johnston ’087 with G.987.3 Draft because (a) Johnston ’087 and G.987.3 Draft disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3 Draft’s teachings with those of Johnston ’087. For similar reasons, a person of ordinary skill in the art would be motivated to combine Johnston ’087 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

(12) Exemplary Lee ’822 Solutions

A person of ordinary skill in the art would be motivated to combine Lee ’822 with Wijngaarden ’381 for many reasons. For example, Lee ’822 describes, “controlling effective FEC of an ONU and an OLT without changing an RTT based on optical link quality.” *See, e.g.*, Lee ’822 at abstract, [0029]-[0030], Fig. 4. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Lee ’822 to implement the details of “[i]n a passive optical network, an upstream transmission rate from an ONT to an OLT can be optimized by matching a transmission scheme for a channel to the upstream transmission characteristics of the channel” including monitoring the BER and adjusting FEC accordingly taught by Wijngaarden ’381 because, it is also directed at helping manage upstream burst overhead parameters.

Wijngaarden ’381 at abstract, [0022]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data transfer with minimal overhead. Wijngaarden ’381 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine Lee ’822 with Wijngaarden ’381 because (a) Lee ’822 and Wijngaarden ’381 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wijngaarden ’381’s teachings with those of Lee ’822. For similar reasons, a person of ordinary skill in the art would be motivated to combine Lee ’822 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Lee ’822 with Andersen ’455 for many reasons. For example, Lee ’822 describes, “controlling effective FEC of an ONU and an OLT without changing an RTT based on optical link quality.” *See, e.g.*, Lee ’822 at abstract, [0029]-[0030], Fig. 4. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Lee ’822 to implement the details of “determining a momentary parameter value of at least one scheduling control parameter (PS) of a set of different scheduling control parameters” taught by Andersen ’455 because, it is also directed at helping manage upstream burst overhead parameters. Andersen ’455 at [0001], [0064]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data transfer. Andersen ’455 at [0005]. In addition, a person of ordinary skill in the art would be motivated to combine Lee ’822 with Andersen ’455 because (a) Lee ’822 and Andersen ’455 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage

upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Andersen '455's teachings with those of Lee '822. For similar reasons, a person of ordinary skill in the art would be motivated to combine Lee '822 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Lee '822 with Krimmel '362 for many reasons. For example, Lee '822 describes, "controlling effective FEC of an ONU and an OLT without changing an RTT based on optical link quality." *See, e.g.*, Lee '822 at abstract, [0029]-[0030], Fig. 4. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Lee '822 to implement the details of "operating a passive optical network that is capable to consider changes of the transmission quality of a link" taught by Krimmel '362 because, it is also directed at helping manage upstream burst overhead parameters. Krimmel '362 at [0007], [0035]-[0037]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing the transmission rate. Krimmel '362 at [0044]. In addition, a person of ordinary skill in the art would be motivated to combine Lee '822 with Krimmel '362 because (a) Lee '822 and Krimmel '362 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Krimmel '362's teachings with those of Lee '822. For similar reasons, a person of ordinary skill in the art would be motivated to combine Lee '822 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Lee '822 and Dalton '923 for many reasons. For example, Lee '822 describes, "controlling effective FEC of an ONU

and an OLT without changing an RTT based on optical link quality." *See, e.g.*, Lee '822 at abstract, [0029]-[0030], Fig. 4. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Lee '822 to implement the details of a "optical power control in a passive optical network (PON) and, more specifically, to adjusting a burst-mode data transmission preamble in response to power measurement" taught by Dalton '923 because, it is also directed at helping manage upstream burst overhead parameters. Dalton '923 at [0002]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as maximizing the available bandwidth. Dalton '923 at [0011], [0024]. In addition, a person of ordinary skill in the art would be motivated to combine Lee '822 with Dalton '923 because (a) Lee '822 and Dalton '923 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Dalton '923's teachings with those of Lee '822. For similar reasons, a person of ordinary skill in the art would be motivated to combine Lee '822 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Lee '822 with Weeber '729 for many reasons. For example, Lee '822 describes, "controlling effective FEC of an ONU and an OLT without changing an RTT based on optical link quality." *See, e.g.*, Lee '822 at abstract, [0029]-[0030], Fig. 4. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Lee '822 to implement the details of "bandwidth mapper 255 for managing transmissions in the upstream direction" taught by Weeber '729 because, it is also directed at helping manage upstream burst overhead parameters. Weeber '729 at [0056], [0068]. A person of ordinary skill in the art would be motivated by the advantages of such functionality,

such as enhancing upstream capacity. Weeber ’729 at [0056]. In addition, a person of ordinary skill in the art would be motivated to combine Lee ’822 with Weeber ’729 because (a) Lee ’822 and Weeber ’729 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Weeber ’729’s teachings with those of Lee ’822. For similar reasons, a person of ordinary skill in the art would be motivated to combine Lee ’822 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Lee ’822 with the G-PON Standard for many reasons. For example, Lee ’822 describes, “controlling effective FEC of an ONU and an OLT without changing an RTT based on optical link quality.” *See, e.g.*, Lee ’822 at abstract, [0029]-[0030], Fig. 4. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Lee ’822 to implement the details of “gigabit-capable passive optical networks [GPON]” including where the “OLTs set the desired ONU FEC encoding status (on/off)” as taught by the G-PON Standard because, it is also directed at helping manage upstream burst overhead parameters. G-PON Standard, G.984.3 at i, 36-38, 92-93. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as improving data transfer. G-PON Standard, G.984.3 at 36-38, 92-93. In addition, a person of ordinary skill in the art would be motivated to combine Lee ’822 with the G-PON Standard because (a) Lee ’822 and the G-PON Standard disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the G-PON Standard’s teachings

with those of Lee ’822. For similar reasons, a person of ordinary skill in the art would be motivated to combine Lee ’822 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Lee ’822 with Li ’413 for many reasons. For example, Lee ’822 describes, “controlling effective FEC of an ONU and an OLT without changing an RTT based on optical link quality.” *See, e.g.*, Lee ’822 at abstract, [0029]-[0030], Fig. 4. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Lee ’822 to implement the details of “a performance monitoring mechanism configured to monitor performance of the PON based on received optical signals” that includes “BER-based performance monitoring” taught by Li ’413 because, it is also directed at helping manage upstream burst overhead parameters. Li ’413 at abstract, [0060]-[0064]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as better monitoring the link quality. Li ’413 at [0038]. In addition, a person of ordinary skill in the art would be motivated to combine Lee ’822 with Li ’413 because (a) Lee ’822 and Li ’413 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Li ’413’s teachings with those of Lee ’822. For similar reasons, a person of ordinary skill in the art would be motivated to combine Lee ’822 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Lee ’822 with Khermosh ’378 for many reasons. For example, Lee ’822 describes, “controlling effective FEC of an ONU and an OLT without changing an RTT based on optical link quality.” *See, e.g.*, Lee ’822

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at abstract, [0029]-[0030], Fig. 4. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Lee '822 to implement the details of "managing forward error correction" by "monitoring communications quality from the optical network unit… [or] from the optical line terminal" taught by Khermosh '378 because, it is also directed at helping manage upstream burst overhead parameters. Khermosh '378 at [0011]-[0012]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as reducing the error rate during data transfer. Khermosh '378 at [0006], [0008]-[0012]. In addition, a person of ordinary skill in the art would be motivated to combine Lee '822 with Khermosh '378 because (a) Lee '822 and Khermosh '378 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Khermosh '378's teachings with those of Lee '822. For similar reasons, a person of ordinary skill in the art would be motivated to combine Lee '822 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Lee '822 with Kanno '158 for many reasons. For example, Lee '822 describes, "controlling effective FEC of an ONU and an OLT without changing an RTT based on optical link quality." *See, e.g.*, Lee '822 at abstract, [0029]-[0030], Fig. 4. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Lee '822 to implement the details of "counting, in each of the plurality of subscriber terminating units, an error count … and determining, in the office terminal unit, based on the received error count, an error correction method or an error correction disuse which is used in each of the plurality of subscriber terminating units" taught by Kanno '158

because, it is also directed at helping manage upstream burst overhead parameters. Kanno ’158 at [0015], [0060]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing the length of the overhead in a parity for the error correction in the up-link direction. Kanno ’158 at [0060]. In addition, a person of ordinary skill in the art would be motivated to combine Lee ’822 with Kanno ’158 because (a) Lee ’822 and Kanno ’158 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kanno ’158’s teachings with those of Lee ’822. For similar reasons, a person of ordinary skill in the art would be motivated to combine Lee ’822 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Lee ’822 with Wijngaarden ’380 for many reasons. For example, Lee ’822 describes, “controlling effective FEC of an ONU and an OLT without changing an RTT based on optical link quality.” *See, e.g.*, Lee ’822 at abstract, [0029]-[0030], Fig. 4. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Lee ’822 to implement the details of “a downstream transmission rate from an OLT to multiple ONTs can be optimized by matching a transmission scheme for frames addressed to a channel to the downstream transmission characteristics of the channel” taught by Wijngaarden ’380 because, it is also directed at helping manage upstream burst overhead parameters. Wijngaarden ’380 at [0035], Fig. 3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as minimizing error rates during data transfer while also minimizing overhead. Wijngaarden ’380 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine Lee ’822

with Wijngaarden ’380 because (a) Lee ’822 and Wijngaarden ’380 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wijngaarden ’380’s teachings with those of Lee ’822. For similar reasons, a person of ordinary skill in the art would be motivated to combine Lee ’822 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Lee ’822 with Johnston ’087 for many reasons. For example, Lee ’822 describes, “controlling effective FEC of an ONU and an OLT without changing an RTT based on optical link quality.” *See, e.g.*, Lee ’822 at abstract, [0029]-[0030], Fig. 4. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Lee ’822 to implement the details of “a superframe counter [that] provides error checking for potential dropped frames” taught by Johnston ’087 because, it is also directed at helping manage upstream burst overhead parameters. Johnston ’087 at 6:63-7:17, 7:18-29, Figs. 2-3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing upstream data transfer. Johnston ’087 at 4:36-5:3. In addition, a person of ordinary skill in the art would be motivated to combine Lee ’822 with Johnston ’087 because (a) Lee ’822 and Johnston ’087 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Johnston ’087’s teachings with those of Lee ’822. For similar reasons, a person of ordinary skill in the art would

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be motivated to combine Lee '822 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Lee '822 with the XG-PON Standard for many reasons. For example, Lee '822 describes, "controlling effective FEC of an ONU and an OLT without changing an RTT based on optical link quality." *See, e.g.*, Lee '822 at abstract, [0029]-[0030], Fig. 4. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Lee '822 to implement the details of "10-gigabit-capable passive optical networks" including where "[t]he OLT dynamically activates or deactivates the FEC functionality for a given ONU in the upstream direction by selecting the appropriate burst profile" as taught by the XG-PON Standard because, it is also directed at helping manage upstream burst overhead parameters. XG-PON Standard, G.987.3 at i, 33, G.987.2 at 22. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as dynamically adjusting the burst profile. XG-PON Standard, G.987.2 at 22. In addition, a person of ordinary skill in the art would be motivated to combine Lee '822 with the XG-PON Standard because (a) Lee '822 and the XG-PON Standard disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the XG-PON Standard's teachings with those of Lee '822. For similar reasons, a person of ordinary skill in the art would be motivated to combine Lee '822 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Lee '822 with G.987.2 Rev 3 for many reasons. For example, Lee '822 describes, "controlling effective FEC of an ONU

and an OLT without changing an RTT based on optical link quality." *See, e.g.*, Lee '822 at abstract, [0029]-[0030], Fig. 4. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Lee '822 to implement the details of "a burst profile" based on "operationally dependent factors" as taught by G.987.2 Rev 3 because, it is also directed at helping manage upstream burst overhead parameters. G.987.2 Rev 3 at 43-44. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as adjusting the burst overhead based on operationally dependent factors. G.987.2 Rev 3 at 43-44. In addition, a person of ordinary skill in the art would be motivated to combine Lee '822 with G.987.2 Rev 3 because (a) Lee '822 and G.987.2 Rev 3 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.2 Rev 3's teachings with those of Lee '822. For similar reasons, a person of ordinary skill in the art would be motivated to combine Lee '822 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Lee '822 with G.987.3 Draft for many reasons. For example, Lee '822 describes, "controlling effective FEC of an ONU and an OLT without changing an RTT based on optical link quality." *See, e.g.*, Lee '822 at abstract, [0029]-[0030], Fig. 4. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Lee '822 to implement the details of "the draft ITU_T Recommendation G.987.3 that describes the Transmission Convergence layer for 10-Gigabit-capable Optical Network systems" as taught by G.987.3 Draft because, it is also directed at helping efficiently manage upstream burst overhead parameters. G.987.3 Draft at 1, 135. A person of

ordinary skill in the art would be motivated by the advantages of such functionality, such as adjusting the burst overhead based on link quality. G.987.3 Draft at 49. In addition, a person of ordinary skill in the art would be motivated to combine Lee '822 with G.987.3 Draft because (a) Lee '822 and G.987.3 Draft disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3 Draft's teachings with those of Lee '822. For similar reasons, a person of ordinary skill in the art would be motivated to combine Lee '822 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

(13) Exemplary XG-PON Standard Solutions

A person of ordinary skill in the art would be motivated to combine the XG-PON Standard with Wijngaarden '381 for many reasons. For example, the XG-PON Standard describes, "10-gigabit-capable passive optical networks" including where "[t]he OLT dynamically activates or deactivates the FEC functionality for a given ONU in the upstream direction by selecting the appropriate burst profile." *See, e.g.*, XG-PON Standard, G.987.3 at i, 33, G.987.2 at 22. A person having ordinary skill in the art would have been motivated to modify the method and/or device of the XG-PON Standard to implement the details of "[i]n a passive optical network, an upstream transmission rate from an ONT to an OLT can be optimized by matching a transmission scheme for a channel to the upstream transmission characteristics of the channel" including monitoring the BER and adjusting FEC accordingly taught by Wijngaarden '381 because, it is also directed at helping manage upstream burst overhead parameters. Wijngaarden '381 at abstract, [0022]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data transfer with minimal overhead. Wijngaarden '381 at abstract. In addition, a

person of ordinary skill in the art would be motivated to combine the XG-PON Standard with Wijngaarden ’381 because (a) the XG-PON Standard and Wijngaarden ’381 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wijngaarden ’381’s teachings with those of the XG-PON Standard. For similar reasons, a person of ordinary skill in the art would be motivated to combine the XG-PON Standard with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine the XG-PON Standard with Andersen ’455 for many reasons. For example, the XG-PON Standard describes, “10-gigabit-capable passive optical networks” including where “[t]he OLT dynamically activates or deactivates the FEC functionality for a given ONU in the upstream direction by selecting the appropriate burst profile.” *See, e.g.*, XG-PON Standard, G.987.3 at i, 33, G.987.2 at 22. A person having ordinary skill in the art would have been motivated to modify the method and/or device of the XG-PON Standard to implement the details of “determining a momentary parameter value of at least one scheduling control parameter (PS) of a set of different scheduling control parameters” taught by Andersen ’455 because, it is also directed at helping manage upstream burst overhead parameters. Andersen ’455 at [0001], [0064]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data transfer. Andersen ’455 at [0005]. In addition, a person of ordinary skill in the art would be motivated to combine the XG-PON Standard with Andersen ’455 because (a) the XG-PON Standard and Andersen ’455 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst

overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Andersen '455's teachings with those of the XG-PON Standard. For similar reasons, a person of ordinary skill in the art would be motivated to combine the XG-PON Standard with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine the XG-PON Standard with Krimmel '362 for many reasons. For example, the XG-PON Standard describes, "10-gigabit-capable passive optical networks" including where "[t]he OLT dynamically activates or deactivates the FEC functionality for a given ONU in the upstream direction by selecting the appropriate burst profile." *See, e.g.*, XG-PON Standard, G.987.3 at i, 33, G.987.2 at 22. A person having ordinary skill in the art would have been motivated to modify the method and/or device of the XG-PON Standard to implement the details of "operating a passive optical network that is capable to consider changes of the transmission quality of a link" taught by Krimmel '362 because, it is also directed at helping manage upstream burst overhead parameters. Krimmel '362 at [0007], [0035]-[0037]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing the transmission rate. Krimmel '362 at [0044]. In addition, a person of ordinary skill in the art would be motivated to combine the XG-PON Standard with Krimmel '362 because (a) the XG-PON Standard and Krimmel '362 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Krimmel '362's teachings with those of the XG-PON Standard. For similar reasons, a person of ordinary skill in the art would be motivated to combine the XG-PON Standard with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine the XG-PON Standard and Dalton '923 for many reasons. For example, the XG-PON Standard describes, "10-gigabit-capable passive optical networks" including where "[t]he OLT dynamically activates or deactivates the FEC functionality for a given ONU in the upstream direction by selecting the appropriate burst profile." *See, e.g.*, XG-PON Standard, G.987.3 at i, 33, G.987.2 at 22. A person having ordinary skill in the art would have been motivated to modify the method and/or device of the XG-PON Standard to implement the details of a "optical power control in a passive optical network (PON) and, more specifically, to adjusting a burst-mode data transmission preamble in response to power measurement" taught by Dalton '923 because, it is also directed at helping manage upstream burst overhead parameters. Dalton '923 at [0002]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as maximizing the available bandwidth. Dalton '923 at [0011], [0024]. In addition, a person of ordinary skill in the art would be motivated to combine the XG-PON Standard with Dalton '923 because (a) the XG-PON Standard and Dalton '923 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Dalton '923's teachings with those of the XG-PON Standard. For similar reasons, a person of ordinary skill in the art would be motivated to combine the XG-PON Standard with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine the XG-PON Standard with Weeber '729 for many reasons. For example, the XG-PON Standard describes, "10-gigabit-capable passive optical networks" including where "[t]he OLT dynamically activates or

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deactivates the FEC functionality for a given ONU in the upstream direction by selecting the appropriate burst profile." *See, e.g.*, XG-PON Standard, G.987.3 at i, 33, G.987.2 at 22. A person having ordinary skill in the art would have been motivated to modify the method and/or device of the XG-PON Standard to implement the details of "bandwidth mapper 255 for managing transmissions in the upstream direction" taught by Weeber '729 because, it is also directed at helping manage upstream burst overhead parameters. Weeber '729 at [0056], [0068]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as enhancing upstream capacity. Weeber '729 at [0056]. In addition, a person of ordinary skill in the art would be motivated to combine the XG-PON Standard with Weeber '729 because (a) the XG-PON Standard and Weeber '729 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Weeber '729's teachings with those of the XG-PON Standard. For similar reasons, a person of ordinary skill in the art would be motivated to combine the XG-PON Standard with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine the XG-PON Standard with the G-PON Standard for many reasons. For example, the XG-PON Standard describes, "10-gigabit-capable passive optical networks" including where "[t]he OLT dynamically activates or deactivates the FEC functionality for a given ONU in the upstream direction by selecting the appropriate burst profile." *See, e.g.*, XG-PON Standard, G.987.3 at i, 33, G.987.2 at 22. A person having ordinary skill in the art would have been motivated to modify the method and/or device of the XG-PON Standard to implement the details of "gigabit-capable passive optical networks

[GPON]" including where the "OLTs set the desired ONU FEC encoding status (on/off)" as taught by the G-PON Standard because, it is also directed at helping manage upstream burst overhead parameters. G-PON Standard, G.984.3 at i, 36-38, 92-93. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as improving data transfer. G-PON Standard, G.984.3 at 36-38, 92-93. In addition, a person of ordinary skill in the art would be motivated to combine the XG-PON Standard with the G-PON Standard because (a) the XG-PON Standard and the G-PON Standard disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the G-PON Standard's teachings with those of the XG-PON Standard. For similar reasons, a person of ordinary skill in the art would be motivated to combine the XG-PON Standard with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine the XG-PON Standard with Li '413 for many reasons. For example, the XG-PON Standard describes, "10-gigabit-capable passive optical networks" including where "[t]he OLT dynamically activates or deactivates the FEC functionality for a given ONU in the upstream direction by selecting the appropriate burst profile." *See, e.g.*, XG-PON Standard, G.987.3 at i, 33, G.987.2 at 22. A person having ordinary skill in the art would have been motivated to modify the method and/or device of the XG-PON Standard to implement the details of "a performance monitoring mechanism configured to monitor performance of the PON based on received optical signals" that includes "BER-based performance monitoring" taught by Li '413 because, it is also directed at helping manage upstream burst overhead parameters. Li '413 at abstract, [0060]-[0064]. A person of ordinary skill in the art would

be motivated by the advantages of such functionality, such as better monitoring the link quality. Li '413 at [0038]. In addition, a person of ordinary skill in the art would be motivated to combine the XG-PON Standard with Li '413 because (a) the XG-PON Standard and Li '413 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Li '413's teachings with those of the XG-PON Standard. For similar reasons, a person of ordinary skill in the art would be motivated to combine the XG-PON Standard with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine the XG-PON Standard with Khermosh '378 for many reasons. For example, the XG-PON Standard describes, "10-gigabit-capable passive optical networks" including where "[t]he OLT dynamically activates or deactivates the FEC functionality for a given ONU in the upstream direction by selecting the appropriate burst profile." *See, e.g.*, XG-PON Standard, G.987.3 at i, 33, G.987.2 at 22. A person having ordinary skill in the art would have been motivated to modify the method and/or device of the XG-PON Standard to implement the details of "managing forward error correction" by "monitoring communications quality from the optical network unit… [or] from the optical line terminal" taught by Khermosh '378 because, it is also directed at helping manage upstream burst overhead parameters. Khermosh '378 at [0011]-[0012]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as reducing the error rate during data transfer. Khermosh '378 at [0006], [0008]-[0012]. In addition, a person of ordinary skill in the art would be motivated to combine the XG-PON Standard with Khermosh '378 because (a) the XG-PON Standard and Khermosh '378 disclose similar products, methods, and solutions; and (b) both

references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Khermosh '378's teachings with those of the XG-PON Standard. For similar reasons, a person of ordinary skill in the art would be motivated to combine the XG-PON Standard with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine the XG-PON Standard with Kanno '158 for many reasons. For example, the XG-PON Standard describes, "10-gigabit-capable passive optical networks" including where "[t]he OLT dynamically activates or deactivates the FEC functionality for a given ONU in the upstream direction by selecting the appropriate burst profile." *See, e.g.*, XG-PON Standard, G.987.3 at i, 33, G.987.2 at 22. A person having ordinary skill in the art would have been motivated to modify the method and/or device of the XG-PON Standard to implement the details of "counting, in each of the plurality of subscriber terminating units, an error count … and determining, in the office terminal unit, based on the received error count, an error correction method or an error correction disuse which is used in each of the plurality of subscriber terminating units" taught by Kanno '158 because, it is also directed at helping manage upstream burst overhead parameters. Kanno '158 at [0015], [0060]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing the length of the overhead in a parity for the error correction in the up-link direction. Kanno '158 at [0060]. In addition, a person of ordinary skill in the art would be motivated to combine the XG-PON Standard with Kanno '158 because (a) the XG-PON Standard and Kanno '158 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage

upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kanno '158's teachings with those of the XG-PON Standard. For similar reasons, a person of ordinary skill in the art would be motivated to combine the XG-PON Standard with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine the XG-PON Standard with Wijngaarden '380 for many reasons. For example, the XG-PON Standard describes, "10-gigabit-capable passive optical networks" including where "[t]he OLT dynamically activates or deactivates the FEC functionality for a given ONU in the upstream direction by selecting the appropriate burst profile." *See, e.g.*, XG-PON Standard, G.987.3 at i, 33, G.987.2 at 22. A person having ordinary skill in the art would have been motivated to modify the method and/or device of the XG-PON Standard to implement the details of "a downstream transmission rate from an OLT to multiple ONTs can be optimized by matching a transmission scheme for frames addressed to a channel to the downstream transmission characteristics of the channel" taught by Wijngaarden '380 because, it is also directed at helping manage upstream burst overhead parameters. Wijngaarden '380 at [0035], Fig. 3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as minimizing error rates during data transfer while also minimizing overhead. Wijngaarden '380 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine the XG-PON Standard with Wijngaarden '380 because (a) the XG-PON Standard and Wijngaarden '380 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wijngaarden '380's teachings with

those of the XG-PON Standard. For similar reasons, a person of ordinary skill in the art would be motivated to combine the XG-PON Standard with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine the XG-PON Standard with Johnston ’087 for many reasons. For example, the XG-PON Standard describes, “10-gigabit-capable passive optical networks” including where “[t]he OLT dynamically activates or deactivates the FEC functionality for a given ONU in the upstream direction by selecting the appropriate burst profile.” *See, e.g.*, XG-PON Standard, G.987.3 at i, 33, G.987.2 at 22. A person having ordinary skill in the art would have been motivated to modify the method and/or device of the XG-PON Standard to implement the details of “a superframe counter [that] provides error checking for potential dropped frames” taught by Johnston ’087 because, it is also directed at helping manage upstream burst overhead parameters. Johnston ’087 at 6:63-7:17, 7:18-29, Figs. 2-3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing upstream data transfer. Johnston ’087 at 4:36-5:3. In addition, a person of ordinary skill in the art would be motivated to combine the XG-PON Standard with Johnston ’087 because (a) the XG-PON Standard and Johnston ’087 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Johnston ’087’s teachings with those of the XG-PON Standard. For similar reasons, a person of ordinary skill in the art would be motivated to combine the XG-PON Standard with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

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A person of ordinary skill in the art would be motivated to combine the XG-PON Standard with Lee '822 for many reasons. For example, the XG-PON Standard describes, "10-gigabit-capable passive optical networks" including where "[t]he OLT dynamically activates or deactivates the FEC functionality for a given ONU in the upstream direction by selecting the appropriate burst profile." *See, e.g.*, XG-PON Standard, G.987.3 at i, 33, G.987.2 at 22. A person having ordinary skill in the art would have been motivated to modify the method and/or device of the XG-PON Standard to implement the details of "controlling effective FEC of an ONU and an OLT without changing an RTT based on optical link quality" taught by Lee '822 because, it is also directed at helping manage upstream burst overhead parameters. Lee '822 at abstract, [0029]-[0030], Fig. 4. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data throughout. Lee '822 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine the XG-PON Standard with Lee '822 because (a) the XG-PON Standard and Lee '822 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Lee '822's teachings with those of the XG-PON Standard. For similar reasons, a person of ordinary skill in the art would be motivated to combine the XG-PON Standard with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine the XG-PON Standard with G.987.2 Rev 3 for many reasons. For example, the XG-PON Standard describes, "10-gigabit-capable passive optical networks" including where "[t]he OLT dynamically activates or deactivates the FEC functionality for a given ONU in the upstream direction by selecting the

appropriate burst profile." *See, e.g.*, XG-PON Standard, G.987.3 at i, 33, G.987.2 at 22. A person having ordinary skill in the art would have been motivated to modify the method and/or device of the XG-PON Standard to implement the details of "a burst profile" based on "operationally dependent factors" as taught by G.987.2 Rev 3 because, it is also directed at helping manage upstream burst overhead parameters. G.987.2 Rev 3 at 43-44. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as adjusting the burst overhead based on operationally dependent factors. G.987.2 Rev 3 at 43-44. In addition, a person of ordinary skill in the art would be motivated to combine the XG-PON Standard with G.987.2 Rev 3 because (a) the XG-PON Standard and G.987.2 Rev 3 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.2 Rev 3's teachings with those of the XG-PON Standard. For similar reasons, a person of ordinary skill in the art would be motivated to combine the XG-PON Standard with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine the XG-PON Standard with G.987.3 Draft for many reasons. For example, the XG-PON Standard describes, "10-gigabit-capable passive optical networks" including where "[t]he OLT dynamically activates or deactivates the FEC functionality for a given ONU in the upstream direction by selecting the appropriate burst profile." *See, e.g.*, XG-PON Standard, G.987.3 at i, 33, G.987.2 at 22. A person having ordinary skill in the art would have been motivated to modify the method and/or device of the XG-PON Standard to implement the details of "the draft ITU_T Recommendation G.987.3 that describes the Transmission Convergence layer for 10-Gigabit-capable Optical Network

systems" as taught by G.987.3 Draft because, it is also directed at helping efficiently manage upstream burst overhead parameters. G.987.3 Draft at 1, 135. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as adjusting the burst overhead based on link quality. G.987.3 Draft at 49. In addition, a person of ordinary skill in the art would be motivated to combine the XG-PON Standard with G.987.3 Draft because (a) the XG-PON Standard and G.987.3 Draft disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3 Draft's teachings with those of the XG-PON Standard. For similar reasons, a person of ordinary skill in the art would be motivated to combine the XG-PON Standard with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

(14) Exemplary G.987.2 Rev 3 Solutions

A person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with Wijngaarden '381 for many reasons. For example, G.987.2 Rev 3 describes, "a burst profile" based on "operationally dependent factors." *See, e.g.*, G.987.2 Rev 3 at 43-44. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.2 Rev 3 to implement the details of "[i]n a passive optical network, an upstream transmission rate from an ONT to an OLT can be optimized by matching a transmission scheme for a channel to the upstream transmission characteristics of the channel" including monitoring the BER and adjusting FEC accordingly taught by Wijngaarden '381 because, it is also directed at helping manage upstream burst overhead parameters. Wijngaarden '381 at abstract, [0022]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data transfer with minimal overhead. Wijngaarden '381 at abstract. In addition, a person of ordinary skill in the

art would be motivated to combine G.987.2 Rev 3 with Wijngaarden ’381 because (a) G.987.2 Rev 3 and Wijngaarden ’381 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wijngaarden ’381’s teachings with those of G.987.2 Rev 3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with Andersen ’455 for many reasons. For example, G.987.2 Rev 3 describes, “a burst profile” based on “operationally dependent factors.” *See, e.g.*, G.987.2 Rev 3 at 43-44. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.2 Rev 3 to implement the details of “determining a momentary parameter value of at least one scheduling control parameter (PS) of a set of different scheduling control parameters” taught by Andersen ’455 because, it is also directed at helping manage upstream burst overhead parameters. Andersen ’455 at [0001], [0064]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data transfer. Andersen ’455 at [0005]. In addition, a person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with Andersen ’455 because (a) G.987.2 Rev 3 and Andersen ’455 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Andersen ’455’s teachings with those of G.987.2 Rev 3. For similar reasons, a person of ordinary skill in the art

would be motivated to combine G.987.2 Rev 3 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with Krimmel ’362 for many reasons. For example, G.987.2 Rev 3 describes, “a burst profile” based on “operationally dependent factors.” *See, e.g.*, G.987.2 Rev 3 at 43-44. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.2 Rev 3 to implement the details of “operating a passive optical network that is capable to consider changes of the transmission quality of a link” taught by Krimmel ’362 because, it is also directed at helping manage upstream burst overhead parameters. Krimmel ’362 at [0007], [0035]-[0037]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing the transmission rate. Krimmel ’362 at [0044]. In addition, a person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with Krimmel ’362 because (a) G.987.2 Rev 3 and Krimmel ’362 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Krimmel ’362’s teachings with those of G.987.2 Rev 3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 and Dalton ’923 for many reasons. For example, G.987.2 Rev 3 describes, “a burst profile” based on “operationally dependent factors.” *See, e.g.*, G.987.2 Rev 3 at 43-44. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.2 Rev 3

to implement the details of a "optical power control in a passive optical network (PON) and, more specifically, to adjusting a burst-mode data transmission preamble in response to power measurement" taught by Dalton '923 because, it is also directed at helping manage upstream burst overhead parameters. Dalton '923 at [0002]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as maximizing the available bandwidth. Dalton '923 at [0011], [0024]. In addition, a person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with Dalton '923 because (a) G.987.2 Rev 3 and Dalton '923 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Dalton '923's teachings with those of G.987.2 Rev 3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with Weeber '729 for many reasons. For example, G.987.2 Rev 3 describes, "a burst profile" based on "operationally dependent factors." *See, e.g.*, G.987.2 Rev 3 at 43-44. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.2 Rev 3 to implement the details of "bandwidth mapper 255 for managing transmissions in the upstream direction" taught by Weeber '729 because, it is also directed at helping manage upstream burst overhead parameters. Weeber '729 at [0056], [0068]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as enhancing upstream capacity. Weeber '729 at [0056]. In addition, a person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with Weeber '729 because (a) G.987.2 Rev 3 and Weeber '729 disclose

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similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Weeber '729's teachings with those of G.987.2 Rev 3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with the G-PON Standard for many reasons. For example, G.987.2 Rev 3 describes, "a burst profile" based on "operationally dependent factors." *See, e.g.*, G.987.2 Rev 3 at 43-44. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.2 Rev 3 to implement the details of "gigabit-capable passive optical networks [GPON]" including where the "OLTs set the desired ONU FEC encoding status (on/off)" as taught by the G-PON Standard because, it is also directed at helping manage upstream burst overhead parameters. G-PON Standard, G.984.3 at i, 36-38, 92-93. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as improving data transfer. G-PON Standard, G.984.3 at 36-38, 92-93. In addition, a person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with the G-PON Standard because (a) G.987.2 Rev 3 and the G-PON Standard disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the G-PON Standard's teachings with those of G.987.2 Rev 3. For similar reasons, a person of ordinary skill in the art would be motivated to combine

G.987.2 Rev 3 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with Li '413 for many reasons. For example, G.987.2 Rev 3 describes, "a burst profile" based on "operationally dependent factors." *See, e.g.*, G.987.2 Rev 3 at 43-44. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.2 Rev 3 to implement the details of "a performance monitoring mechanism configured to monitor performance of the PON based on received optical signals" that includes "BER-based performance monitoring" taught by Li '413 because, it is also directed at helping manage upstream burst overhead parameters. Li '413 at abstract, [0060]-[0064]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as better monitoring the link quality. Li '413 at [0038]. In addition, a person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with Li '413 because (a) G.987.2 Rev 3 and Li '413 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Li '413's teachings with those of G.987.2 Rev 3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with Khermosh '378 for many reasons. For example, G.987.2 Rev 3 describes, "a burst profile" based on "operationally dependent factors." *See, e.g.*, G.987.2 Rev 3 at 43-44. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.2 Rev 3

to implement the details of "managing forward error correction" by "monitoring communications quality from the optical network unit… [or] from the optical line terminal" taught by Khermosh '378 because, it is also directed at helping manage upstream burst overhead parameters. Khermosh '378 at [0011]-[0012]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as reducing the error rate during data transfer. Khermosh '378 at [0006], [0008]-[0012]. In addition, a person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with Khermosh '378 because (a) G.987.2 Rev 3 and Khermosh '378 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Khermosh '378's teachings with those of G.987.2 Rev 3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with Kanno '158 for many reasons. For example, G.987.2 Rev 3 describes, "a burst profile" based on "operationally dependent factors." *See, e.g.*, G.987.2 Rev 3 at 43-44. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.2 Rev 3 to implement the details of "counting, in each of the plurality of subscriber terminating units, an error count … and determining, in the office terminal unit, based on the received error count, an error correction method or an error correction disuse which is used in each of the plurality of subscriber terminating units" taught by Kanno '158 because, it is also directed at helping manage upstream burst overhead parameters. Kanno '158 at [0015], [0060]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing the length

of the overhead in a parity for the error correction in the up-link direction. Kanno ’158 at [0060]. In addition, a person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with Kanno ’158 because (a) G.987.2 Rev 3 and Kanno ’158 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kanno ’158’s teachings with those of G.987.2 Rev 3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with Wijngaarden ’380 for many reasons. For example, G.987.2 Rev 3 describes, “a burst profile” based on “operationally dependent factors.” *See, e.g.*, G.987.2 Rev 3 at 43-44. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.2 Rev 3 to implement the details of “a downstream transmission rate from an OLT to multiple ONTs can be optimized by matching a transmission scheme for frames addressed to a channel to the downstream transmission characteristics of the channel” taught by Wijngaarden ’380 because, it is also directed at helping manage upstream burst overhead parameters. Wijngaarden ’380 at [0035], Fig. 3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as minimizing error rates during data transfer while also minimizing overhead. Wijngaarden ’380 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with Wijngaarden ’380 because (a) G.987.2 Rev 3 and Wijngaarden ’380 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage

upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wijngaarden '380's teachings with those of G.987.2 Rev 3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with Johnston '087 for many reasons. For example, G.987.2 Rev 3 describes, "a burst profile" based on "operationally dependent factors." *See, e.g.*, G.987.2 Rev 3 at 43-44. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.2 Rev 3 to implement the details of "a superframe counter [that] provides error checking for potential dropped frames" taught by Johnston '087 because, it is also directed at helping manage upstream burst overhead parameters. Johnston '087 at 6:63-7:17, 7:18-29, Figs. 2-3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing upstream data transfer. Johnston '087 at 4:36-5:3. In addition, a person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with Johnston '087 because (a) G.987.2 Rev 3 and Johnston '087 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Johnston '087's teachings with those of G.987.2 Rev 3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with Lee '822 for many reasons. For example, G.987.2 Rev 3 describes, "a burst profile" based on "operationally dependent factors." *See, e.g.*, G.987.2 Rev 3 at 43-44. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.2 Rev 3 to implement the details of "controlling effective FEC of an ONU and an OLT without changing an RTT based on optical link quality" taught by Lee '822 because, it is also directed at helping manage upstream burst overhead parameters. Lee '822 at abstract, [0029]-[0030], Fig. 4. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data throughout. Lee '822 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with Lee '822 because (a) G.987.2 Rev 3 and Lee '822 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Lee '822's teachings with those of G.987.2 Rev 3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with the XG-PON Standard for many reasons. For example, G.987.2 Rev 3 describes, "a burst profile" based on "operationally dependent factors." *See, e.g.*, G.987.2 Rev 3 at 43-44. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.2 Rev 3 to implement the details of "10-gigabit-capable passive optical networks" including where "[t]he OLT dynamically activates or deactivates the FEC functionality for a given ONU in the upstream direction by selecting the appropriate burst profile" as taught by the XG-PON Standard

because, it is also directed at helping manage upstream burst overhead parameters. XG-PON Standard, G.987.3 at i, 33, G.987.2 at 22. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as dynamically adjusting the burst profile. XG-PON Standard, G.987.2 at 22. In addition, a person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with the XG-PON Standard because (a) G.987.2 Rev 3 and the XG-PON Standard disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the XG-PON Standard's teachings with those of G.987.2 Rev 3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with G.987.3 Draft for many reasons. For example, G.987.2 Rev 3 describes, "a burst profile" based on "operationally dependent factors." *See, e.g.*, G.987.2 Rev 3 at 43-44. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.2 Rev 3 to implement the details of "the draft ITU_T Recommendation G.987.3 that describes the Transmission Convergence layer for 10-Gigabit-capable Optical Network systems" as taught by G.987.3 Draft because, it is also directed at helping efficiently manage upstream burst overhead parameters. G.987.3 Draft at 1, 135. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as adjusting the burst overhead based on link quality. G.987.3 Draft at 49. In addition, a person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with G.987.3 Draft because (a) G.987.2 Rev 3 and G.987.3 Draft disclose similar

products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3 Draft's teachings with those of G.987.2 Rev 3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.2 Rev 3 with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

(15) Exemplary G.987.3 Draft Solutions

A person of ordinary skill in the art would be motivated to combine G.987.3 Draft with Wijngaarden '381 for many reasons. For example, G.987.3 Draft describes, "the draft ITU_T Recommendation G.987.3 that describes the Transmission Convergence layer for 10-Gigabit-capable Optical Network systems." *See, e.g.*, G.987.3 Draft at 1, 135. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 Draft to implement the details of "[i]n a passive optical network, an upstream transmission rate from an ONT to an OLT can be optimized by matching a transmission scheme for a channel to the upstream transmission characteristics of the channel" including monitoring the BER and adjusting FEC accordingly taught by Wijngaarden '381 because, it is also directed at helping manage upstream burst overhead parameters. Wijngaarden '381 at abstract, [0022]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data transfer with minimal overhead. Wijngaarden '381 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 Draft with Wijngaarden '381 because (a) G.987.3 Draft and Wijngaarden '381 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wijngaarden '381's teachings with those

of G.987.3 Draft. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 Draft with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.3 Draft with Andersen '455 for many reasons. For example, G.987.3 Draft describes, "the draft ITU_T Recommendation G.987.3 that describes the Transmission Convergence layer for 10-Gigabit-capable Optical Network systems." *See, e.g.*, G.987.3 Draft at 1, 135. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 Draft to implement the details of "determining a momentary parameter value of at least one scheduling control parameter (PS) of a set of different scheduling control parameters" taught by Andersen '455 because, it is also directed at helping manage upstream burst overhead parameters. Andersen '455 at [0001], [0064]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data transfer. Andersen '455 at [0005]. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 Draft with Andersen '455 because (a) G.987.3 Draft and Andersen '455 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Andersen '455's teachings with those of G.987.3 Draft. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 Draft with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.3 Draft with Krimmel '362 for many reasons. For example, G.987.3 Draft describes, "the draft ITU_T

Recommendation G.987.3 that describes the Transmission Convergence layer for 10-Gigabit-capable Optical Network systems." *See, e.g.*, G.987.3 Draft at 1, 135. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 Draft to implement the details of "operating a passive optical network that is capable to consider changes of the transmission quality of a link" taught by Krimmel '362 because, it is also directed at helping manage upstream burst overhead parameters. Krimmel '362 at [0007], [0035]-[0037]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing the transmission rate. Krimmel '362 at [0044]. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 Draft with Krimmel '362 because (a) G.987.3 Draft and Krimmel '362 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Krimmel '362's teachings with those of G.987.3 Draft. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 Draft with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.3 Draft and Dalton '923 for many reasons. For example, G.987.3 Draft describes, "the draft ITU_T Recommendation G.987.3 that describes the Transmission Convergence layer for 10-Gigabit-capable Optical Network systems." *See, e.g.*, G.987.3 Draft at 1, 135. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 Draft to implement the details of a "optical power control in a passive optical network (PON) and, more specifically, to adjusting a burst-mode data transmission preamble in response to power

measurement" taught by Dalton '923 because, it is also directed at helping manage upstream burst overhead parameters. Dalton '923 at [0002]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as maximizing the available bandwidth. Dalton '923 at [0011], [0024]. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 Draft with Dalton '923 because (a) G.987.3 Draft and Dalton '923 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Dalton '923's teachings with those of G.987.3 Draft. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 Draft with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.3 Draft with Weeber '729 for many reasons. For example, G.987.3 Draft describes, "the draft ITU_T Recommendation G.987.3 that describes the Transmission Convergence layer for 10-Gigabit-capable Optical Network systems." *See, e.g.*, G.987.3 Draft at 1, 135. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 Draft to implement the details of "bandwidth mapper 255 for managing transmissions in the upstream direction" taught by Weeber '729 because, it is also directed at helping manage upstream burst overhead parameters. Weeber '729 at [0056], [0068]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as enhancing upstream capacity. Weeber '729 at [0056]. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 Draft with Weeber '729 because (a) G.987.3 Draft and Weeber '729 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same

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field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Weeber '729's teachings with those of G.987.3 Draft. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 Draft with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.3 Draft with the G-PON Standard for many reasons. For example, G.987.3 Draft describes, "the draft ITU_T Recommendation G.987.3 that describes the Transmission Convergence layer for 10-Gigabit-capable Optical Network systems." *See, e.g.*, G.987.3 Draft at 1, 135. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 Draft to implement the details of "gigabit-capable passive optical networks [GPON]" including where the "OLTs set the desired ONU FEC encoding status (on/off)" as taught by the G-PON Standard because, it is also directed at helping manage upstream burst overhead parameters. G-PON Standard, G.984.3 at i, 36-38, 92-93. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as improving data transfer. G-PON Standard, G.984.3 at 36-38, 92-93. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 Draft with the G-PON Standard because (a) G.987.3 Draft and the G-PON Standard disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the G-PON Standard's teachings with those of G.987.3 Draft. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 Draft with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

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A person of ordinary skill in the art would be motivated to combine G.987.3 Draft with Li '413 for many reasons. For example, G.987.3 Draft describes, "the draft ITU_T Recommendation G.987.3 that describes the Transmission Convergence layer for 10-Gigabit-capable Optical Network systems." *See, e.g.*, G.987.3 Draft at 1, 135. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 Draft to implement the details of "a performance monitoring mechanism configured to monitor performance of the PON based on received optical signals" that includes "BER-based performance monitoring" taught by Li '413 because, it is also directed at helping manage upstream burst overhead parameters. Li '413 at abstract, [0060]-[0064]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as better monitoring the link quality. Li '413 at [0038]. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 Draft with Li '413 because (a) G.987.3 Draft and Li '413 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Li '413's teachings with those of G.987.3 Draft. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 Draft with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.3 Draft with Khermosh '378 for many reasons. For example, G.987.3 Draft describes, "the draft ITU_T Recommendation G.987.3 that describes the Transmission Convergence layer for 10-Gigabit-capable Optical Network systems." *See, e.g.*, G.987.3 Draft at 1, 135. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 Draft to

implement the details of "managing forward error correction" by "monitoring communications quality from the optical network unit… [or] from the optical line terminal" taught by Khermosh '378 because, it is also directed at helping manage upstream burst overhead parameters. Khermosh '378 at [0011]-[0012]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as reducing the error rate during data transfer. Khermosh '378 at [0006], [0008]-[0012]. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 Draft with Khermosh '378 because (a) G.987.3 Draft and Khermosh '378 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Khermosh '378's teachings with those of G.987.3 Draft. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 Draft with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.3 Draft with Kanno '158 for many reasons. For example, G.987.3 Draft describes, "the draft ITU_T Recommendation G.987.3 that describes the Transmission Convergence layer for 10-Gigabit-capable Optical Network systems." *See, e.g.*, G.987.3 Draft at 1, 135. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 Draft to implement the details of "counting, in each of the plurality of subscriber terminating units, an error count … and determining, in the office terminal unit, based on the received error count, an error correction method or an error correction disuse which is used in each of the plurality of subscriber terminating units" taught by Kanno '158 because, it is also directed at helping manage upstream burst overhead parameters. Kanno '158 at [0015], [0060]. A person of ordinary skill in the art

would be motivated by the advantages of such functionality, such as optimizing the length of the overhead in a parity for the error correction in the up-link direction. Kanno ’158 at [0060]. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 Draft with Kanno ’158 because (a) G.987.3 Draft and Kanno ’158 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kanno ’158’s teachings with those of G.987.3 Draft. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 Draft with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.3 Draft with Wijngaarden ’380 for many reasons. For example, G.987.3 Draft describes, “the draft ITU_T Recommendation G.987.3 that describes the Transmission Convergence layer for 10-Gigabit-capable Optical Network systems.” *See, e.g.*, G.987.3 Draft at 1, 135. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 Draft to implement the details of “a downstream transmission rate from an OLT to multiple ONTs can be optimized by matching a transmission scheme for frames addressed to a channel to the downstream transmission characteristics of the channel” taught by Wijngaarden ’380 because, it is also directed at helping manage upstream burst overhead parameters. Wijngaarden ’380 at [0035], Fig. 3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as minimizing error rates during data transfer while also minimizing overhead. Wijngaarden ’380 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 Draft with Wijngaarden ’380 because (a) G.987.3 Draft and Wijngaarden ’380 disclose similar

products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Wijngaarden '380's teachings with those of G.987.3 Draft. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 Draft with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.3 Draft with Johnston '087 for many reasons. For example, G.987.3 Draft describes, "the draft ITU_T Recommendation G.987.3 that describes the Transmission Convergence layer for 10-Gigabit-capable Optical Network systems." *See, e.g.*, G.987.3 Draft at 1, 135. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 Draft to implement the details of "a superframe counter [that] provides error checking for potential dropped frames" taught by Johnston '087 because, it is also directed at helping manage upstream burst overhead parameters. Johnston '087 at 6:63-7:17, 7:18-29, Figs. 2-3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing upstream data transfer. Johnston '087 at 4:36-5:3. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 Draft with Johnston '087 because (a) G.987.3 Draft and Johnston '087 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Johnston '087's teachings with those of G.987.3 Draft. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 Draft with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

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A person of ordinary skill in the art would be motivated to combine G.987.3 Draft with Lee '822 for many reasons. For example, G.987.3 Draft describes, "the draft ITU_T Recommendation G.987.3 that describes the Transmission Convergence layer for 10-Gigabit-capable Optical Network systems." *See, e.g.*, G.987.3 Draft at 1, 135. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 Draft to implement the details of "controlling effective FEC of an ONU and an OLT without changing an RTT based on optical link quality" taught by Lee '822 because, it is also directed at helping manage upstream burst overhead parameters. Lee '822 at abstract, [0029]-[0030], Fig. 4. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as optimizing data throughout. Lee '822 at abstract. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 Draft with Lee '822 because (a) G.987.3 Draft and Lee '822 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Lee '822's teachings with those of G.987.3 Draft. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 Draft with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.3 Draft with the XG-PON Standard for many reasons. For example, G.987.3 Draft describes, "the draft ITU_T Recommendation G.987.3 that describes the Transmission Convergence layer for 10-Gigabit-capable Optical Network systems." *See, e.g.*, G.987.3 Draft at 1, 135. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 Draft to implement the details of "10-gigabit-capable passive optical networks" including where "[t]he

OLT dynamically activates or deactivates the FEC functionality for a given ONU in the upstream direction by selecting the appropriate burst profile" as taught by the XG-PON Standard because, it is also directed at helping manage upstream burst overhead parameters. XG-PON Standard, G.987.3 at i, 33, G.987.2 at 22. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as dynamically adjusting the burst profile. XG-PON Standard, G.987.2 at 22. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 Draft with the XG-PON Standard because (a) G.987.3 Draft and the XG-PON Standard disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the XG-PON Standard's teachings with those of G.987.3 Draft. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 Draft with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.3 Draft with G.987.2 Rev 3 for many reasons. For example, G.987.3 Draft describes, "the draft ITU_T Recommendation G.987.3 that describes the Transmission Convergence layer for 10-Gigabit-capable Optical Network systems." *See, e.g.*, G.987.3 Draft at 1, 135. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 Draft to implement the details of "a burst profile" based on "operationally dependent factors" as taught by G.987.2 Rev 3 because, it is also directed at helping manage upstream burst overhead parameters. G.987.2 Rev 3 at 43-44. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as adjusting the burst overhead based on operationally dependent

factors. G.987.2 Rev 3 at 43-44. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 Draft with G.987.2 Rev 3 because (a) G.987.3 Draft and G.987.2 Rev 3 disclose similar products, methods, and solutions; and (b) both references are analogous art and in the same field of endeavor as each other, for example, both relate to helping manage upstream burst overhead parameters. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.2 Rev 3's teachings with those of G.987.3 Draft. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 Draft with other references in Exhibits B-1 – B-15 and Appendix B-Secondary with similar teachings.

d) The Claims Recite Well-Known Concepts That Would Have Been Obvious to Implement.

The Asserted Claims represent nothing more than an arrangement of well-known concepts and features and add nothing to the state of the art at the time of the alleged invention. For each of the concepts represented by the Asserted Claims, it would have been obvious to add to the teachings of any number of known products and references, including to the teachings of any of the primary references in Exhibits B-1 – B-15 and Appendix B-Secondary to the extent that such reference is alleged to be missing such concept or feature. The following are examples of concepts that would have been obvious, which is not intended to be an exhaustive list of the claimed features that would have been obvious. Defendants reserve the right to supplement these examples as necessary.

(1) It would have been obvious to modify any primary reference for managing upstream burst overhead parameters (Claim 1[A])

To the extent Iarnach contends that any reference charted in Exhibits B-1 – B-15 and Appendix B-Secondary does not disclose "[a] method for managing upstream burst overhead parameters" it would have been obvious to combine such a well-known feature with any of the

references charted in Exhibits B-1 – B-15 and Appendix B-Secondary. A person having ordinary skill in the art would have been motivated to employ or implement managing upstream burst overhead parameters. *See, e.g.*, Wijngaarden '381, Andersen '455, Krimmel '362, Dalton '923, Weeber '729, G-PON Standard, Li '413, Khermosh '378, Kanno '158, Wijngaarden '380, Johnston '087, Lee '822, XG-PON Standard, G.987.2 Rev 3, G.987.3 Draft, Kani '247, Julien '533, Rafel '132, Haran '248, Haran '645, Nakaishi '116, Sitton '720, Kobayashi '674, Matsuyama '562, Yuji '485, Nagura '400, Mitsuyama '281, Hu '129, He '470, and/or Higuchi '958. The claimed management of upstream burst overhead parameters is nothing more than a well-known technique that was known in the industry and/or the existing standards. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(2) It would have been obvious to modify any primary reference for wherein an OLT or ONU detects the transmission quality of a downlink between the OLT and the ONU (Claim 1[B])

To the extent Iarnach contends that any reference charted in Exhibits B-1 – B-15 and Appendix B-Secondary does not disclose "an optical line terminal or an optical network unit detecting transmission quality of a downlink between the optical line terminal and the optical network unit" it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits B-1 – B-15 and Appendix B-Secondary. A person having ordinary skill in the art would have been motivated to employ or implement transmission quality detection means in an OLT or ONU. *See, e.g.*, Wijngaarden '381, Andersen '455, Krimmel '362, Dalton '923, Weeber '729, G-PON Standard, Li '413, Khermosh '378, Kanno '158, Wijngaarden '380, Johnston '087, Lee '822, XG-PON Standard, G.987.2 Rev 3, G.987.3 Draft, Kani '247, Julien '533, Rafel '132, Haran '248, Haran '645, Nakaishi '116, Sitton '720, Kobayashi '674, Matsuyama '562, Yuji '485, Nagura '400, Mitsuyama '281, Hu '129, He '470, and/or Higuchi '958. The

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claimed transmission quality detection means in an OLT or ONU is nothing more than a well-known technique that was known in the industry and/or the existing standards. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

> (3) It would have been obvious to modify any primary reference for wherein the OLT or ONU determines the upstream burst overhead parameters based on the transmission quality (Claim 1[C])

To the extent Iarnach contends that any reference charted in Exhibits B-1 – B-15 and Appendix B-Secondary does not disclose "the optical line terminal or the optical network unit determining the upstream burst overhead parameters suitable for the optical network unit according to the transmission quality" it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits B-1 – B-15 and Appendix B-Secondary. A person having ordinary skill in the art would have been motivated to employ or implement a means for the OLT or ONU to determine the upstream burst overhead parameters based on the transmission quality. *See, e.g.*, Wijngaarden '381, Andersen '455, Krimmel '362, Dalton '923, Weeber '729, G-PON Standard, Li '413, Khermosh '378, Kanno '158, Wijngaarden '380, Johnston '087, Lee '822, XG-PON Standard, G.987.2 Rev 3, G.987.3 Draft, Kani '247, Julien '533, Rafel '132, Haran '248, Haran '645, Nakaishi '116, Sitton '720, Kobayashi '674, Matsuyama '562, Yuji '485, Nagura '400, Mitsuyama '281, Hu '129, He '470, and/or Higuchi '958. The claimed determining, at the OLT or ONU, the upstream burst overhead parameters based on the transmission quality is nothing more than a well-known technique that was known in the industry and/or the existing standards. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

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(4) It would have been obvious to modify any primary reference for wherein the ONU uses the upstream burst overhead parameters after a switching time determined by the ONU or OLT (Claim 1[D])

To the extent Iarnach contends that any reference charted in Exhibits B-1 – B-15 and Appendix B-Secondary does not disclose "the optical network unit starting to use the upstream burst overhead parameters suitable for the optical network unit after switching time determined by the optical network unit itself or indicated by the optical line terminal" it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits B-1 – B-15 and Appendix B-Secondary. A person having ordinary skill in the art would have been motivated to employ or implement a switching time before the ONU starts to use the upstream burst overhead parameters. *See, e.g.*, Wijngaarden '381, Andersen '455, Krimmel '362, Dalton '923, Weeber '729, G-PON Standard, Li '413, Khermosh '378, Kanno '158, Wijngaarden '380, Johnston '087, Lee '822, XG-PON Standard, G.987.2 Rev 3, G.987.3 Draft, Kani '247, Julien '533, Rafel '132, Haran '248, Haran '645, Nakaishi '116, Sitton '720, Kobayashi '674, Matsuyama '562, Yuji '485, Nagura '400, Mitsuyama '281, Hu '129, He '470, and/or Higuchi '958. The claimed switching time before the ONU starts to use the upstream burst overhead parameters is nothing more than a well-known technique that was known in the industry and/or the existing standards. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(5) It would have been obvious to modify any primary reference for wherein, before the OLT or ONU detects the transmission quality of the downlink, the OLT determines upstream burst overhead parameters sets based on link quality (Claim 1[E], 1[F])

To the extent Iarnach contends that any reference charted in Exhibits B-1 – B-15 and Appendix B-Secondary does not disclose "wherein, before the step of the optical line terminal or

the optical network unit detecting the transmission quality of the downlink between the optical line terminal and the optical network unit, the method further comprises: the optical line terminal determining and identifying N kinds of upstream burst overhead parameter sets according to different levels of link quality, wherein N is an integer and is larger than zero" it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits B-1 – B-15 and Appendix B-Secondary. A person having ordinary skill in the art would have been motivated to employ or implement, before the OLT or ONU detects the transmission quality of the downlink, the OLT determines upstream burst overhead parameters sets based on link quality. *See, e.g.*, Wijngaarden '381, Andersen '455, Krimmel '362, Dalton '923, Weeber '729, G-PON Standard, Li '413, Khermosh '378, Kanno '158, Wijngaarden '380, Johnston '087, Lee '822, XG-PON Standard, G.987.2 Rev 3, G.987.3 Draft, Kani '247, Julien '533, Rafel '132, Haran '248, Haran '645, Nakaishi '116, Sitton '720, Kobayashi '674, Matsuyama '562, Yuji '485, Nagura '400, Mitsuyama '281, Hu '129, He '470, and/or Higuchi '958. The claimed determining, in the OLT, the upstream burst overhead parameter sets based on link quality, before the OLT or ONU detects the transmission quality, is nothing more than a well-known technique that was known in the industry and/or the existing standards. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

> (6) It would have been obvious to modify any primary reference for wherein the OLT sends an upstream burst overhead parameter set/value to the ONU where the ONU receives the set/value in a waiting state and then uses the set (Claim 1[G])

To the extent Iarnach contends that any reference charted in Exhibits B-1 – B-15 and Appendix B-Secondary does not disclose "the optical line terminal sending a parameter value or an identification of one default upstream burst overhead parameter set to the optical network unit;

and the optical network unit receiving the parameter value or the identification of the upstream burst overhead parameter set in a waiting state and using the upstream burst overhead parameter set" it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits B-1 – B-15 and Appendix B-Secondary. A person having ordinary skill in the art would have been motivated to employ or implement wherein the OLT sends an upstream burst overhead parameter set/value to the ONU where the ONU receives the set/value in a waiting state and then uses the set. *See, e.g.*, Wijngaarden '381, Andersen '455, Krimmel '362, Dalton '923, Weeber '729, G-PON Standard, Li '413, Khermosh '378, Kanno '158, Wijngaarden '380, Johnston '087, Lee '822, XG-PON Standard, G.987.2 Rev 3, G.987.3 Draft, Kani '247, Julien '533, Rafel '132, Haran '248, Haran '645, Nakaishi '116, Sitton '720, Kobayashi '674, Matsuyama '562, Yuji '485, Nagura '400, Mitsuyama '281, Hu '129, He '470, and/or Higuchi '958. The claimed sending of the upstream burst overhead parameter set/value by the OLT to the ONU which receives the set/value in a waiting state and then uses the set/value is nothing more than a well-known technique that was known in the industry and/or the existing standards. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

> (7) It would have been obvious to modify any primary reference for wherein the OLT sends upstream burst overhead parameter sets/values to the ONU where the ONU receives the sets/values in a waiting state and then uses one of the sets (Claim 1[H])

To the extent Iarnach contends that any reference charted in Exhibits B-1 – B-15 and Appendix B-Secondary does not disclose "the optical line terminal sending parameter values or identifications of more than one upstream burst overhead parameter set to the optical network unit; and the optical network unit receiving the parameter values or the identifications of the upstream burst overhead parameter sets in a waiting state and using one of the received upstream burst

overhead parameter sets" it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits B-1 – B-15 and Appendix B-Secondary. A person having ordinary skill in the art would have been motivated to employ or implement wherein the OLT sends upstream burst overhead parameter sets/values to the ONU where the ONU receives the sets/values in a waiting state and then uses one of the sets. *See, e.g.*, Wijngaarden '381, Andersen '455, Krimmel '362, Dalton '923, Weeber '729, G-PON Standard, Li '413, Khermosh '378, Kanno '158, Wijngaarden '380, Johnston '087, Lee '822, XG-PON Standard, G.987.2 Rev 3, G.987.3 Draft, Kani '247, Julien '533, Rafel '132, Haran '248, Haran '645, Nakaishi '116, Sitton '720, Kobayashi '674, Matsuyama '562, Yuji '485, Nagura '400, Mitsuyama '281, Hu '129, He '470, and/or Higuchi '958. The claimed sending of the upstream burst overhead parameter sets/value by the OLT to the ONU which receives the sets/values in a waiting state and then uses one of the sets is nothing more than a well-known technique that was known in the industry and/or the existing standards. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

> (8) It would have been obvious to modify any primary reference for wherein, after the ONU receives the upstream burst overhead parameter set(s)/value(s), the ONU enters into a serial number state (Claim 2[A])

To the extent Iarnach contends that any reference charted in Exhibits B-1 – B-15 and Appendix B-Secondary does not disclose "after the step of the optical network unit receiving the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s), the method further comprises: the optical network unit entering into a serial number state" it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits B-1 – B-15 and Appendix B-Secondary. A person having ordinary skill in the art would

have been motivated to employ or implement wherein, after the ONU receives the upstream burst overhead parameter set(s)/value(s), the ONU enters into a serial number state. *See, e.g.*, Wijngaarden '381, Andersen '455, Krimmel '362, Dalton '923, Weeber '729, G-PON Standard, Li '413, Khermosh '378, Kanno '158, Wijngaarden '380, Johnston '087, Lee '822, XG-PON Standard, G.987.2 Rev 3, G.987.3 Draft, Kani '247, Julien '533, Rafel '132, Haran '248, Haran '645, Nakaishi '116, Sitton '720, Kobayashi '674, Matsuyama '562, Yuji '485, Nagura '400, Mitsuyama '281, Hu '129, He '470, and/or Higuchi '958. The claimed entering into the serial number state after receiving upstream burst overhead parameter set(s)/value(s) is nothing more than a well-known technique that was known in the industry and/or the existing standards. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle. This state already existed within the existing standard, and it would have been trivial for a POSITA and an obvious solution with predictable results.

(9) It would have been obvious to modify any primary reference for wherein the OLT detects the transmission quality of the downlink when the ONU is in the serial number state (Claim 2[B])

To the extent Iarnach contends that any reference charted in Exhibits B-1 – B-15 and Appendix B-Secondary does not disclose "the step of the optical line terminal detecting the transmission quality of the downlink between the optical line terminal and the optical network unit comprises: in the serial number state of the optical network unit, the optical line terminal detecting the downlink between the optical network unit and the optical line terminal to acquire quality information of the downlink" it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits B-1 – B-15 and Appendix B-Secondary. A person having ordinary skill in the art would have been motivated to employ or implement wherein the

OLT detects the transmission quality of the downlink when the ONU is in the serial number state. *See, e.g.*, Wijngaarden '381, Andersen '455, Krimmel '362, Dalton '923, Weeber '729, G-PON Standard, Li '413, Khermosh '378, Kanno '158, Wijngaarden '380, Johnston '087, Lee '822, XG-PON Standard, G.987.2 Rev 3, G.987.3 Draft, Kani '247, Julien '533, Rafel '132, Haran '248, Haran '645, Nakaishi '116, Sitton '720, Kobayashi '674, Matsuyama '562, Yuji '485, Nagura '400, Mitsuyama '281, Hu '129, He '470, and/or Higuchi '958. The claimed detecting the transmission quality of the downlink by the OLT when the ONU is in the serial number state is nothing more than a well-known technique that was known in the industry and/or the existing standards. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle. This state already existed within the existing standard, and it would have been trivial for a POSITA and an obvious solution with predictable results.

> (10) It would have been obvious to modify any primary reference for wherein the OLT determines the upstream burst overhead parameters for the ONU based on the transmission quality and sends the upstream burst overhead parameter set(s)/value(s) to the ONU via a unicast or broadcast message (Claim 2[C])

To the extent Iarnach contends that any reference charted in Exhibits B-1 – B-15 and Appendix B-Secondary does not disclose "the step of the optical line terminal determining the upstream burst overhead parameters suitable for the optical network unit according to the transmission quality comprises: the optical line terminal determining the upstream burst overhead parameter set suitable for the optical network unit according to the quality information of the downlink, and notifying the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) suitable for the optical network unit to the optical network unit via a unicast message or a broadcast message" it would have been obvious to combine such a well-

known feature with any of the references charted in Exhibits B-1 – B-15 and Appendix B-Secondary. A person having ordinary skill in the art would have been motivated to employ or implement sending a unicast or broadcast message from the OLT to the ONU. *See, e.g.*, Wijngaarden '381, Andersen '455, Krimmel '362, Dalton '923, Weeber '729, G-PON Standard, Li '413, Khermosh '378, Kanno '158, Wijngaarden '380, Johnston '087, Lee '822, XG-PON Standard, G.987.2 Rev 3, G.987.3 Draft, Kani '247, Julien '533, Rafel '132, Haran '248, Haran '645, Nakaishi '116, Sitton '720, Kobayashi '674, Matsuyama '562, Yuji '485, Nagura '400, Mitsuyama '281, Hu '129, He '470, and/or Higuchi '958. The claimed sending of the unicast or broadcast message from the OLT to the ONU is nothing more than a well-known technique that was known in the industry and/or the existing standards. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

> (11) It would have been obvious to modify any primary reference for wherein, after the ONU receives the upstream burst overhead parameter set(s)/value(s), the ONU enters into a serial number state (Claim 3[A])

To the extent Iarnach contends that any reference charted in Exhibits B-1 – B-15 and Appendix B-Secondary does not disclose "after the step of the optical network unit receiving the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s), the method further comprises: the optical network unit entering into a serial number state" it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits B-1 – B-15 and Appendix B-Secondary. A person having ordinary skill in the art would have been motivated to employ or implement wherein, after the ONU receives the upstream burst overhead parameter set(s)/value(s), the ONU enters into a serial number state. *See, e.g.*, Wijngaarden '381, Andersen '455, Krimmel '362, Dalton '923, Weeber '729, G-PON Standard,

Li ’413, Khermosh ’378, Kanno ’158, Wijngaarden ’380, Johnston ’087, Lee ’822, XG-PON Standard, G.987.2 Rev 3, G.987.3 Draft, Kani ’247, Julien ’533, Rafel ’132, Haran ’248, Haran ’645, Nakaishi ’116, Sitton ’720, Kobayashi ’674, Matsuyama ’562, Yuji ’485, Nagura ’400, Mitsuyama ’281, Hu ’129, He ’470, and/or Higuchi ’958. The claimed entering into the serial number state after receiving upstream burst overhead parameter set(s)/value(s) is nothing more than a well-known technique that was known in the industry and/or the existing standards. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle. This state already existed within the existing standard, and it would have been trivial for a POSITA and an obvious solution with predictable results.

> (12) It would have been obvious to modify any primary reference for wherein the ONU detects the transmission quality of the downlink when the ONU is in the serial number state (Claim 3[B])

To the extent Iarnach contends that any reference charted in Exhibits B-1 – B-15 and Appendix B-Secondary does not disclose “the step of the optical network unit detecting the transmission quality of the downlink between the optical line terminal and the optical network unit comprises: in the serial number state of the optical network unit, the optical network unit detecting the downlink between the optical network unit and the optical line terminal to acquire quality information of the downlink” it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits B-1 – B-15 and Appendix B-Secondary. A person having ordinary skill in the art would have been motivated to employ or implement wherein the ONU detects the transmission quality of the downlink when the ONU is in the serial number state. *See, e.g.*, Wijngaarden ’381, Andersen ’455, Krimmel ’362, Dalton ’923, Weeber ’729, G-PON Standard, Li ’413, Khermosh ’378, Kanno ’158, Wijngaarden ’380, Johnston ’087, Lee ’822, XG-

PON Standard, G.987.2 Rev 3, G.987.3 Draft, Kani ’247, Julien ’533, Rafel ’132, Haran ’248, Haran ’645, Nakaishi ’116, Sitton ’720, Kobayashi ’674, Matsuyama ’562, Yuji ’485, Nagura ’400, Mitsuyama ’281, Hu ’129, He ’470, and/or Higuchi ’958. The claimed detecting the transmission quality of the downlink by the ONU when the ONU is in the serial number state is nothing more than a well-known technique that was known in the industry and/or the existing standards. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle. This state already existed within the existing standard, and it would have been trivial for a POSITA and an obvious solution with predictable results.

(13) It would have been obvious to modify any primary reference for wherein the ONU notifies the OLT of the transmission quality (Claim 3[C])

To the extent Iarnach contends that any reference charted in Exhibits B-1 – B-15 and Appendix B-Secondary does not disclose “after the step of acquiring the quality information of the downlink, the method further comprises: the optical network unit notifying the quality information of the downlink to the optical line terminal” it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits B-1 – B-15 and Appendix B-Secondary. A person having ordinary skill in the art would have been motivated to employ or implement wherein the ONU notifies the OLT of the transmission quality. *See, e.g.*, Wijngaarden ’381, Andersen ’455, Krimmel ’362, Dalton ’923, Weeber ’729, G-PON Standard, Li ’413, Khermosh ’378, Kanno ’158, Wijngaarden ’380, Johnston ’087, Lee ’822, XG-PON Standard, G.987.2 Rev 3, G.987.3 Draft, Kani ’247, Julien ’533, Rafel ’132, Haran ’248, Haran ’645, Nakaishi ’116, Sitton ’720, Kobayashi ’674, Matsuyama ’562, Yuji ’485, Nagura ’400, Mitsuyama ’281, Hu ’129, He ’470, and/or Higuchi ’958. The claimed notifying the OLT of the transmission quality from the ONU is nothing more than a well-known technique that was known in the industry

and/or the existing standards. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

> (14) It would have been obvious to modify any primary reference for wherein the OLT determines the upstream burst overhead parameters for the ONU based on the transmission quality and sends the upstream burst overhead parameter set(s)/value(s) to the ONU via a unicast or broadcast message (Claim 3[D])

To the extent Iarnach contends that any reference charted in Exhibits B-1 – B-15 and Appendix B-Secondary does not disclose "the step of the optical line terminal determining the upstream burst overhead parameters suitable for the optical network unit according to the transmission quality comprises: the optical line terminal determining the upstream burst overhead parameter set suitable for the optical network unit according to the quality information of the downlink, and notifying the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) suitable for the optical network unit to the optical network unit via a unicast message or a broadcast message" it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits B-1 – B-15 and Appendix B-Secondary. A person having ordinary skill in the art would have been motivated to employ or implement sending a unicast or broadcast message from the OLT to the ONU. *See, e.g.*, Wijngaarden '381, Andersen '455, Krimmel '362, Dalton '923, Weeber '729, G-PON Standard, Li '413, Khermosh '378, Kanno '158, Wijngaarden '380, Johnston '087, Lee '822, XG-PON Standard, G.987.2 Rev 3, G.987.3 Draft, Kani '247, Julien '533, Rafel '132, Haran '248, Haran '645, Nakaishi '116, Sitton '720, Kobayashi '674, Matsuyama '562, Yuji '485, Nagura '400, Mitsuyama '281, Hu '129, He '470, and/or Higuchi '958. The claimed sending of the unicast or broadcast message from the OLT to the ONU is nothing more than a well-known technique that

was known in the industry and/or the existing standards. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

> (15) It would have been obvious to modify any primary reference for wherein, while or after the OLT notifies the ONU of the upstream burst overhead parameter set(s)/values or the ONU notifies the OLT of the upstream burst overhead parameter set(s)/values, the OLT sends a switching index value to the ONU and the ONU begins using the upstream burst overhead parameters in the next frame (Claim 5[A])

To the extent Iarnach contends that any reference charted in Exhibits B-1 – B-15 and Appendix B-Secondary does not disclose "while or after the optical line terminal notifies the parameter value(s) or the identification(s) of the determined upstream burst overhead parameter set(s) to the optical network unit, or while or after the optical network unit notifies the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) to the optical line terminal, the method further comprises: the optical line terminal setting a switching index value of the upstream burst overhead parameters in a tag field assigned for a bandwidth of the optical network unit, and sending the switching index value to the optical network unit via a downstream frame; the step of the optical network unit starting to use the upstream burst overhead parameters after the switching time indicated by the optical line terminal comprises: after the optical network unit receives the switching index value, the optical network unit using the upstream burst overhead parameters suitable for the optical network unit in a next frame" it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits B-1 – B-15 and Appendix B-Secondary. A person having ordinary skill in the art would have been motivated to employ or implement wherein, while or after the OLT notifies the ONU of the upstream burst overhead parameter set(s)/values or the ONU notifies the OLT of the upstream burst overhead parameter set(s)/values, the OLT sends a switching index value to the ONU and the ONU begins

using the upstream burst overhead parameters in the next frame. *See, e.g.*, Wijngaarden ’381, Andersen ’455, Krimmel ’362, Dalton ’923, Weeber ’729, G-PON Standard, Li ’413, Khermosh ’378, Kanno ’158, Wijngaarden ’380, Johnston ’087, Lee ’822, XG-PON Standard, G.987.2 Rev 3, G.987.3 Draft, Kani ’247, Julien ’533, Rafel ’132, Haran ’248, Haran ’645, Nakaishi ’116, Sitton ’720, Kobayashi ’674, Matsuyama ’562, Yuji ’485, Nagura ’400, Mitsuyama ’281, Hu ’129, He ’470, and/or Higuchi ’958. The claimed switching index value is nothing more than a well-known technique that was known in the industry and/or the existing standards. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

> (16) It would have been obvious to modify any primary reference for wherein, while or after the OLT notifies the ONU of the upstream burst overhead parameter set(s)/values or the ONU notifies the OLT of the upstream burst overhead parameter set(s)/values, the OLT sends a hyper frame number to the ONU and the ONU begins using the upstream burst overhead parameters after the frame indicated by the hyper frame number arrives (Claim 5[B])

To the extent Iarnach contends that any reference charted in Exhibits B-1 – B-15 and Appendix B-Secondary does not disclose “while or after the optical line terminal notifies the parameter value(s) or the identification(s) of the determined upstream burst overhead parameter set(s) to the optical network unit, or while or after the optical network unit notifies the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) to the optical line terminal, the method further comprises: the optical line terminal notifying a hyper frame number to the optical network unit; the step of the optical network unit starting to use the upstream burst overhead parameters after the switching time indicated by the optical line terminal comprises: after the optical network unit receives the hyper frame number and after a frame indicated by the hyper frame number arrives, the optical network unit starting to use the upstream burst overhead

parameters suitable for the optical network unit" it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits B-1 – B-15 and Appendix B-Secondary. A person having ordinary skill in the art would have been motivated to employ or implement wherein, while or after the OLT notifies the ONU of the upstream burst overhead parameter set(s)/values or the ONU notifies the OLT of the upstream burst overhead parameter set(s)/values, the OLT sends a hyper frame number to the ONU and the ONU begins using the upstream burst overhead parameters after the frame indicated by the hyper frame number arrives. *See, e.g.*, Wijngaarden '381, Andersen '455, Krimmel '362, Dalton '923, Weeber '729, G-PON Standard, Li '413, Khermosh '378, Kanno '158, Wijngaarden '380, Johnston '087, Lee '822, XG-PON Standard, G.987.2 Rev 3, G.987.3 Draft, Kani '247, Julien '533, Rafel '132, Haran '248, Haran '645, Nakaishi '116, Sitton '720, Kobayashi '674, Matsuyama '562, Yuji '485, Nagura '400, Mitsuyama '281, Hu '129, He '470, and/or Higuchi '958. The claimed hyper frame number is nothing more than a well-known technique that was known in the industry and/or the existing standards. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

> (17) It would have been obvious to modify any primary reference for wherein, while or after the OLT notifies the ONU of the upstream burst overhead parameter set(s)/values or the ONU notifies the OLT of the upstream burst overhead parameter set(s)/values, the ONU sends a hyper frame number to the OLT and the ONU begins using the upstream burst overhead parameters after the frame indicated by the hyper frame number arrives (Claim 5[C])

To the extent Iarnach contends that any reference charted in Exhibits B-1 – B-15 and Appendix B-Secondary does not disclose "while or after the optical line terminal notifies the parameter value(s) or the identification(s) of the determined upstream burst overhead parameter

set(s) to the optical network unit, or while or after the optical network unit notifies the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) to the optical line terminal, the method further comprises: the optical network unit notifying a hyper frame number to the optical line terminal; the step of the optical network unit starting to use the upstream burst overhead parameters after the switching time determined by the optical network unit itself comprises: after a frame indicated by the hyper frame number arrives, the optical network unit starting to use the upstream burst overhead parameters suitable for the optical network unit" it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits B-1 – B-15 and Appendix B-Secondary. A person having ordinary skill in the art would have been motivated to employ or implement wherein, while or after the OLT notifies the ONU of the upstream burst overhead parameter set(s)/values or the ONU notifies the OLT of the upstream burst overhead parameter set(s)/values, the ONU sends a hyper frame number to the OLT and the ONU begins using the upstream burst overhead parameters after the frame indicated by the hyper frame number arrives. *See, e.g.*, Wijngaarden '381, Andersen '455, Krimmel '362, Dalton '923, Weeber '729, G-PON Standard, Li '413, Khermosh '378, Kanno '158, Wijngaarden '380, Johnston '087, Lee '822, XG-PON Standard, G.987.2 Rev 3, G.987.3 Draft, Kani '247, Julien '533, Rafel '132, Haran '248, Haran '645, Nakaishi '116, Sitton '720, Kobayashi '674, Matsuyama '562, Yuji '485, Nagura '400, Mitsuyama '281, Hu '129, He '470, and/or Higuchi '958. The claimed hyper frame number is nothing more than a well-known technique that was known in the industry and/or the existing standards. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(18) It would have been obvious to modify any primary reference for wherein the upstream burst overhead parameter set

includes the state of forward error correction, delimiter, preamble, and guard band (Claim 6[A])

To the extent Iarnach contends that any reference charted in Exhibits B-1 – B-15 and Appendix B-Secondary does not disclose "the upstream burst overhead parameter set comprises: state of forward error correction, delimiter, preamble and guard band" it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits B-1 – B-15 and Appendix B-Secondary. A person having ordinary skill in the art would have been motivated to employ or implement wherein the upstream burst overhead parameter set includes the state of forward error correction, delimiter, preamble, and guard band. *See, e.g.*, Wijngaarden '381, Andersen '455, Krimmel '362, Dalton '923, Weeber '729, G-PON Standard, Li '413, Khermosh '378, Kanno '158, Wijngaarden '380, Johnston '087, Lee '822, XG-PON Standard, G.987.2 Rev 3, G.987.3 Draft, Kani '247, Julien '533, Rafel '132, Haran '248, Haran '645, Nakaishi '116, Sitton '720, Kobayashi '674, Matsuyama '562, Yuji '485, Nagura '400, Mitsuyama '281, Hu '129, He '470, and/or Higuchi '958. The claimed upstream burst overhead parameter set including the state of forward error correction, delimiter, preamble, and guard band is nothing more than a well-known technique that was known in the industry and/or the existing standards. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(19) It would have been obvious to modify any primary reference for wherein, when the OLT sends the upstream burst overhead parameter sets/values to the ONU, the OLT sends the sets/values to all ONUs or one or more ONUs (Claim 7[A])

To the extent Iarnach contends that any reference charted in Exhibits B-1 – B-15 and Appendix B-Secondary does not disclose "in the step of the optical line terminal sending the parameter values or the identifications of more than one upstream burst overhead parameter set to the optical network unit, the optical line terminal sends the parameter values or the identifications

of one or more upstream burst overhead parameter sets to all optical network units or one or more optical network units which communicate with the optical line terminal" it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits B-1 – B-15 and Appendix B-Secondary. A person having ordinary skill in the art would have been motivated to employ or implement wherein, when the OLT sends the upstream burst overhead parameter sets/values to the ONU, the OLT sends the sets/values to all ONUs or one or more ONUs. *See, e.g.*, Wijngaarden '381, Andersen '455, Krimmel '362, Dalton '923, Weeber '729, G-PON Standard, Li '413, Khermosh '378, Kanno '158, Wijngaarden '380, Johnston '087, Lee '822, XG-PON Standard, G.987.2 Rev 3, G.987.3 Draft, Kani '247, Julien '533, Rafel '132, Haran '248, Haran '645, Nakaishi '116, Sitton '720, Kobayashi '674, Matsuyama '562, Yuji '485, Nagura '400, Mitsuyama '281, Hu '129, He '470, and/or Higuchi '958. The claimed sending of the upstream burst overhead parameter sets/values to one, more than one, or all ONUs is nothing more than a well-known technique that was known in the industry and/or the existing standards as unicast, multicast, and broadcast messages were well known. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

> (20) It would have been obvious to modify any primary reference for wherein, while or after the OLT notifies the ONU of the upstream burst overhead parameter set(s)/values or the ONU notifies the OLT of the upstream burst overhead parameter set(s)/values, the OLT sends a switching index value to the ONU and the ONU begins using the upstream burst overhead parameters in the next frame (Claim 8[A])

To the extent Iarnach contends that any reference charted in Exhibits B-1 – B-15 and Appendix B-Secondary does not disclose "while or after the optical line terminal notifies the parameter value(s) or the identification(s) of the determined upstream burst overhead parameter set(s) to the optical network unit, or while or after the optical network unit notifies the parameter

value(s) or the identification(s) of the upstream burst overhead parameter set(s) to the optical line terminal, the method further comprises: the optical line terminal setting a switching index value of the upstream burst overhead parameters in a tag field assigned for a bandwidth of the optical network unit, and sending the switching index value to the optical network unit via a downstream frame; the step of the optical network unit starting to use the upstream burst overhead parameters after the switching time indicated by the optical line terminal comprises: after the optical network unit receives the switching index value, the optical network unit using the upstream burst overhead parameters suitable for the optical network unit in a next frame" it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits B-1 – B-15 and Appendix B-Secondary. A person having ordinary skill in the art would have been motivated to employ or implement wherein, while or after the OLT notifies the ONU of the upstream burst overhead parameter set(s)/values or the ONU notifies the OLT of the upstream burst overhead parameter set(s)/values, the OLT sends a switching index value to the ONU and the ONU begins using the upstream burst overhead parameters in the next frame. *See, e.g.*, Wijngaarden '381, Andersen '455, Krimmel '362, Dalton '923, Weeber '729, G-PON Standard, Li '413, Khermosh '378, Kanno '158, Wijngaarden '380, Johnston '087, Lee '822, XG-PON Standard, G.987.2 Rev 3, G.987.3 Draft, Kani '247, Julien '533, Rafel '132, Haran '248, Haran '645, Nakaishi '116, Sitton '720, Kobayashi '674, Matsuyama '562, Yuji '485, Nagura '400, Mitsuyama '281, Hu '129, He '470, and/or Higuchi '958. The claimed switching index value is nothing more than a well-known technique that was known in the industry and/or the existing standards. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(21) It would have been obvious to modify any primary reference for wherein, while or after the OLT notifies the ONU of

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the upstream burst overhead parameter set(s)/values or the ONU notifies the OLT of the upstream burst overhead parameter set(s)/values, the OLT sends a hyper frame number to the ONU and the ONU begins using the upstream burst overhead parameters after the frame indicated by the hyper frame number arrives (Claim 8[B])

To the extent Iarnach contends that any reference charted in Exhibits B-1 – B-15 and Appendix B-Secondary does not disclose "while or after the optical line terminal notifies the parameter value(s) or the identification(s) of the determined upstream burst overhead parameter set(s) to the optical network unit, or while or after the optical network unit notifies the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) to the optical line terminal, the method further comprises: the optical line terminal notifying a hyper frame number to the optical network unit; the step of the optical network unit starting to use the upstream burst overhead parameters after the switching time indicated by the optical line terminal comprises: after the optical network unit receives the hyper frame number and after a frame indicated by the hyper frame number arrives, the optical network unit starting to use the upstream burst overhead parameters suitable for the optical network unit" it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits B-1 – B-15 and Appendix B-Secondary. A person having ordinary skill in the art would have been motivated to employ or implement wherein, while or after the OLT notifies the ONU of the upstream burst overhead parameter set(s)/values or the ONU notifies the OLT of the upstream burst overhead parameter set(s)/values, the OLT sends a hyper frame number to the ONU and the ONU begins using the upstream burst overhead parameters after the frame indicated by the hyper frame number arrives. *See, e.g.*, Wijngaarden '381, Andersen '455, Krimmel '362, Dalton '923, Weeber '729, G-PON Standard, Li '413, Khermosh '378, Kanno '158, Wijngaarden '380, Johnston '087, Lee '822, XG-PON Standard, G.987.2 Rev 3, G.987.3 Draft, Kani '247, Julien '533, Rafel '132, Haran '248,

Haran ’645, Nakaishi ’116, Sitton ’720, Kobayashi ’674, Matsuyama ’562, Yuji ’485, Nagura ’400, Mitsuyama ’281, Hu ’129, He ’470, and/or Higuchi ’958. The claimed hyper frame number is nothing more than a well-known technique that was known in the industry and/or the existing standards. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

> (22) It would have been obvious to modify any primary reference for wherein, while or after the OLT notifies the ONU of the upstream burst overhead parameter set(s)/values or the ONU notifies the OLT of the upstream burst overhead parameter set(s)/values, the ONU sends a hyper frame number to the OLT and the ONU begins using the upstream burst overhead parameters after the frame indicated by the hyper frame number arrives (Claim 8[C])

To the extent Iarnach contends that any reference charted in Exhibits B-1 – B-15 and Appendix B-Secondary does not disclose “while or after the optical line terminal notifies the parameter value(s) or the identification(s) of the determined upstream burst overhead parameter set(s) to the optical network unit, or while or after the optical network unit notifies the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) to the optical line terminal, the method further comprises: the optical network unit notifying a hyper frame number to the optical line terminal; the step of the optical network unit starting to use the upstream burst overhead parameters after the switching time determined by the optical network unit itself comprises: after a frame indicated by the hyper frame number arrives, the optical network unit starting to use the upstream burst overhead parameters suitable for the optical network unit” it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits B-1 – B-15 and Appendix B-Secondary. A person having ordinary skill in the art would have been motivated to employ or implement wherein, while or after the OLT notifies the ONU

of the upstream burst overhead parameter set(s)/values or the ONU notifies the OLT of the upstream burst overhead parameter set(s)/values, the ONU sends a hyper frame number to the OLT and the ONU begins using the upstream burst overhead parameters after the frame indicated by the hyper frame number arrives. *See, e.g.*, Wijngaarden '381, Andersen '455, Krimmel '362, Dalton '923, Weeber '729, G-PON Standard, Li '413, Khermosh '378, Kanno '158, Wijngaarden '380, Johnston '087, Lee '822, XG-PON Standard, G.987.2 Rev 3, G.987.3 Draft, Kani '247, Julien '533, Rafel '132, Haran '248, Haran '645, Nakaishi '116, Sitton '720, Kobayashi '674, Matsuyama '562, Yuji '485, Nagura '400, Mitsuyama '281, Hu '129, He '470, and/or Higuchi '958. The claimed hyper frame number is nothing more than a well-known technique that was known in the industry and/or the existing standards. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

> (23) It would have been obvious to modify any primary reference for wherein the upstream burst overhead parameter set includes the state of forward error correction, delimiter, preamble, and guard band (Claim 9[A])

To the extent Iarnach contends that any reference charted in Exhibits B-1 – B-15 and Appendix B-Secondary does not disclose "the upstream burst overhead parameter set comprises: state of forward error correction, delimiter, preamble and guard band" it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits B-1 – B-15 and Appendix B-Secondary. A person having ordinary skill in the art would have been motivated to employ or implement wherein the upstream burst overhead parameter set includes the state of forward error correction, delimiter, preamble, and guard band. *See, e.g.*, Wijngaarden '381, Andersen '455, Krimmel '362, Dalton '923, Weeber '729, G-PON Standard, Li '413, Khermosh '378, Kanno '158, Wijngaarden '380, Johnston '087, Lee '822, XG-PON Standard, G.987.2 Rev

3, G.987.3 Draft, Kani '247, Julien '533, Rafel '132, Haran '248, Haran '645, Nakaishi '116, Sitton '720, Kobayashi '674, Matsuyama '562, Yuji '485, Nagura '400, Mitsuyama '281, Hu '129, He '470, and/or Higuchi '958. The claimed upstream burst overhead parameter set including the state of forward error correction, delimiter, preamble, and guard band is nothing more than a well-known technique that was known in the industry and/or the existing standards. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

e) Additional Reasons to Combine.

In addition to the information contained elsewhere in these invalidity contentions, including in Exhibits B-1 – B-15 and Appendix B-Secondary, Defendants have identified additional motivations and reasons to combine the various references. Defendants note that in *KSR Int'l Co. v. Teleflex Inc.*, the Supreme Court held that "[i]n determining whether the subject matter of a patent claim is obvious, neither the particular motivation nor the avowed purpose of the patentee controls. What matters is the objective reach of the claim. If the claim extends to what is obvious, it is invalid under § 103." 127 S. Ct. 1727, 1742 (2007).

KSR further illustrated several ways in which the subject matter of a patent claim may be shown to have been obvious. For instance, "[o]ne of the ways in which a patent's subject matter can be proved obvious is by noting that there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent's claims." *KSR*, 127 S. Ct. at 1742. The Supreme Court held that it was error to "look only to the problem the patentee was trying to solve." *Id*. As the Court explained, "[t]he question is not whether the combination was obvious to the patentee but whether the combination was obvious to a person with ordinary skill in the art. Under the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the

manner claimed." *Id*. Further, "[c]ommon sense teaches … that familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle." *Id.* Further, a showing that a combination of elements was "obvious to try" may demonstrate that it was obvious under § 103. *Id.* For instance, the Supreme Court held that "predictable solutions" using a combination of "known options" may render the subject matter of a patent claim obvious. *Id.*

When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product was not of innovation but of ordinary skill and common sense. *Id.* The ways in which the subject matter of a patent claim may be shown to be obvious, identified by *KSR*, are merely illustrative. A core thrust of *KSR* was that "[r]igid preventative rules that deny factfinders recourse to common sense are neither necessary under our case law nor consistent with it." *KSR*, 127 S. Ct. at 1742-43 (quoting *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1367 (Fed. Cir. 2006) ("Our suggestion test is in actuality quite flexible and not only permits, but requires, consideration of common knowledge and common sense"), and *Alza Corp. v. Mylan Labs., Inc.*, 464 F.3d 1286, 1291 (Fed. Cir. 2006) ("There is flexibility in our obviousness jurisprudence because a motivation may be found *implicitly* in the prior art. We do not have a rigid test that requires an actual teaching to combine ...").

Although Defendants note that there is no longer a rigid requirement regarding motivation to combine under *KSR*, Defendants provide the following statements regarding motivation to combine. Multiple teachings, suggestions, and/or reasons to modify any of the references and/or to combine any two or more of the references in Exhibits B-1 – B-15 and Appendix B-Secondary

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come from many sources, including the prior art (specific and as a whole), common knowledge, common sense, predictability, expectations, industry trends, design incentives or need, market demands or pressure, market forces, obvious to try, the nature of the problem faced, and/or knowledge possessed by one of ordinary skill. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field of endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one.

The combination of prior art references identified in these contentions would have been obvious because the combination represents the known potential options with a reasonable expectation of success. Additionally, one of ordinary skill in the art would have been motivated to create combinations identified in these contentions using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or teaching, suggestion, or motivation in the prior art generally. Also, market forces in the industry, and the desire to improve features and performance, would motivate the addition of features to systems as they became available, became less expensive, became more commonly used, provided better performance, reduced costs, size or weight, or predictably achieved other desirable results.

C. Other Grounds for Invalidity

Defendants identify the following additional grounds for invalidity of the Asserted Claims of the ’359 Patent. Defendants reserve the right to supplement these disclosures based on further investigation and discovery.

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1. Invalidity of the ’359 Patent Based on 35 U.S.C. § 112, ¶ 1 (Enablement and Written Description)

Based on Defendants’ present understanding of Iarnach’s asserted scope of the claims of the ’359 Patent, to the extent such positions can be understood from Iarnach’s Preliminary Infringement Contentions, the Asserted Claims of the ’359 Patent are invalid for reciting at least the following claim terms, phrases, or limitations that lack enablement or sufficient written description:

- “A method for managing upstream burst overhead parameters, comprising:” (’359 Patent, claim 1[A])
- “an optical line terminal or an optical network unit detecting transmission quality of a downlink between the optical line terminal and the optical network unit;” (’359 Patent, claim 1[B])
- “the optical line terminal or the optical network unit determining the upstream burst overhead parameters suitable for the optical network unit according to the transmission quality; and” (’359 Patent, claim 1[C])
- “the optical network unit starting to use the upstream burst overhead parameters suitable for the optical network unit after switching time determined by the optical network unit itself or indicated by the optical line terminal;” (’359 Patent, claim 1[D])
- “wherein, before the step of the optical line terminal or the optical network unit detecting the transmission quality of the downlink between the optical line terminal and the optical network unit, the method further comprises:” (’359 Patent, claim 1[E])
- “the optical line terminal determining and identifying N kinds of upstream burst overhead parameter sets according to different levels of link quality, wherein N is an integer and is larger than zero; and” (’359 Patent, claim 1[F])
- “the optical line terminal sending a parameter value or an identification of one default upstream burst overhead parameter set to the optical network unit; and the optical network unit receiving the parameter value or the identification of the upstream burst overhead parameter set in a waiting state and using the upstream burst overhead parameter set; or,” (’359 Patent, claim 1[G])
- “the optical line terminal sending parameter values or identifications of more than one upstream burst overhead parameter set to the optical network unit; and the optical network unit receiving the parameter values or the identifications of the upstream burst overhead parameter sets in a waiting state and using one of the received upstream burst overhead parameter sets.” (’359 Patent, claim 1[H])

- "The method of claim 1, wherein: after the step of the optical network unit receiving the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s), the method further comprises: the optical network unit entering into a serial number state;" ('359 Patent, claim 2[A])

- "the step of the optical line terminal detecting the transmission quality of the downlink between the optical line terminal and the optical network unit comprises: in the serial number state of the optical network unit, the optical line terminal detecting the downlink between the optical network unit and the optical line terminal to acquire quality information of the downlink;" ('359 Patent, claim 2[B])

- "the step of the optical line terminal determining the upstream burst overhead parameters suitable for the optical network unit according to the transmission quality comprises: the optical line terminal determining the upstream burst overhead parameter set suitable for the optical network unit according to the quality information of the downlink, and notifying the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) suitable for the optical network unit to the optical network unit via a unicast message or a broadcast message." ('359 Patent, claim 2[C])

- "The method of claim 1, wherein: after the step of the optical network unit receiving the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s), the method further comprises: the optical network unit entering into a serial number state;" ('359 Patent, claim 3[A])

- "the step of the optical network unit detecting the transmission quality of the downlink between the optical line terminal and the optical network unit comprises: in the serial number state of the optical network unit, the optical network unit detecting the downlink between the optical network unit and the optical line terminal to acquire quality information of the downlink;" ('359 Patent, claim 3[B])

- "after the step of acquiring the quality information of the downlink, the method further comprises: the optical network unit notifying the quality information of the downlink to the optical line terminal;" ('359 Patent, claim 3[C])

- "the step of the optical line terminal determining the upstream burst overhead parameters suitable for the optical network unit according to the transmission quality comprises: the optical line terminal determining the upstream burst overhead parameter set suitable for the optical network unit according to the quality information of the downlink, and notifying the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) suitable for the optical network unit to the optical network unit via a unicast message or a broadcast message." ('359 Patent, claim 3[D])

- "The method of claim 2, wherein: while or after the optical line terminal notifies the parameter value(s) or the identification(s) of the determined upstream burst overhead parameter set(s) to the optical network unit, or while or after the optical network unit notifies the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) to the optical line terminal, the method further comprises: the optical line

terminal setting a switching index value of the upstream burst overhead parameters in a tag field assigned for a bandwidth of the optical network unit, and sending the switching index value to the optical network unit via a downstream frame; the step of the optical network unit starting to use the upstream burst overhead parameters after the switching time indicated by the optical line terminal comprises: after the optical network unit receives the switching index value, the optical network unit using the upstream burst overhead parameters suitable for the optical network unit in a next frame; or," ('359 Patent, claim 5[A])

- "while or after the optical line terminal notifies the parameter value(s) or the identification(s) of the determined upstream burst overhead parameter set(s) to the optical network unit, or while or after the optical network unit notifies the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) to the optical line terminal, the method further comprises: the optical line terminal notifying a hyper frame number to the optical network unit; the step of the optical network unit starting to use the upstream burst overhead parameters after the switching time indicated by the optical line terminal comprises: after the optical network unit receives the hyper frame number and after a frame indicated by the hyper frame number arrives, the optical network unit starting to use the upstream burst overhead parameters suitable for the optical network unit; or," ('359 Patent, claim 5[B])

- "while or after the optical line terminal notifies the parameter value(s) or the identification(s) of the determined upstream burst overhead parameter set(s) to the optical network unit, or while or after the optical network unit notifies the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) to the optical line terminal, the method further comprises: the optical network unit notifying a hyper frame number to the optical line terminal; the step of the optical network unit starting to use the upstream burst overhead parameters after the switching time determined by the optical network unit itself comprises: after a frame indicated by the hyper frame number arrives, the optical network unit starting to use the upstream burst overhead parameters suitable for the optical network unit." ('359 Patent, claim 5[C])

- "The method of claim 2, wherein: the upstream burst overhead parameter set comprises: state of forward error correction, delimiter, preamble and guard band." ('359 Patent, claim 6[A])

- "The method of claim 1, wherein: in the step of the optical line terminal sending the parameter values or the identifications of more than one upstream burst overhead parameter set to the optical network unit, the optical line terminal sends the parameter values or the identifications of one or more upstream burst overhead parameter sets to all optical network units or one or more optical network units which communicate with the optical line terminal." ('359 Patent, claim 7[A])

- "The method of claim 3, wherein: while or after the optical line terminal notifies the parameter value(s) or the identification(s) of the determined upstream burst overhead parameter set(s) to the optical network unit, or while or after the optical network unit notifies the parameter value(s) or the identification(s) of the upstream burst overhead

parameter set(s) to the optical line terminal, the method further comprises: the optical line terminal setting a switching index value of the upstream burst overhead parameters in a tag field assigned for a bandwidth of the optical network unit, and sending the switching index value to the optical network unit via a downstream frame; the step of the optical network unit starting to use the upstream burst overhead parameters after the switching time indicated by the optical line terminal comprises: after the optical network unit receives the switching index value, the optical network unit using the upstream burst overhead parameters suitable for the optical network unit in a next frame; or," ('359 Patent, claim 8[A])

- "while or after the optical line terminal notifies the parameter value(s) or the identification(s) of the determined upstream burst overhead parameter set(s) to the optical network unit, or while or after the optical network unit notifies the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) to the optical line terminal, the method further comprises: the optical line terminal notifying a hyper frame number to the optical network unit; the step of the optical network unit starting to use the upstream burst overhead parameters after the switching time indicated by the optical line terminal comprises: after the optical network unit receives the hyper frame number and after a frame indicated by the hyper frame number arrives, the optical network unit starting to use the upstream burst overhead parameters suitable for the optical network unit; or," ('359 Patent, claim 8[B])

- "while or after the optical line terminal notifies the parameter value(s) or the identification(s) of the determined upstream burst overhead parameter set(s) to the optical network unit, or while or after the optical network unit notifies the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) to the optical line terminal, the method further comprises: the optical network unit notifying a hyper frame number to the optical line terminal; the step of the optical network unit starting to use the upstream burst overhead parameters after the switching time determined by the optical network unit itself comprises: after a frame indicated by the hyper frame number arrives, the optical network unit starting to use the upstream burst overhead parameters suitable for the optical network unit." ('359 Patent, claim 8[C])

- "The method of claim 3, wherein: the upstream burst overhead parameter set comprises: state of forward error correction, delimiter, preamble and guard band." ('359 Patent, claim 9[A])

These claim terms, phrases, and limitations, as apparently construed by Iarnach, fail to satisfy the enablement and/or written description requirements of 35 U.S.C. § 112. This is at least because the specifications of the '359 Patent demonstrate that the patentee neither conceived of nor demonstrated possession of all that Iarnach now contends the claims cover. In addition, based on Defendant's present understanding of Iarnach's Preliminary Infringement Contentions, each of

the Asserted Claims of the ’359 Patent in which these claim terms, phrases, and limitations appear is invalid because the specification fails to provide sufficient disclosure to enable a person of ordinary skill in the art to which the alleged invention pertains, or with which it is most nearly connected, to implement the alleged invention without undue experimentation.

2. Invalidity of the ’359 Patent Based on 35 U.S.C. § 112, ¶ 2 (Indefiniteness)

Based on the Defendants’ present understanding of Iarnach’s asserted scope of the claims of the ’359 Patent, to the extent such positions can be understood from Iarnach’s Preliminary Infringement Contentions, the Defendants assert that the Asserted Claims of the ’359 Patent are invalid for reciting at least the following indefinite claim terms, phrases, or limitations:

- “A method for managing upstream burst overhead parameters, comprising:” (’359 Patent, claim 1[A])
- “an optical line terminal or an optical network unit detecting transmission quality of a downlink between the optical line terminal and the optical network unit;” (’359 Patent, claim 1[B])
- “the optical line terminal or the optical network unit determining the upstream burst overhead parameters suitable for the optical network unit according to the transmission quality; and” (’359 Patent, claim 1[C])
- “the optical network unit starting to use the upstream burst overhead parameters suitable for the optical network unit after switching time determined by the optical network unit itself or indicated by the optical line terminal;” (’359 Patent, claim 1[D])
- “wherein, before the step of the optical line terminal or the optical network unit detecting the transmission quality of the downlink between the optical line terminal and the optical network unit, the method further comprises:” (’359 Patent, claim 1[E])
- “the optical line terminal determining and identifying N kinds of upstream burst overhead parameter sets according to different levels of link quality, wherein N is an integer and is larger than zero; and” (’359 Patent, claim 1[F])
- “the optical line terminal sending a parameter value or an identification of one default upstream burst overhead parameter set to the optical network unit; and the optical network unit receiving the parameter value or the identification of the upstream burst overhead parameter set in a waiting state and using the upstream burst overhead parameter set; or,” (’359 Patent, claim 1[G])

- "the optical line terminal sending parameter values or identifications of more than one upstream burst overhead parameter set to the optical network unit; and the optical network unit receiving the parameter values or the identifications of the upstream burst overhead parameter sets in a waiting state and using one of the received upstream burst overhead parameter sets." ('359 Patent, claim 1[H])

- "The method of claim 1, wherein: after the step of the optical network unit receiving the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s), the method further comprises: the optical network unit entering into a serial number state;" ('359 Patent, claim 2[A])

- "the step of the optical line terminal detecting the transmission quality of the downlink between the optical line terminal and the optical network unit comprises: in the serial number state of the optical network unit, the optical line terminal detecting the downlink between the optical network unit and the optical line terminal to acquire quality information of the downlink;" ('359 Patent, claim 2[B])

- "the step of the optical line terminal determining the upstream burst overhead parameters suitable for the optical network unit according to the transmission quality comprises: the optical line terminal determining the upstream burst overhead parameter set suitable for the optical network unit according to the quality information of the downlink, and notifying the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) suitable for the optical network unit to the optical network unit via a unicast message or a broadcast message." ('359 Patent, claim 2[C])

- "The method of claim 1, wherein: after the step of the optical network unit receiving the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s), the method further comprises: the optical network unit entering into a serial number state;" ('359 Patent, claim 3[A])

- "the step of the optical network unit detecting the transmission quality of the downlink between the optical line terminal and the optical network unit comprises: in the serial number state of the optical network unit, the optical network unit detecting the downlink between the optical network unit and the optical line terminal to acquire quality information of the downlink;" ('359 Patent, claim 3[B])

- "after the step of acquiring the quality information of the downlink, the method further comprises: the optical network unit notifying the quality information of the downlink to the optical line terminal;" ('359 Patent, claim 3[C])

- "the step of the optical line terminal determining the upstream burst overhead parameters suitable for the optical network unit according to the transmission quality comprises: the optical line terminal determining the upstream burst overhead parameter set suitable for the optical network unit according to the quality information of the downlink, and notifying the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) suitable for the optical network unit to the optical network unit via a unicast message or a broadcast message." ('359 Patent, claim 3[D])

- "The method of claim 2, wherein: while or after the optical line terminal notifies the parameter value(s) or the identification(s) of the determined upstream burst overhead parameter set(s) to the optical network unit, or while or after the optical network unit notifies the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) to the optical line terminal, the method further comprises: the optical line terminal setting a switching index value of the upstream burst overhead parameters in a tag field assigned for a bandwidth of the optical network unit, and sending the switching index value to the optical network unit via a downstream frame; the step of the optical network unit starting to use the upstream burst overhead parameters after the switching time indicated by the optical line terminal comprises: after the optical network unit receives the switching index value, the optical network unit using the upstream burst overhead parameters suitable for the optical network unit in a next frame; or," ('359 Patent, claim 5[A])

- "while or after the optical line terminal notifies the parameter value(s) or the identification(s) of the determined upstream burst overhead parameter set(s) to the optical network unit, or while or after the optical network unit notifies the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) to the optical line terminal, the method further comprises: the optical line terminal notifying a hyper frame number to the optical network unit; the step of the optical network unit starting to use the upstream burst overhead parameters after the switching time indicated by the optical line terminal comprises: after the optical network unit receives the hyper frame number and after a frame indicated by the hyper frame number arrives, the optical network unit starting to use the upstream burst overhead parameters suitable for the optical network unit; or," ('359 Patent, claim 5[B])

- "while or after the optical line terminal notifies the parameter value(s) or the identification(s) of the determined upstream burst overhead parameter set(s) to the optical network unit, or while or after the optical network unit notifies the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) to the optical line terminal, the method further comprises: the optical network unit notifying a hyper frame number to the optical line terminal; the step of the optical network unit starting to use the upstream burst overhead parameters after the switching time determined by the optical network unit itself comprises: after a frame indicated by the hyper frame number arrives, the optical network unit starting to use the upstream burst overhead parameters suitable for the optical network unit." ('359 Patent, claim 5[C])

- "The method of claim 2, wherein: the upstream burst overhead parameter set comprises: state of forward error correction, delimiter, preamble and guard band." ('359 Patent, claim 6[A])

- "The method of claim 1, wherein: in the step of the optical line terminal sending the parameter values or the identifications of more than one upstream burst overhead parameter set to the optical network unit, the optical line terminal sends the parameter values or the identifications of one or more upstream burst overhead parameter sets to all optical network units or one or more optical network units which communicate with the optical line terminal." ('359 Patent, claim 7[A])

- "The method of claim 3, wherein: while or after the optical line terminal notifies the parameter value(s) or the identification(s) of the determined upstream burst overhead parameter set(s) to the optical network unit, or while or after the optical network unit notifies the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) to the optical line terminal, the method further comprises: the optical line terminal setting a switching index value of the upstream burst overhead parameters in a tag field assigned for a bandwidth of the optical network unit, and sending the switching index value to the optical network unit via a downstream frame; the step of the optical network unit starting to use the upstream burst overhead parameters after the switching time indicated by the optical line terminal comprises: after the optical network unit receives the switching index value, the optical network unit using the upstream burst overhead parameters suitable for the optical network unit in a next frame; or," ('359 Patent, claim 8[A])

- "while or after the optical line terminal notifies the parameter value(s) or the identification(s) of the determined upstream burst overhead parameter set(s) to the optical network unit, or while or after the optical network unit notifies the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) to the optical line terminal, the method further comprises: the optical line terminal notifying a hyper frame number to the optical network unit; the step of the optical network unit starting to use the upstream burst overhead parameters after the switching time indicated by the optical line terminal comprises: after the optical network unit receives the hyper frame number and after a frame indicated by the hyper frame number arrives, the optical network unit starting to use the upstream burst overhead parameters suitable for the optical network unit; or," ('359 Patent, claim 8[B])

- "while or after the optical line terminal notifies the parameter value(s) or the identification(s) of the determined upstream burst overhead parameter set(s) to the optical network unit, or while or after the optical network unit notifies the parameter value(s) or the identification(s) of the upstream burst overhead parameter set(s) to the optical line terminal, the method further comprises: the optical network unit notifying a hyper frame number to the optical line terminal; the step of the optical network unit starting to use the upstream burst overhead parameters after the switching time determined by the optical network unit itself comprises: after a frame indicated by the hyper frame number arrives, the optical network unit starting to use the upstream burst overhead parameters suitable for the optical network unit." ('359 Patent, claim 8[C])

- "The method of claim 3, wherein: the upstream burst overhead parameter set comprises: state of forward error correction, delimiter, preamble and guard band." ('359 Patent, claim 9[A])

These claim terms, phrases, and limitations, as apparently construed by Iarnach, violate the definiteness requirements of 35 U.S.C. § 112.

Based on Defendants' present understanding of Iarnach's Preliminary Infringement Contentions, these claim terms, phrases, and limitations are indefinite because they are inconsistent with and broader than the alleged invention disclosed in the specification and during prosecution. And given Iarnach's apparent constructions of the claim terms, phrases, and limitations, persons of ordinary skill in the art at the time of the invention would not have understood what is claimed with reasonable certainty, even when the claims are read in light of the specification and prosecution history.

3. Additional Grounds for Invalidity of the '359 Patent

In addition to the preceding invalidity contentions, Defendants reserve the right to assert that the Asserted Claims are invalid under 35 U.S.C. § 102(f) and/or § 102(g) in the event that Defendants obtain evidence that the named inventor of the '359 Patent did not invent (either alone or in conjunction with other parties) the subject matter claimed in the '359 Patent. Should Defendants obtain such evidence, Defendants will provide the name of the person(s) from whom and the circumstances under which the invention or any part of it was derived, and/or the circumstances surrounding the making of the invention before the patent application.

4. Collateral Estoppel

In the event the PTAB or any other judicial body issues an applicable decision or ruling such as, but not limited to, a ruling in Inter Partes Review, Iarnach is estopped from asserting the claims of the '359 Patent in view of such decisions or rulings.

Defendants reserve the right to supplement these disclosures based on further investigation and discovery.

5. Secondary Considerations

There are no objective indicia of non-obviousness evidencing the validity of any of the Asserted Claims. If Iarnach identifies any alleged objective indicia of non-obviousness or

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secondary considerations supporting the validity of any Asserted Claims, Defendants reserve the right to supplement these contentions to respond to any such evidence. Further, to the extent any products allegedly practicing the claims have been successful, there is no nexus between the claimed inventions and the products' alleged success.

V. THE '378 PATENT IS INVALID.

A. Identification of Prior Art

Defendants contend that the prior art references described and charted in Exhibits C-1 – C-15 and Appendix C-Secondary anticipate and/or render obvious, alone or in combination, one or more of the Asserted Claims of the '378 Patent.

B. The Asserted Claims Are Anticipated and/or Rendered Obvious.

Iarnach asserts claims 1-8 of the '378 Patent against the Defendants in this lawsuit. These claims are invalid because the '378 Patent fails to meet one or more of the requirements for patentability. The individual bases for invalidity are provided below and in Exhibits C-1 – C-15 and Appendix C-Secondary. Each of the prior art references, the underlying work, and/or the underlying apparatus or method qualifies as prior art under one or more sections of 35 U.S.C. §§ 102 and/or 103.

In an effort to focus the issues, the Defendants have cited representative portions of identified references, even where a reference may contain additional disclosures or support for a particular claim element. Each and every disclosure of the same limitation in the same reference is not necessarily identified. In addition, POSITA generally read a prior art reference as a whole and in the context of other publications and literature and in the context of their knowledge as persons of ordinary skill in the art. Thus, to understand and interpret any specific statement or disclosure within a prior art reference, such persons would rely on other information within the reference, along with other publications and their general scientific knowledge and experience in

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the field. Thus, each prior art reference identified herein should be understood in the context of the reference itself, in conjunction with anything incorporated by reference or described as relevant technology by the reference, any documents that are referred to for further understanding by the reference, any system embodying the reference, and any testimony by those with knowledge of the reference, such as the named authors and inventors. The Defendants may rely on uncited portions of the prior art references and on other publications and expert testimony to provide context, and as aids to understanding and interpreting the portions that are cited. The Defendants may also rely on uncited portions of the prior art references, other disclosed publications, and the testimony of experts to establish that a person of ordinary skill in the art would have been motivated to modify or combine certain of the cited references so as to render the claims obvious.

1. The ’378 Patent Priority Date.

Iarnach’s Preliminary Infringement Contentions allege that the Asserted Claims of the ’378 Patent are entitled at least to the priority date January 25, 2010. Defendants contend that the ’378 is not entitled to a priority date earlier than November 10, 2010. To the extent Iarnach alleges that any prior art relied on in these invalidity contentions does not qualify as prior art to an Asserted Patent, Defendants reserve the right to rebut those allegations (*e.g.*, by demonstrating an earlier relevant date for the challenged prior art and/or a later priority date for the Asserted Patent and/or Asserted Claim).

2. The ’378 Patent Is Anticipated and/or Rendered Obvious by the Prior Art.

Some or all of the Asserted Claims of the ’378 Patent are invalid as anticipated and/or rendered obvious under 35 U.S.C. §§ 102 and/or 103 in view of each of the primary prior art references identified in the claim charts included in Exhibits C-1 – C-15, which identify specific examples of where each limitation of the Asserted Claims is found in the prior art references. As

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explained above, the cited portions of prior art references identified in the attached claim charts are exemplary in nature and representative of the content and teaching of the prior art references, and should be understood in the context of the reference as a whole and as they would be understood by a person of ordinary skill in the art.

Defendants identify the following references as anticipating and/or rendering obvious one or more of the Asserted Claims of the '378 Patent under 35 U.S.C. §§ 102 and/or 103. The table of anticipating and/or rending obvious references below is exemplary, and it does not constitute an admission that any reference not listed below does not also anticipate and/or render obvious the claims of the '378 Patent. Further, Defendants contend that any prior art reference in the attached charts that is charted for each limitation of any given claim, anticipates that claim, regardless of whether that prior art reference is listed in the following table.

Exhibit	**Primary Prior Art**	**Date**[7]
Ex. C-1	US2008/0144622 to Platnic et al. ("Platnic '622")	June 19, 2008
Ex. C-2	US2002/0150097 to Yen et al. ("Yen '097")	October 17, 2002
Ex. C-3	WO2006/077575A1 to Platnic et al. ("Platnic '575")	July 27, 2006
Ex. C-4	WO2003/036907 to Niemi et al. ("Niemi '907")	May 1, 2003
Ex. C-5	CN1855834A to Jiang Tao He ("He")	November 1, 2006
Ex. C-6	JP2004260556A to Sato Masayuki, et al. ("Masayuki")	September 16, 2004

[7] Defendants reserve the right to identify additional bases for qualification as prior art for each of the identified references in the event that it is determined that the Asserted Patents are not entitled to the claimed priority date.

Exhibit	Primary Prior Art	Date[7]
Ex. C-7	WO02/062006 to Sato Masayuki, et al. ("Masayuki '006")	August 8, 2002
Ex. C-8	WO2007033553A1 to Ming et al. ("Ming '553")	March 29, 2007
Ex. C-9	CN100391202C, to Jiang Qi, et al. ("Qi")	May 28, 2008
Ex. C-10	US20070133800A1 to Kim ("Kim")	June 14. 2007
Ex. C-11	Draft G.987.3 (03/2010) & G.987.3 (10/2010) ("G.987.3 (03/2010) and G.987.3 (10/2010)" or "G.987.3," collectively)	March 2010, October 2010, respectively
Ex. C-12	G.988 (10/2010) ("G.988")	October 2010
Ex. C-15	G.984.3 (03/2008) ("G.984.3")	March 2008
Ex. C-14	US2012/0128155 ("Effenberger '155")	July 31, 2009
Ex. C-15	US2011/0029773 ("Effenberger '773")	July 31, 2009

To the extent any item of prior art cited above is deemed not to disclose and/or render obvious, explicitly or inherently, any limitation of an Asserted Claim of the '378 Patent, Defendants reserve the right to argue that any difference between that prior art and the corresponding patent claim would have been either inherent in the art or obvious to a person of ordinary skill in the art, even if Defendants have not specifically denoted that the art is to be combined with the knowledge of a person of ordinary skill in the art.

3. The ’378 Patent Is Obvious Over the Prior Art.

To the extent Iarnach argues that any limitation of the Asserted Claims of the ’378 Patent are not explicitly disclosed and/or rendered obvious by an item of prior art identified above and in Exhibits C-1 – C-15 and Appendix C-Secondary, any purported differences are such that the claimed subject matter as a whole would have been obvious to one skilled in the art at the time of the alleged invention, in view of the state of the art and knowledge of those skilled in the art. The item of prior art would, therefore, render such claims invalid as obvious under 35 U.S.C. § 103.

a) The Claims Are Obvious Over the Primary References in Light of One or More Secondary References.

To the extent the foregoing references are found not to anticipate and/or render obvious the Asserted Claims of the ’378 Patent, the foregoing references render the Asserted Claims obvious, either alone or in combination with one or more of the other references identified above. One of ordinary skill in the art would have been motivated to combine the various references cited above and herein so as to disclose each and every limitation of the Asserted Claims of the ’378 Patent.

Prior art references rendering the Asserted Claims of the ’378 Patent obvious, either alone or in combination with other references in Exhibits C-1 – C-15 and Appendix C-Secondary, are provided in the tables above and below and in Exhibits C-1 – C-15 and Appendix C-Secondary. The prior art identified in Exhibits C-1 – C-15 and Appendix C-Secondary render one or more asserted claims of the ’378 Patent obvious when the references are read in combination with one or more of each other, when read in combination with any of the prior art identified in Appendix C-Secondary, and/or when read in view of the state of the art and knowledge of those skilled in the art.

Ex. C-Secondary References	Date
TJ-08 dsl2008.205.00-Q2-15 ("Liaison Statement")	March 2008
TJ LS Reply DSLF R1 ("LS Reply")	April 2008
US20060031936A1	April 4, 2002
JP2006245778A	March 1, 2005
JP2007228292A	February 23, 2006

To the extent Iarnach argues that any Asserted Claim of the '378 Patent is not disclosed or rendered obvious by any Exhibits C-1 – C-15 and Appendix C-Secondary reference, the Asserted Claims nevertheless would have been obvious in light of one or more other Exhibits C-1 – C-15 references and/or one or more references identified and charted in Appendix C-Secondary and in view of the knowledge, experience, and understanding of persons of ordinary skill in the art.

Each and every reference identified is also relevant to the state of the art at the time of the alleged invention. Any of the references disclosed above may be combined with another to render obvious (and therefore invalid) each of Iarnach's Asserted Claims. Defendants may rely on a subset of (or all of) the above-identified references, including all references in Exhibits Exhibits C-1 – C-15 and Appendix C-Secondary, for purposes of obviousness in view of the Court's claim construction, positions taken by Iarnach during this litigation, and further investigation and discovery.

b) Exemplary Combinations of the Prior Art.

The table below provides an identification of exemplary combinations of prior art references that, based on Defendants' present understanding of Iarnach's Preliminary Infringement Contentions and apparent reading of the Asserted Claims, render obvious one or more of the

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Asserted Claims of the ’378 Patent. The combinations of references identified below are non-exhaustive, and additional examples are apparent from other combinations of references addressed in Exhibits C-1 – C-15 and Appendix C-Secondary. Defendants expressly note that, although certain references charted in Exhibits C-1 – C-15 are listed variously in the left or right column below, Defendants do not thereby imply any restriction as to which Exhibits C-1 – C-15 reference is primary and which Exhibits C-1 – C-15 reference is secondary in such a combination. Defendants reserve the right to rely on either identified reference in the identified combinations as a primary and/or secondary reference.

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Reference	Combination References
US2008/0144622 to Platnic et al. ("Platnic '622")	Yen '097, Platnic '575, Niemi '907, He, Masayuki, Masayuki '006, Ming '553, Qi, Kim, G.987.3, G.988, G.984.3, Effenberger '155, Effenberger '773, and/or Appendix C-Secondary
US2002/0150097 to Yen et al. ("Yen '097")	Platnic '622, Platnic '575, Niemi '907, He, Masayuki, Masayuki '006, Ming '553, Qi, Kim, G.987.3, G.988, G.984.3, Effenberger '155, Effenberger '773, and/or Appendix C-Secondary
WO2006/077575A1 to Platnic et al. ("Platnic '575")	Platnic '622, Yen '097,, Niemi '907, He, Masayuki, Masayuki '006, Ming '553, Qi, Kim, G.987.3, G.988, G.984.3, Effenberger '155, Effenberger '773, and/or Appendix C-Secondary
WO2003/036907 to Niemi et al. ("Niemi '907")	Platnic '622, Yen '097, Platnic '575, He, Masayuki, Masayuki '006, Ming '553, Qi, Kim, G.987.3, G.988, G.984.3, Effenberger '155, Effenberger '773, and/or Appendix C-Secondary
CN1855834A to Jiang Tao He ("He")	Platnic '622, Yen '097, Platnic '575, Niemi '907, Masayuki, Masayuki '006, Ming '553, Qi, Kim, G.987.3, G.988, G.984.3, Effenberger '155, Effenberger '773, and/or Appendix C-Secondary
JP2004260556A to Sato Masayuki, et al. ("Masayuki")	Platnic '622, Yen '097, Platnic '575, Niemi '907, He, Masayuki '006, Ming '553, Qi, Kim, G.987.3, G.988, G.984.3, Effenberger '155, Effenberger '773, and/or Appendix C-Secondary
WO02/062006 to Sato Masayuki, et al. ("Masayuki '006")	Platnic '622, Yen '097, Platnic '575, Niemi '907, He, Masayuki, Ming '553, Qi, Kim, G.987.3, G.988, G.984.3, Effenberger '155, Effenberger '773, and/or Appendix C-Secondary
WO2007033553A1 to Ming et al. ("Ming '553")	Platnic '622, Yen '097, Platnic '575, Niemi '907, He, Masayuki, Masayuki '006, Qi, Kim, G.987.3, G.988, G.984.3, Effenberger '155, Effenberger '773, and/or Appendix C-Secondary
CN100391202C, to Jiang Qi, et al. ("Qi")	Platnic '622, Yen '097, Platnic '575, Niemi '907, He, Masayuki, Masayuki '006, Ming '553, Kim, G.987.3, G.988, G.984.3, Effenberger '155, Effenberger '773, and/or Appendix C-Secondary

US20070133800A1 to Kim ("Kim")	Platnic '622, Yen '097, Platnic '575, Niemi '907, He, Masayuki, Masayuki '006, Ming '553, Qi, G.987.3, G.988, G.984.3, Effenberger '155, Effenberger '773, and/or Appendix C-Secondary
Draft G.987.3 (03/2010) & G.987.3 (10/2010) ("G.987.3 (03/2010) and G.987.3 (10/2010)" or "G.987.3," collectively)	Platnic '622, Yen '097, Platnic '575, Niemi '907, He, Masayuki, Masayuki '006, Ming '553, Qi, Kim, G.988, G.984.3, and/or Appendix C-Secondary
G.988 (10/2010) ("G.988")	Platnic '622, Yen '097, Platnic '575, Niemi '907, He, Masayuki, Masayuki '006, Ming '553, Qi, Kim, G.987.3, G.984.3, Effenberger '155, Effenberger '773, and/or Appendix C-Secondary
G.984.3 (03/2008) ("G.984.3")	Platnic '622, Yen '097, Platnic '575, Niemi '907, He, Masayuki, Masayuki '006, Ming '553, Qi, Kim, G.987.3, G.988, Effenberger '155, Effenberger '773, and/or Appendix C-Secondary
US2012/0128155 ("Effenberger '155")	Platnic '622, Yen '097, Platnic '575, Niemi '907, He, Masayuki, Masayuki '006, Ming '553, Qi, Kim, G.987.3, G.988, G.984.3, Effenberger '773, and/or Appendix C-Secondary
US2011/0029773 ("Effenberger '773")	Platnic '622, Yen '097, Platnic '575, Niemi '907, He, Masayuki, Masayuki '006, Ming '553, Qi, Kim, G.987.3, G.988, G.984.3, Effenberger '155, and/or Appendix C-Secondary

It would have been obvious to combine these references for reasons that are readily apparent to one of ordinary skill in the art, and for reasons explained herein.

c) Prior Art Solutions

In addition to the exemplary combinations provided above, to the extent Iarnach alleges the references in Exhibits C-1 – C-15 and Appendix C-Secondary do not disclose any particular limitation of the Asserted Claims of the '378 Patent, either expressly or inherently, it would have been obvious to a person of ordinary skill in the art as of the alleged invention date of the '378 Patent to modify the references in Exhibits C-1 – C-15 and Appendix C-Secondary and/or combine

the teachings of the references in Exhibits C-1 – C-15 and Appendix C-Secondary with the other prior art references in Exhibits C-1 – C-15 and Appendix C-Secondary in a manner that would have rendered the Asserted Claims invalid as obvious. The Defendants provide examples of such combinations below. The exemplary combinations below are non-exhaustive, and the Defendants reserve the right to rely on additional combinations as may be apparent from the prior art references in Exhibits C-1 – C-15 and Appendix C-Secondary. These obviousness combinations should not be construed to suggest that any reference included in any combination is not anticipatory in its own right.

(1) Exemplary Platnic ’622 Solutions

A person of ordinary skill in the art would be motivated to combine Platnic ’622 with Yen ’097 for many reasons. For example, Platnic ’622 describes a “method and a system enabling multicast transmission of multicast services in a communication network, for example comprising a PON (passive optical network), and with various levels of security.” *See, e.g.*, Platnic ’622 at [0008]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Platnic ’622 to implement the details of a “multicast connection in accordance with a preferred embodiment of the present invention is also secured via a multicasting churning key (i.e., encryption key) to prevent eavesdropping by unauthorized users” taught by Yen ’097 because, it is also directed at encryption of communications systems. Yen ’097 at [0013]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as reducing the risk of a security breach. Yen ’097 at [0017] - [0018]. In addition, a person of ordinary skill in the art would be motivated to combine Platnic ’622 with Yen ’097 because (a) Platnic ’622 and Yen ’097 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success

in incorporating Yen ’097’s teachings with those of Platnic ’622. Specifically, Platnic ’662 specifically incorporates Yen ’097 by reference. For similar reasons, a person of ordinary skill in the art would be motivated to combine Platnic ’622 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Platnic ’622 with Platnic ’575 for many reasons. For example, Platnic ’622 describes a “method and a system enabling multicast transmission of multicast services in a communication network, for example comprising a PON (passive optical network), and with various levels of security.” *See, e.g.*, Platnic ’622 at [0008]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Platnic ’622 to implement the details of a “method and a system for delivering secured multicast services such as video to multiple clients in a passive optical network (PON) by multicasting” taught by Platnic ’575 because, it is also directed at encryption of communications systems. Platnic ’575 at Field of the invention. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as using encryption in a multicast system. Platnic ’575 at 5-11-12. In addition, a person of ordinary skill in the art would be motivated to combine Platnic ’622 with Platnic ’575 because (a) Platnic ’622 and Platnic ’575 disclose similar products, methods, and solutions; (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption and (c) both have the same named inventor. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Platnic ’575’s teachings with those of Platnic ’622. For similar reasons, a person of ordinary skill in the art would be motivated to combine Platnic ’622 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Platnic '622 with Niemi '907 for many reasons. For example, Platnic '622 describes a "method and a system enabling multicast transmission of multicast services in a communication network, for example comprising a PON (passive optical network), and with various levels of security." *See, e.g.*, Platnic '622 at [0008]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Platnic '622 to implement the details of a "encrypting a multicast message by using ciphering" taught by Niemi '907 because, it is also directed at encryption of communications systems. Niemi '907 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "sending the encrypted multicast message to the plurality of user entities simultaneously." Niemi '907 at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Platnic '622 with Niemi '907 because (a) Platnic '622 and Niemi '907 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Niemi '907's teachings with those of Platnic '622. For similar reasons, a person of ordinary skill in the art would be motivated to combine Platnic '622 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Platnic '622 with He for many reasons. For example, Platnic '622 describes a "method and a system enabling multicast transmission of multicast services in a communication network, for example comprising a PON (passive optical network), and with various levels of security." *See, e.g.*, Platnic '622 at [0008]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Platnic '622 to implement the details of a "generating a key at the optical network line

terminal, and said key is used as the public key of the multicast and is used to encrypt the multicast bit-stream" taught by He because, it is also directed at encryption of communications systems. He at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such the use of multiple channels for transmitting the multicast bit-stream and key. He at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Platnic '622 with He because (a) Platnic '622 and He disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating He's teachings with those of Platnic '622. For similar reasons, a person of ordinary skill in the art would be motivated to combine Platnic '622 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Platnic '622 with Masayuki for many reasons. For example, Platnic '622 describes a "method and a system enabling multicast transmission of multicast services in a communication network, for example comprising a PON (passive optical network), and with various levels of security." *See, e.g.*, Platnic '622 at [0008]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Platnic '622 to implement the details of a "generating a multicast encryption key for encrypting a message to be multicast to the subscriber apparatus" taught by Masayuki because, it is also directed at encryption of communications systems. Masayuki at [0008]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as storing the multicast encryption key on the subscriber side. Masayuki at [0008]. In addition, a person of ordinary skill in the art would be motivated to combine Platnic '622 with Masayuki because

(a) Platnic ’622 and Masayuki disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Masayuki’s teachings with those of Platnic ’622. For similar reasons, a person of ordinary skill in the art would be motivated to combine Platnic ’622 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Platnic ’622 with Masayuki ’006 for many reasons. For example, Platnic ’622 describes a “method and a system enabling multicast transmission of multicast services in a communication network, for example comprising a PON (passive optical network), and with various levels of security.” *See, e.g.*, Platnic ’622 at [0008]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Platnic ’622 to implement the details of a “An encryption key sending means for sending a key to a plurality of subscriber-side devices that should receive the multicast data” taught by Masayuki ’006 because, it is also directed at encryption of communications systems. Masayuki ’006 at 4. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “receiving the encryption key sent from the network side device to the client side device” and means of encryption and decryption. Masayuki ’006 at 4. In addition, a person of ordinary skill in the art would be motivated to combine Platnic ’622 with Masayuki ’006 because (a) Platnic ’622 and Masayuki ’006 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Masayuki ’006’s teachings with those of Platnic ’622. For similar reasons, a person of ordinary skill in the art would be

motivated to combine Platnic '622 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Platnic '622 with Ming '553 for many reasons. For example, Platnic '622 describes a "method and a system enabling multicast transmission of multicast services in a communication network, for example comprising a PON (passive optical network), and with various levels of security." *See, e.g.*, Platnic '622 at [0008]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Platnic '622 to implement the details of a "a method and a device for controlling multicast right in a passive optical network system" taught by Ming '553 because, it is also directed at encryption of communications systems. Ming '553 at 3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as regular updating of the security key. Ming '553 at 3. In addition, a person of ordinary skill in the art would be motivated to combine Platnic '622 with Ming '553 because (a) Platnic '622 and Ming '553 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ming '553's teachings with those of Platnic '622. For similar reasons, a person of ordinary skill in the art would be motivated to combine Platnic '622 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Platnic '622 with Qi for many reasons. For example, Platnic '622 describes a "method and a system enabling multicast transmission of multicast services in a communication network, for example comprising a PON (passive optical network), and with various levels of security." *See, e.g.*, Platnic '622 at [0008]. A

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person having ordinary skill in the art would have been motivated to modify the method and/or device of Platnic '622 to implement the details of a "a key generation means 43 for generating and transmitting a key to the optical network unit" taught by Qi because, it is also directed at encryption of communications systems. Qi at [0061]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the systems identification of the ONU participating in the multicast. Qi at [0061]. In addition, a person of ordinary skill in the art would be motivated to combine Platnic '622 with Qi because (a) Platnic '622 and Qi disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Qi's teachings with those of Platnic '622. For similar reasons, a person of ordinary skill in the art would be motivated to combine Platnic '622 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Platnic '622 with Kim for many reasons. For example, Platnic '622 describes a "method and a system enabling multicast transmission of multicast services in a communication network, for example comprising a PON (passive optical network), and with various levels of security." *See, e.g.*, Platnic '622 at [0008]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Platnic '622 to implement the details of a "method for setting a security channel based on a multi-point control protocol" taught by Kim because, it is also directed at encryption of communications systems. Kim at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the automatic registration of an ONU with security capability. Kim at Abstract. In addition, a person of ordinary skill in the art would be motivated to

combine Platnic ’622 with Kim because (a) Platnic ’622 and Kim disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kim’s teachings with those of Platnic ’622. For similar reasons, a person of ordinary skill in the art would be motivated to combine Platnic ’622 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Platnic ’622 with G.987.3 for many reasons. For example, Platnic ’622 describes a “method and a system enabling multicast transmission of multicast services in a communication network, for example comprising a PON (passive optical network), and with various levels of security.” *See, e.g.*, Platnic ’622 at [0008]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Platnic ’622 to implement the details of “Downstream multicast encryption” taught by G.987.3 because, it is also directed at encryption of communications systems. G.987.3 at 15.5.2. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as transmission of the encryption key via the OMCI. G.987.3 at 15.5.2. In addition, a person of ordinary skill in the art would be motivated to combine Platnic ’622 with G.987.3 because (a) Platnic ’622 and G.987.3 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3’s teachings with those of Platnic ’622. For similar reasons, a person of ordinary skill in the art would be motivated to combine Platnic

’622 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Platnic ’622 with G.988 for many reasons. For example, Platnic ’622 describes a “method and a system enabling multicast transmission of multicast services in a communication network, for example comprising a PON (passive optical network), and with various levels of security.” *See, e.g.*, Platnic ’622 at [0008]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Platnic ’622 to implement the details of a “Broadcast (multicast) encryption” taught by G.988 because, it is also directed at encryption of communications systems. G.988 at 81. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “keys are generated by the OLT and distributed via OMCI.” G.988 at 81. In addition, a person of ordinary skill in the art would be motivated to combine Platnic ’622 with G.988 because (a) Platnic ’622 and G.988 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.988’s teachings with those of Platnic ’622. For similar reasons, a person of ordinary skill in the art would be motivated to combine Platnic ’622 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Platnic ’622 with G.984.3 for many reasons. For example, Platnic ’622 describes a “method and a system enabling multicast transmission of multicast services in a communication network, for example comprising a PON (passive optical network), and with various levels of security.” *See, e.g.*, Platnic ’622 at [0008]. A person having ordinary skill in the art would have been motivated to modify the method

and/or device of Platnic '622 to implement the details of a "Key exchange and switch-over" taught by G.984.3 because, it is also directed at encryption of communications systems. G.984.3 at 12.3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as sending the "Request_Key message in the PLOAM channel." G.984.3 at 91. In addition, a person of ordinary skill in the art would be motivated to combine Platnic '622 with G.984.3 because (a) Platnic '622 and G.984.3 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.984.3's teachings with those of Platnic '622. For similar reasons, a person of ordinary skill in the art would be motivated to combine Platnic '622 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Platnic '622 with Effenberger '155 for many reasons. For example, Platnic '622 describes a "method and a system enabling multicast transmission of multicast services in a communication network, for example comprising a PON (passive optical network), and with various levels of security." *See, e.g.*, Platnic '622 at [0008]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Platnic '622 to implement the details of a "apparatus and method for providing security in a Passive Optical Network (PON) using an Enhanced Security Control management entity (ME)" taught by Effenberger '155 because, it is also directed at encryption of communications systems. Effenberger '155 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as sending the exchanging security information with an optical line terminal (OLT) via an ONU management control interface (OMCI) channel by using a plurality of attributes in an Enhanced Security Control management

entity (ME) in the ONU." Effenberger '155 at Claim 1. In addition, a person of ordinary skill in the art would be motivated to combine Platnic '622 with Effenberger '155 because (a) Platnic '622 and Effenberger '155 disclose similar products, methods, and solutions, (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption, and Effenberger was a primary contributor and now Rapporteur of the ITU SG15/Q2 Study Group. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Effenberger '155's teachings with those of Platnic '622. For similar reasons, a person of ordinary skill in the art would be motivated to combine Platnic '622 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Platnic '622 with Effenberger '773 for many reasons. For example, Platnic '622 describes a "method and a system enabling multicast transmission of multicast services in a communication network, for example comprising a PON (passive optical network), and with various levels of security." *See, e.g.*, Platnic '622 at [0008]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Platnic '622 to implement the details of a "network component comprising at least one processor coupled to a memory and configured to exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel," taught by Effenberger '773 because, it is also directed at security of communications systems. Effenberger '773 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel." Effenberger '773 at Claim 1. In addition, a person of ordinary skill in the art would be motivated

to combine Platnic ’622 with Effenberger ’773 because (a) Platnic ’622 and Effenberger ’773 disclose similar products, methods, and solutions, (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption, and Effenberger was a primary contributor and now Rapporteur of the ITU SG15/Q2 Study Group. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Effenberger ’773’s teachings with those of Platnic ’622. For similar reasons, a person of ordinary skill in the art would be motivated to combine Platnic ’622 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

(2) Exemplary Yen ’097 Solutions

A person of ordinary skill in the art would be motivated to combine Yen ’097 with Platnic ’622 for many reasons. For example, Yen ’097 describes a “multicast connection in accordance with a preferred embodiment of the present invention is also secured via a multicasting churning key (i.e., encryption key) to prevent eavesdropping by unauthorized users.” *See, e.g.*, Yen ’097 at [0013]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Yen ’097 to implement the details of a “method and a system enabling multicast transmission of multicast services in a communication network, for example comprising a PON (passive optical network), and with various levels of security” taught by Platnic ’622 because, it is also directed at encryption of communications systems. Platnic ’622 at [0008]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as transmitting the code key message and data traffic in different channels. Platnic ’622 at [0101]. In addition, a person of ordinary skill in the art would be motivated to combine Yen ’097 with Platnic ’622 because (a) Yen ’097 and Platnic ’622 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption. Moreover, a POSITA would have had a reasonable

expectation of success in incorporating Platnic ’622 ’s teachings with those of Yen ’097. For similar reasons, a person of ordinary skill in the art would be motivated to combine Yen ’097 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Yen ’097 with Platnic ’575 for many reasons. For example, Yen ’097 describes a “multicast connection in accordance with a preferred embodiment of the present invention is also secured via a multicasting churning key (i.e., encryption key) to prevent eavesdropping by unauthorized users.” *See, e.g.*, Yen ’097 at [0013]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Yen ’097 to implement the details of a “method and a system for delivering secured multicast services such as video to multiple clients in a passive optical network (PON) by multicasting” taught by Platnic ’575 because, it is also directed at encryption of communications systems. Platnic ’575 at Field of the invention. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as using encryption in a multicast system. Platnic ’575 at 5-11-12. In addition, a person of ordinary skill in the art would be motivated to combine Yen ’097 with Platnic ’575 because (a) Yen ’097 and Platnic ’575 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Platnic ’575’s teachings with those of Yen ’097. For similar reasons, a person of ordinary skill in the art would be motivated to combine Yen ’097 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Yen ’097 with Niemi ’907 for many reasons. For example, Yen ’097 describes a “multicast connection in accordance

with a preferred embodiment of the present invention is also secured via a multicasting churning key (i.e., encryption key) to prevent eavesdropping by unauthorized users." *See, e.g.*, Yen '097 at [0013]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Yen '097 to implement the details of a "encrypting a multicast message by using ciphering" taught by Niemi '907 because, it is also directed at encryption of communications systems. Niemi '907 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "sending the encrypted multicast message to the plurality of user entities simultaneously." Niemi '907 at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Yen '097 with Niemi '907 because (a) Yen '097 and Niemi '907 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Niemi '907's teachings with those of Yen '097. For similar reasons, a person of ordinary skill in the art would be motivated to combine Yen '097 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Yen '097 with He for many reasons. For example, Yen '097 describes a "multicast connection in accordance with a preferred embodiment of the present invention is also secured via a multicasting churning key (i.e., encryption key) to prevent eavesdropping by unauthorized users." *See, e.g.*, Yen '097 at [0013]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Yen '097 to implement the details of a "generating a key at the optical network line terminal, and said key is used as the public key of the multicast and is used to encrypt the multicast bit-stream" taught by He because, it is also directed at encryption of communications systems. He

at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such the use of multiple channels for transmitting the multicast bit-stream and key. He at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Yen '097 with He because (a) Yen '097 and He disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating He's teachings with those of Yen '097. For similar reasons, a person of ordinary skill in the art would be motivated to combine Yen '097 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Yen '097 with Masayuki for many reasons. For example, Yen '097 describes a "multicast connection in accordance with a preferred embodiment of the present invention is also secured via a multicasting churning key (i.e., encryption key) to prevent eavesdropping by unauthorized users." *See, e.g.*, Yen '097 at [0013]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Yen '097 to implement the details of a "generating a multicast encryption key for encrypting a message to be multicast to the subscriber apparatus" taught by Masayuki because, it is also directed at encryption of communications systems. Masayuki at [0008]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as storing the multicast encryption key on the subscriber side. Masayuki at [0008]. In addition, a person of ordinary skill in the art would be motivated to combine Yen '097 with Masayuki because (a) Yen '097 and Masayuki disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would

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have had a reasonable expectation of success in incorporating Masayuki's teachings with those of Yen '097. For similar reasons, a person of ordinary skill in the art would be motivated to combine Yen '097 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Yen '097 with Masayuki '006 for many reasons. For example, Yen '097 describes a "multicast connection in accordance with a preferred embodiment of the present invention is also secured via a multicasting churning key (i.e., encryption key) to prevent eavesdropping by unauthorized users." *See, e.g.*, Yen '097 at [0013]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Yen '097 to implement the details of a "An encryption key sending means for sending a key to a plurality of subscriber-side devices that should receive the multicast data" taught by Masayuki '006 because, it is also directed at encryption of communications systems. Masayuki '006 at 4. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "receiving the encryption key sent from the network side device to the client side device" and means of encryption and decryption. Masayuki '006 at 4. In addition, a person of ordinary skill in the art would be motivated to combine Yen '097 with Masayuki '006 because (a) Yen '097 and Masayuki '006 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Masayuki '006's teachings with those of Yen '097. For similar reasons, a person of ordinary skill in the art would be motivated to combine Yen '097 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

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A person of ordinary skill in the art would be motivated to combine Yen '097 with Ming '553 for many reasons. For example, Yen '097 describes a "multicast connection in accordance with a preferred embodiment of the present invention is also secured via a multicasting churning key (i.e., encryption key) to prevent eavesdropping by unauthorized users." *See, e.g.*, Yen '097 at [0013]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Yen '097 to implement the details of a "a method and a device for controlling multicast right in a passive optical network system" taught by Ming '553 because, it is also directed at encryption of communications systems. Ming '553 at 3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as regular updating of the security key. Ming '553 at 3. In addition, a person of ordinary skill in the art would be motivated to combine Yen '097 with Ming '553 because (a) Yen '097 and Ming '553 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ming '553's teachings with those of Yen '097. For similar reasons, a person of ordinary skill in the art would be motivated to combine Yen '097 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Yen '097 with Qi for many reasons. For example, Yen '097 describes a "multicast connection in accordance with a preferred embodiment of the present invention is also secured via a multicasting churning key (i.e., encryption key) to prevent eavesdropping by unauthorized users." *See, e.g.*, Yen '097 at [0013]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Yen '097 to implement the details of a "a key generation means 43 for generating and

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transmitting a key to the optical network unit" taught by Qi because, it is also directed at encryption of communications systems. Qi at [0061]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the systems identification of the ONU participating in the multicast. Qi at [0061]. In addition, a person of ordinary skill in the art would be motivated to combine Yen '097 with Qi because (a) Yen '097 and Qi disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Qi's teachings with those of Yen '097. For similar reasons, a person of ordinary skill in the art would be motivated to combine Yen '097 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Yen '097 with Kim for many reasons. For example, Yen '097 describes a "multicast connection in accordance with a preferred embodiment of the present invention is also secured via a multicasting churning key (i.e., encryption key) to prevent eavesdropping by unauthorized users." *See, e.g.*, Yen '097 at [0013]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Yen '097 to implement the details of a "method for setting a security channel based on a multi-point control protocol" taught by Kim because, it is also directed at encryption of communications systems. Kim at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the automatic registration of an ONU with security capability. Kim at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Yen '097 with Kim because (a) Yen '097 and Kim disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each

other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kim's teachings with those of Yen '097. For similar reasons, a person of ordinary skill in the art would be motivated to combine Yen '097 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Yen '097 with G.987.3 for many reasons. For example, Yen '097 describes a "multicast connection in accordance with a preferred embodiment of the present invention is also secured via a multicasting churning key (i.e., encryption key) to prevent eavesdropping by unauthorized users." *See, e.g.*, Yen '097 at [0013]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Yen '097 to implement the details of "Downstream multicast encryption" taught by G.987.3 because, it is also directed at encryption of communications systems. G.987.3 at 15.5.2. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as transmission of the encryption key via the OMCI. G.987.3 at 15.5.2. In addition, a person of ordinary skill in the art would be motivated to combine Yen '097 with G.987.3 because (a) Yen '097 and G.987.3 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3's teachings with those of Yen '097. For similar reasons, a person of ordinary skill in the art would be motivated to combine Yen '097 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Yen '097 with G.988 for many reasons. For example, Yen '097 describes a "multicast connection in accordance with a

preferred embodiment of the present invention is also secured via a multicasting churning key (i.e., encryption key) to prevent eavesdropping by unauthorized users." *See, e.g.*, Yen '097 at [0013]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Yen '097 to implement the details of a "Broadcast (multicast) encryption" taught by G.988 because, it is also directed at encryption of communications systems. G.988 at 81. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "keys are generated by the OLT and distributed via OMCI." G.988 at 81. In addition, a person of ordinary skill in the art would be motivated to combine Yen '097 with G.988 because (a) Yen '097 and G.988 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.988's teachings with those of Yen '097. For similar reasons, a person of ordinary skill in the art would be motivated to combine Yen '097 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Yen '097 with G.984.3 for many reasons. For example, Yen '097 describes a "multicast connection in accordance with a preferred embodiment of the present invention is also secured via a multicasting churning key (i.e., encryption key) to prevent eavesdropping by unauthorized users." *See, e.g.*, Yen '097 at [0013]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Yen '097 to implement the details of a "Key exchange and switch-over" taught by G.984.3 because, it is also directed at encryption of communications systems. G.984.3 at 12.3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as sending the "Request_Key message in the PLOAM channel." G.984.3 at 91. In addition, a

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person of ordinary skill in the art would be motivated to combine Yen ’097 with G.984.3 because (a) Yen ’097 and G.984.3 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.984.3’s teachings with those of Yen ’097. For similar reasons, a person of ordinary skill in the art would be motivated to combine Yen ’097 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Yen ’097 with Effenberger ’155 for many reasons. For example, Yen ’097 describes a “multicast connection in accordance with a preferred embodiment of the present invention is also secured via a multicasting churning key (i.e., encryption key) to prevent eavesdropping by unauthorized users.” *See, e.g.*, Yen ’097 at [0013]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Yen ’097 to implement the details of a “apparatus and method for providing security in a Passive Optical Network (PON) using an Enhanced Security Control management entity (ME)” taught by Effenberger ’155 because, it is also directed at encryption of communications systems. Effenberger ’155 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as sending the exchanging security information with an optical line terminal (OLT) via an ONU management control interface (OMCI) channel by using a plurality of attributes in an Enhanced Security Control management entity (ME) in the ONU.” Effenberger ’155 at Claim 1. In addition, a person of ordinary skill in the art would be motivated to combine Yen ’097 with Effenberger ’155 because (a) Yen ’097 and Effenberger ’155 disclose similar products, methods, and solutions, (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept

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of encryption, and Effenberger was a primary contributor and now Rapporteur of the ITU SG15/Q2 Study Group. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Effenberger '155's teachings with those of Yen '097. For similar reasons, a person of ordinary skill in the art would be motivated to combine Yen '097 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Yen '097 with Effenberger '773 for many reasons. For example, Yen '097 describes a "multicast connection in accordance with a preferred embodiment of the present invention is also secured via a multicasting churning key (i.e., encryption key) to prevent eavesdropping by unauthorized users." *See, e.g.*, Yen '097 at [0013]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Yen '097 to implement the details of a "network component comprising at least one processor coupled to a memory and configured to exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel," taught by Effenberger '773 because, it is also directed at security of communications systems. Effenberger '773 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel." Effenberger '773 at Claim 1. In addition, a person of ordinary skill in the art would be motivated to combine Yen '097 with Effenberger '773 because (a) Yen '097 and Effenberger '773 disclose similar products, methods, and solutions, (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption, and Effenberger was a primary contributor and now Rapporteur of the ITU SG15/Q2 Study Group.

Moreover, a POSITA would have had a reasonable expectation of success in incorporating Effenberger ’773’s teachings with those of Yen ’097. For similar reasons, a person of ordinary skill in the art would be motivated to combine Yen ’097 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

(3) Exemplary Platnic ’575 Solutions

A person of ordinary skill in the art would be motivated to combine Platnic ’575 with Platnic ’622 for many reasons. For example, Platnic ’575 describes a “method and a system for delivering secured multicast services such as video to multiple clients in a passive optical network (PON) by multicasting.” *See, e.g.*, Platnic ’575 at Field of Invention. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Platnic ’575 to implement the details of a “method and a system enabling multicast transmission of multicast services in a communication network, for example comprising a PON (passive optical network), and with various levels of security” taught by Platnic ’622 because, it is also directed at encryption of communications systems. Platnic ’622 at [0008]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as transmitting the code key message and data traffic in different channels. Platnic ’622 at [0101]. In addition, a person of ordinary skill in the art would be motivated to combine Platnic ’575 with Platnic ’622 because (a) Platnic ’575 and Platnic ’622 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Platnic ’622 ’s teachings with those of Platnic ’575. For similar reasons, a person of ordinary skill in the art would be motivated to combine Platnic ’575 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

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A person of ordinary skill in the art would be motivated to combine Platnic '575 with Yen '097 for many reasons. For example, Platnic '575 describes a "method and a system for delivering secured multicast services such as video to multiple clients in a passive optical network (PON) by multicasting." *See, e.g.*, Platnic '575 at Field of Invention. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Platnic '575 to implement the details of a "multicast connection in accordance with a preferred embodiment of the present invention is also secured via a multicasting churning key (i.e., encryption key) to prevent eavesdropping by unauthorized users" taught by Yen '097 because, it is also directed at encryption of communications systems. Yen '097 at [0013]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as reducing the risk of a security breach. Yen '097 at [0017]-[0018]. In addition, a person of ordinary skill in the art would be motivated to combine Platnic '575 with Yen '097 because (a) Platnic '575 and Yen '097 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Yen '097's teachings with those of Platnic '575. For similar reasons, a person of ordinary skill in the art would be motivated to combine Platnic '575 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Platnic '575 with Niemi '907 for many reasons. For example, Platnic '575 describes a "method and a system for delivering secured multicast services such as video to multiple clients in a passive optical network (PON) by multicasting." *See, e.g.*, Platnic '575 at Field of Invention. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Platnic '575 to implement

the details of a "encrypting a multicast message by using ciphering" taught by Niemi '907 because, it is also directed at encryption of communications systems. Niemi '907 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "sending the encrypted multicast message to the plurality of user entities simultaneously." Niemi '907 at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Platnic '575 with Niemi '907 because (a) Platnic '575 and Niemi '907 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Niemi '907's teachings with those of Platnic '575. For similar reasons, a person of ordinary skill in the art would be motivated to combine Platnic '575 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Platnic '575 with He for many reasons. For example, Platnic '575 describes a "method and a system for delivering secured multicast services such as video to multiple clients in a passive optical network (PON) by multicasting." *See, e.g.*, Platnic '575 at Field of Invention. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Platnic '575 to implement the details of a "generating a key at the optical network line terminal, and said key is used as the public key of the multicast and is used to encrypt the multicast bit-stream" taught by He because, it is also directed at encryption of communications systems. He at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such the use of multiple channels for transmitting the multicast bit-stream and key. He at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Platnic '575 with He because (a) Platnic

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’575 and He disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating He’s teachings with those of Platnic ’575. For similar reasons, a person of ordinary skill in the art would be motivated to combine Platnic ’575 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Platnic ’575 with Masayuki for many reasons. For example, Platnic ’575 describes a “method and a system for delivering secured multicast services such as video to multiple clients in a passive optical network (PON) by multicasting.” *See, e.g.*, Platnic ’575 at Field of Invention. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Platnic ’575 to implement the details of a “generating a multicast encryption key for encrypting a message to be multicast to the subscriber apparatus” taught by Masayuki because, it is also directed at encryption of communications systems. Masayuki at [0008]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as storing the multicast encryption key on the subscriber side. Masayuki at [0008]. In addition, a person of ordinary skill in the art would be motivated to combine Platnic ’575 with Masayuki because (a) Platnic ’575 and Masayuki disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Masayuki’s teachings with those of Platnic ’575. For similar reasons, a person of ordinary skill in the art would be motivated to combine Platnic ’575 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Platnic '575 with Masayuki '006 for many reasons. For example, Platnic '575 describes a "method and a system for delivering secured multicast services such as video to multiple clients in a passive optical network (PON) by multicasting." *See, e.g.*, Platnic '575 at Field of Invention. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Platnic '575 to implement the details of a "An encryption key sending means for sending a key to a plurality of subscriber-side devices that should receive the multicast data" taught by Masayuki '006 because, it is also directed at encryption of communications systems. Masayuki '006 at 4. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "receiving the encryption key sent from the network side device to the client side device" and means of encryption and decryption. Masayuki '006 at 4. In addition, a person of ordinary skill in the art would be motivated to combine Platnic '575 with Masayuki '006 because (a) Platnic '575 and Masayuki '006 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Masayuki '006's teachings with those of Platnic '575. For similar reasons, a person of ordinary skill in the art would be motivated to combine Platnic '575 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Platnic '575 with Ming '553 for many reasons. For example, Platnic '575 describes a "method and a system for delivering secured multicast services such as video to multiple clients in a passive optical network (PON) by multicasting." *See, e.g.*, Platnic '575 at Field of Invention. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Platnic '575 to implement

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the details of a "a method and a device for controlling multicast right in a passive optical network system" taught by Ming '553 because, it is also directed at encryption of communications systems. Ming '553 at 3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as regular updating of the security key. Ming '553 at 3. In addition, a person of ordinary skill in the art would be motivated to combine Platnic '575 with Ming '553 because (a) Platnic '575 and Ming '553 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ming '553's teachings with those of Platnic '575. For similar reasons, a person of ordinary skill in the art would be motivated to combine Platnic '575 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Platnic '575 with Qi for many reasons. For example, Platnic '575 describes a "method and a system for delivering secured multicast services such as video to multiple clients in a passive optical network (PON) by multicasting." *See, e.g.*, Platnic '575 at Field of Invention. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Platnic '575 to implement the details of a "a key generation means 43 for generating and transmitting a key to the optical network unit" taught by Qi because, it is also directed at encryption of communications systems. Qi at [0061]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the systems identification of the ONU participating in the multicast. Qi at [0061]. In addition, a person of ordinary skill in the art would be motivated to combine Platnic '575 with Qi because (a) Platnic '575 and Qi disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example,

both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Qi's teachings with those of Platnic '575. For similar reasons, a person of ordinary skill in the art would be motivated to combine Platnic '575 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Platnic '575 with Kim for many reasons. For example, Platnic '575 describes a "method and a system for delivering secured multicast services such as video to multiple clients in a passive optical network (PON) by multicasting." *See, e.g.*, Platnic '575 at Field of Invention. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Platnic '575 to implement the details of a "method for setting a security channel based on a multi-point control protocol" taught by Kim because, it is also directed at encryption of communications systems. Kim at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the automatic registration of an ONU with security capability. Kim at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Platnic '575 with Kim because (a) Platnic '575 and Kim disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kim's teachings with those of Platnic '575. For similar reasons, a person of ordinary skill in the art would be motivated to combine Platnic '575 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Platnic '575 with G.987.3 for many reasons. For example, Platnic '575 describes a "method and a system for delivering secured multicast services such as video to multiple clients in a passive optical network

(PON) by multicasting." *See, e.g.*, Platnic '575 at Field of Invention. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Platnic '575 to implement the details of "Downstream multicast encryption" taught by G.987.3 because, it is also directed at encryption of communications systems. G.987.3 at 15.5.2. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as transmission of the encryption key via the OMCI. G.987.3 at 15.5.2. In addition, a person of ordinary skill in the art would be motivated to combine Platnic '575 with G.987.3 because (a) Platnic '575 and G.987.3 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3's teachings with those of Platnic '575. For similar reasons, a person of ordinary skill in the art would be motivated to combine Platnic '575 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Platnic '575 with G.988 for many reasons. For example, Platnic '575 describes a "method and a system for delivering secured multicast services such as video to multiple clients in a passive optical network (PON) by multicasting." *See, e.g.*, Platnic '575 at Field of Invention. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Platnic '575 to implement the details of a "Broadcast (multicast) encryption" taught by G.988 because, it is also directed at encryption of communications systems. G.988 at 81. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "keys are generated by the OLT and distributed via OMCI." G.988 at 81. In addition, a person of ordinary skill in the art would be motivated to combine Platnic '575 with G.988 because (a) Platnic '575 and G.988 disclose similar

products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.988's teachings with those of Platnic '575. For similar reasons, a person of ordinary skill in the art would be motivated to combine Platnic '575 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Platnic '575 with G.984.3 for many reasons. For example, Platnic '575 describes a "method and a system for delivering secured multicast services such as video to multiple clients in a passive optical network (PON) by multicasting." *See, e.g.*, Platnic '575 at Field of Invention. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Platnic '575 to implement the details of a "Key exchange and switch-over" taught by G.984.3 because, it is also directed at encryption of communications systems. G.984.3 at 12.3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as sending the "Request_Key message in the PLOAM channel." G.984.3 at 91. In addition, a person of ordinary skill in the art would be motivated to combine Platnic '575 with G.984.3 because (a) Platnic '575 and G.984.3 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.984.3's teachings with those of Platnic '575. For similar reasons, a person of ordinary skill in the art would be motivated to combine Platnic '575 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

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A person of ordinary skill in the art would be motivated to combine Platnic '575 with Effenberger '155 for many reasons. For example, Platnic '575 describes a "method and a system for delivering secured multicast services such as video to multiple clients in a passive optical network (PON) by multicasting." *See, e.g.*, Platnic '575 at Field of Invention. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Platnic '575 to implement the details of a "apparatus and method for providing security in a Passive Optical Network (PON) using an Enhanced Security Control management entity (ME)" taught by Effenberger '155 because, it is also directed at encryption of communications systems. Effenberger '155 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as sending the exchanging security information with an optical line terminal (OLT) via an ONU management control interface (OMCI) channel by using a plurality of attributes in an Enhanced Security Control management entity (ME) in the ONU." Effenberger '155 at Claim 1. In addition, a person of ordinary skill in the art would be motivated to combine Platnic '575 with Effenberger '155 because (a) Platnic '575 and Effenberger '155 disclose similar products, methods, and solutions, (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption, and Effenberger was a primary contributor and now Rapporteur of the ITU SG15/Q2 Study Group. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Effenberger '155's teachings with those of Platnic '575. For similar reasons, a person of ordinary skill in the art would be motivated to combine Platnic '575 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Platnic '575 with Effenberger '773 for many reasons. For example, Platnic '575 describes a "method and a system

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for delivering secured multicast services such as video to multiple clients in a passive optical network (PON) by multicasting." *See, e.g.*, Platnic '575 at Field of Invention. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Platnic '575 to implement the details of a "network component comprising at least one processor coupled to a memory and configured to exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel," taught by Effenberger '773 because, it is also directed at security of communications systems. Effenberger '773 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel." Effenberger '773 at Claim 1. In addition, a person of ordinary skill in the art would be motivated to combine Platnic '575 with Effenberger '773 because (a) Platnic '575 and Effenberger '773 disclose similar products, methods, and solutions, (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption, and Effenberger was a primary contributor and now Rapporteur of the ITU SG15/Q2 Study Group. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Effenberger '773's teachings with those of Platnic '575. For similar reasons, a person of ordinary skill in the art would be motivated to combine Platnic '575 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

(4) Exemplary Niemi '907 Solutions

A person of ordinary skill in the art would be motivated to combine Niemi '907 with Platnic '622 for many reasons. For example, Niemi '907 describes encryption of communications systems. *See, e.g.*, Niemi '907 at Abstract. A person having ordinary skill in the art would have been

motivated to modify the method and/or device of Niemi ’907 to implement the details of a “method and a system enabling multicast transmission of multicast services in a communication network, for example comprising a PON (passive optical network), and with various levels of security” taught by Platnic ’622 because, it is also directed at encryption of communications systems. Platnic ’622 at [0008]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as transmitting the code key message and data traffic in different channels. Platnic ’622 at [0101]. In addition, a person of ordinary skill in the art would be motivated to combine Niemi ’907 with Platnic ’622 because (a) Niemi ’907 and Platnic ’622 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Platnic ’622 ’s teachings with those of Niemi ’907. For similar reasons, a person of ordinary skill in the art would be motivated to combine Niemi ’907 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Niemi ’907 with Yen ’097 for many reasons. For example, Niemi ’907 describes encryption of communications systems. *See, e.g.*, Niemi ’907 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Niemi ’907 to implement the details of a “multicast connection in accordance with a preferred embodiment of the present invention is also secured via a multicasting churning key (i.e., encryption key) to prevent eavesdropping by unauthorized users” taught by Yen ’097 because, it is also directed at encryption of communications systems. Yen ’097 at [0013]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as reducing the risk of a security breach.

Yen ’097 at [0017]-[0018]. In addition, a person of ordinary skill in the art would be motivated to combine Niemi ’907 with Yen ’097 because (a) Niemi ’907 and Yen ’097 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Yen ’097’s teachings with those of Niemi ’907. For similar reasons, a person of ordinary skill in the art would be motivated to combine Niemi ’907 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Niemi ’907 with Platnic ’575 for many reasons. For example, Niemi ’907 describes encryption of communications systems. *See, e.g.*, Niemi ’907 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as using encryption in a multicast system. Platnic ’575 at 5-11-12. In addition, a person of ordinary skill in the art would be motivated to combine Niemi ’907 with Platnic ’575 because (a) Niemi ’907 and Platnic ’575 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Platnic ’575’s teachings with those of Niemi ’907. For similar reasons, a person of ordinary skill in the art would be motivated to combine Niemi ’907 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Niemi ’907 with He for many reasons. For example, Niemi ’907 describes encryption of communications systems. *See, e.g.*, Niemi ’907 at Abstract. A person having ordinary skill in the art would have been motivated

to modify the method and/or device of Niemi '907 to implement the details of a "generating a key at the optical network line terminal, and said key is used as the public key of the multicast and is used to encrypt the multicast bit-stream" taught by He because, it is also directed at encryption of communications systems. He at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such the use of multiple channels for transmitting the multicast bit-stream and key. He at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Niemi '907 with He because (a) Niemi '907 and He disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating He's teachings with those of Niemi '907. For similar reasons, a person of ordinary skill in the art would be motivated to combine Niemi '907 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Niemi '907 with Masayuki for many reasons. For example, Niemi '907 describes encryption of communications systems. *See, e.g.*, Niemi '907 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Niemi '907 to implement the details of a "generating a multicast encryption key for encrypting a message to be multicast to the subscriber apparatus" taught by Masayuki because, it is also directed at encryption of communications systems. Masayuki at [0008]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as storing the multicast encryption key on the subscriber side. Masayuki at [0008]. In addition, a person of ordinary skill in the art would be motivated to combine Niemi '907 with Masayuki because (a) Niemi '907 and Masayuki disclose similar

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products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Masayuki's teachings with those of Niemi '907. For similar reasons, a person of ordinary skill in the art would be motivated to combine Niemi '907 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Niemi '907 with Masayuki '006 for many reasons. For example, Niemi '907 describes encryption of communications systems. *See, e.g.*, Niemi '907 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Niemi '907 to implement the details of a "An encryption key sending means for sending a key to a plurality of subscriber-side devices that should receive the multicast data" taught by Masayuki '006 because, it is also directed at encryption of communications systems. Masayuki '006 at 4. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "receiving the encryption key sent from the network side device to the client side device" and means of encryption and decryption. Masayuki '006 at 4. In addition, a person of ordinary skill in the art would be motivated to combine Niemi '907 with Masayuki '006 because (a) Niemi '907 and Masayuki '006 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Masayuki '006's teachings with those of Niemi '907. For similar reasons, a person of ordinary skill in the art would be motivated to combine Niemi '907 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

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A person of ordinary skill in the art would be motivated to combine Niemi '907 with Ming '553 for many reasons. For example, Niemi '907 describes encryption of communications systems. *See, e.g.*, Niemi '907 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Niemi '907 to implement the details of a "a method and a device for controlling multicast right in a passive optical network system" taught by Ming '553 because, it is also directed at encryption of communications systems. Ming '553 at 3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as regular updating of the security key. Ming '553 at 3. In addition, a person of ordinary skill in the art would be motivated to combine Niemi '907 with Ming '553 because (a) Niemi '907 and Ming '553 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ming '553's teachings with those of Niemi '907. For similar reasons, a person of ordinary skill in the art would be motivated to combine Niemi '907 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Niemi '907 with Qi for many reasons. For example, Niemi '907 describes encryption of communications systems. *See, e.g.*, Niemi '907 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Niemi '907 to implement the details of a "a key generation means 43 for generating and transmitting a key to the optical network unit" taught by Qi because, it is also directed at encryption of communications systems. Qi at [0061]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the systems identification of the ONU participating in the multicast. Qi at [0061]. In addition, a person of

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ordinary skill in the art would be motivated to combine Niemi '907 with Qi because (a) Niemi '907 and Qi disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Qi's teachings with those of Niemi '907. For similar reasons, a person of ordinary skill in the art would be motivated to combine Niemi '907 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Niemi '907 with Kim for many reasons. For example, Niemi '907 describes encryption of communications systems. *See, e.g.*, Niemi '907 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Niemi '907 to implement the details of a "method for setting a security channel based on a multi-point control protocol" taught by Kim because, it is also directed at encryption of communications systems. Kim at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the automatic registration of an ONU with security capability. Kim at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Niemi '907 with Kim because (a) Niemi '907 and Kim disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kim's teachings with those of Niemi '907. For similar reasons, a person of ordinary skill in the art would be motivated to combine Niemi '907 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

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A person of ordinary skill in the art would be motivated to combine Niemi '907 with G.987.3 for many reasons. For example, Niemi '907 describes encryption of communications systems. *See, e.g.*, Niemi '907 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Niemi '907 to implement the details of "Downstream multicast encryption" taught by G.987.3 because, it is also directed at encryption of communications systems. G.987.3 at 15.5.2. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as transmission of the encryption key via the OMCI. G.987.3 at 15.5.2. In addition, a person of ordinary skill in the art would be motivated to combine Niemi '907 with G.987.3 because (a) Niemi '907 and G.987.3 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3's teachings with those of Niemi '907. For similar reasons, a person of ordinary skill in the art would be motivated to combine Niemi '907 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Niemi '907 with G.988 for many reasons. For example, Niemi '907 describes encryption of communications systems. *See, e.g.*, Niemi '907 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Niemi '907 to implement the details of a "Broadcast (multicast) encryption" taught by G.988 because, it is also directed at encryption of communications systems. G.988 at 81. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "keys are generated by the OLT and distributed via OMCI." G.988 at 81. In addition, a person of ordinary skill in the art would be motivated to

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combine Niemi ’907 with G.988 because (a) Niemi ’907 and G.988 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.988’s teachings with those of Niemi ’907. For similar reasons, a person of ordinary skill in the art would be motivated to combine Niemi ’907 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Niemi ’907 with G.984.3 for many reasons. For example, Niemi ’907 describes encryption of communications systems. *See, e.g.*, Niemi ’907 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Niemi ’907 to implement the details of a “Key exchange and switch-over” taught by G.984.3 because, it is also directed at encryption of communications systems. G.984.3 at 12.3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as sending the “Request_Key message in the PLOAM channel.” G.984.3 at 91. In addition, a person of ordinary skill in the art would be motivated to combine Niemi ’907 with G.984.3 because (a) Niemi ’907 and G.984.3 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.984.3’s teachings with those of Niemi ’907. For similar reasons, a person of ordinary skill in the art would be motivated to combine Niemi ’907 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Niemi '907 with Effenberger '155 for many reasons. For example, Niemi '907 describes encryption of communications systems. *See, e.g.*, Niemi '907 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Niemi '907 to implement the details of a "apparatus and method for providing security in a Passive Optical Network (PON) using an Enhanced Security Control management entity (ME)" taught by Effenberger '155 because, it is also directed at encryption of communications systems. Effenberger '155 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as sending the exchanging security information with an optical line terminal (OLT) via an ONU management control interface (OMCI) channel by using a plurality of attributes in an Enhanced Security Control management entity (ME) in the ONU." Effenberger '155 at Claim 1. In addition, a person of ordinary skill in the art would be motivated to combine Niemi '907 with Effenberger '155 because (a) Niemi '907 and Effenberger '155 disclose similar products, methods, and solutions, (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption, and Effenberger was a primary contributor and now Rapporteur of the ITU SG15/Q2 Study Group. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Effenberger '155's teachings with those of Niemi '907. For similar reasons, a person of ordinary skill in the art would be motivated to combine Niemi '907 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Niemi '907 with Effenberger '773 for many reasons. For example, Niemi '907 describes encryption of communications systems. *See, e.g.*, Niemi '907 at Abstract. A person having ordinary skill in the

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art would have been motivated to modify the method and/or device of Niemi '907 to implement the details of a "network component comprising at least one processor coupled to a memory and configured to exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel," taught by Effenberger '773 because, it is also directed at security of communications systems. Effenberger '773 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel." Effenberger '773 at Claim 1. In addition, a person of ordinary skill in the art would be motivated to combine Niemi '907 with Effenberger '773 because (a) Niemi '907 and Effenberger '773 disclose similar products, methods, and solutions, (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption, and Effenberger was a primary contributor and now Rapporteur of the ITU SG15/Q2 Study Group. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Effenberger '773's teachings with those of Niemi '907. For similar reasons, a person of ordinary skill in the art would be motivated to combine Niemi '907 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

(5) Exemplary He Solutions

A person of ordinary skill in the art would be motivated to combine He with Platnic '622 for many reasons. For example, He describes "generating a key at the optical network line terminal, and said key is used as the public key of the multicast and is used to encrypt the multicast bit-stream." *See, e.g.*, He at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of He to implement the details of a "method and a system enabling multicast transmission of multicast services in a communication network, for

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example comprising a PON (passive optical network), and with various levels of security" taught by Platnic '622 because, it is also directed at encryption of communications systems. Platnic '622 at [0008]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as transmitting the code key message and data traffic in different channels. Platnic '622 at [0101]. In addition, a person of ordinary skill in the art would be motivated to combine He with Platnic '622 because (a) He and Platnic '622 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Platnic '622 's teachings with those of He. For similar reasons, a person of ordinary skill in the art would be motivated to combine He with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine He with Yen '097 for many reasons. For example, He describes "generating a key at the optical network line terminal, and said key is used as the public key of the multicast and is used to encrypt the multicast bit-stream." *See, e.g.*, He at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of He to implement the details of a "multicast connection in accordance with a preferred embodiment of the present invention is also secured via a multicasting churning key (i.e., encryption key) to prevent eavesdropping by unauthorized users" taught by Yen '097 because, it is also directed at encryption of communications systems. Yen '097 at [0013]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as reducing the risk of a security breach. Yen '097 at [0017]-[0018]. In addition, a person of ordinary skill in the art would be motivated to combine He with Yen '097 because (a) He and Yen '097 disclose similar products, methods, and solutions; and (b) both patents are

analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Yen '097's teachings with those of He. For similar reasons, a person of ordinary skill in the art would be motivated to combine He with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine He with Platnic '575 for many reasons. For example, He describes "generating a key at the optical network line terminal, and said key is used as the public key of the multicast and is used to encrypt the multicast bit-stream." *See, e.g.*, He at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as using encryption in a multicast system. Platnic '575 at 5-11-12. In addition, a person of ordinary skill in the art would be motivated to combine He with Platnic '575 because (a) He and Platnic '575 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Platnic '575's teachings with those of He. For similar reasons, a person of ordinary skill in the art would be motivated to combine He with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine He with Niemi '907 for many reasons. For example, He describes "generating a key at the optical network line terminal, and said key is used as the public key of the multicast and is used to encrypt the multicast bit-stream." *See, e.g.*, He at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of He to implement the details of a "encrypting a multicast message by using ciphering" taught by Niemi '907 because, it is also directed at

encryption of communications systems. Niemi '907 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "sending the encrypted multicast message to the plurality of user entities simultaneously." Niemi '907 at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine He with Niemi '907 because (a) He and Niemi '907 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Niemi '907's teachings with those of He. For similar reasons, a person of ordinary skill in the art would be motivated to combine He with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine He with Masayuki for many reasons. For example, He describes "generating a key at the optical network line terminal, and said key is used as the public key of the multicast and is used to encrypt the multicast bit-stream." *See, e.g.*, He at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of He to implement the details of a "generating a multicast encryption key for encrypting a message to be multicast to the subscriber apparatus" taught by Masayuki because, it is also directed at encryption of communications systems. Masayuki at [0008]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as storing the multicast encryption key on the subscriber side. Masayuki at [0008]. In addition, a person of ordinary skill in the art would be motivated to combine He with Masayuki because (a) He and Masayuki disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a

reasonable expectation of success in incorporating Masayuki's teachings with those of He. For similar reasons, a person of ordinary skill in the art would be motivated to combine He with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine He with Masayuki '006 for many reasons. For example, He describes "generating a key at the optical network line terminal, and said key is used as the public key of the multicast and is used to encrypt the multicast bit-stream." *See, e.g.*, He at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of He to implement the details of a "An encryption key sending means for sending a key to a plurality of subscriber-side devices that should receive the multicast data" taught by Masayuki '006 because, it is also directed at encryption of communications systems. Masayuki '006 at 4. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "receiving the encryption key sent from the network side device to the client side device" and means of encryption and decryption. Masayuki '006 at 4. In addition, a person of ordinary skill in the art would be motivated to combine He with Masayuki '006 because (a) He and Masayuki '006 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Masayuki '006's teachings with those of He. For similar reasons, a person of ordinary skill in the art would be motivated to combine He with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine He with Ming '553 for many reasons. For example, He describes "generating a key at the optical network line terminal,

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and said key is used as the public key of the multicast and is used to encrypt the multicast bit-stream." *See, e.g.*, He at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of He to implement the details of a "a method and a device for controlling multicast right in a passive optical network system" taught by Ming '553 because, it is also directed at encryption of communications systems. Ming '553 at 3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as regular updating of the security key. Ming '553 at 3. In addition, a person of ordinary skill in the art would be motivated to combine He with Ming '553 because (a) He and Ming '553 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ming '553's teachings with those of He. For similar reasons, a person of ordinary skill in the art would be motivated to combine He with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine He with Qi for many reasons. For example, He describes "generating a key at the optical network line terminal, and said key is used as the public key of the multicast and is used to encrypt the multicast bit-stream." *See, e.g.*, He at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of He to implement the details of a "a key generation means 43 for generating and transmitting a key to the optical network unit" taught by Qi because, it is also directed at encryption of communications systems. Qi at [0061]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the systems identification of the ONU participating in the multicast. Qi at [0061]. In addition, a person of ordinary skill in

the art would be motivated to combine He with Qi because (a) He and Qi disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Qi's teachings with those of He. For similar reasons, a person of ordinary skill in the art would be motivated to combine He with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine He with Kim for many reasons. For example, He describes "generating a key at the optical network line terminal, and said key is used as the public key of the multicast and is used to encrypt the multicast bit-stream." *See, e.g.*, He at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of He to implement the details of a "method for setting a security channel based on a multi-point control protocol" taught by Kim because, it is also directed at encryption of communications systems. Kim at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the automatic registration of an ONU with security capability. Kim at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine He with Kim because (a) He and Kim disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kim's teachings with those of He. For similar reasons, a person of ordinary skill in the art would be motivated to combine He with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

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A person of ordinary skill in the art would be motivated to combine He with G.987.3 for many reasons. For example, He describes "generating a key at the optical network line terminal, and said key is used as the public key of the multicast and is used to encrypt the multicast bit-stream." *See, e.g.*, He at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of He to implement the details of "Downstream multicast encryption" taught by G.987.3 because, it is also directed at encryption of communications systems. G.987.3 at 15.5.2. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as transmission of the encryption key via the OMCI. G.987.3 at 15.5.2. In addition, a person of ordinary skill in the art would be motivated to combine He with G.987.3 because (a) He and G.987.3 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3's teachings with those of He. For similar reasons, a person of ordinary skill in the art would be motivated to combine He with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine He with G.988 for many reasons. For example, He describes "generating a key at the optical network line terminal, and said key is used as the public key of the multicast and is used to encrypt the multicast bit-stream." *See, e.g.*, He at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of He to implement the details of a "Broadcast (multicast) encryption" taught by G.988 because, it is also directed at encryption of communications systems. G.988 at 81. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "keys are generated by the OLT and distributed via

OMCI." G.988 at 81. In addition, a person of ordinary skill in the art would be motivated to combine He with G.988 because (a) He and G.988 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.988's teachings with those of He. For similar reasons, a person of ordinary skill in the art would be motivated to combine He with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine He with G.984.3 for many reasons. For example, He describes "generating a key at the optical network line terminal, and said key is used as the public key of the multicast and is used to encrypt the multicast bit-stream." *See, e.g.*, He at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of He to implement the details of a "Key exchange and switch-over" taught by G.984.3 because, it is also directed at encryption of communications systems. G.984.3 at 12.3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as sending the "Request_Key message in the PLOAM channel." G.984.3 at 91. In addition, a person of ordinary skill in the art would be motivated to combine He with G.984.3 because (a) He and G.984.3 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.984.3's teachings with those of He. For similar reasons, a person of ordinary skill in the art would be motivated to combine He with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

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A person of ordinary skill in the art would be motivated to combine He with Effenberger '155 for many reasons. For example, He describes "generating a key at the optical network line terminal, and said key is used as the public key of the multicast and is used to encrypt the multicast bit-stream." *See, e.g.*, He at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of He to implement the details of a "apparatus and method for providing security in a Passive Optical Network (PON) using an Enhanced Security Control management entity (ME)" taught by Effenberger '155 because, it is also directed at encryption of communications systems. Effenberger '155 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as sending the exchanging security information with an optical line terminal (OLT) via an ONU management control interface (OMCI) channel by using a plurality of attributes in an Enhanced Security Control management entity (ME) in the ONU." Effenberger '155 at Claim 1. In addition, a person of ordinary skill in the art would be motivated to combine He with Effenberger '155 because (a) He and Effenberger '155 disclose similar products, methods, and solutions, (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption, and Effenberger was a primary contributor and now Rapporteur of the ITU SG15/Q2 Study Group. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Effenberger '155's teachings with those of He. For similar reasons, a person of ordinary skill in the art would be motivated to combine He with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine He with Effenberger '773 for many reasons. For example, He describes "generating a key at the optical network line terminal, and said key is used as the public key of the multicast and is used to encrypt the multicast

bit-stream." *See, e.g.*, He at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of He to implement the details of a "network component comprising at least one processor coupled to a memory and configured to exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel," taught by Effenberger '773 because, it is also directed at security of communications systems. Effenberger '773 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel." Effenberger '773 at Claim 1. In addition, a person of ordinary skill in the art would be motivated to combine He with Effenberger '773 because (a) He and Effenberger '773 disclose similar products, methods, and solutions, (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption, and Effenberger was a primary contributor and now Rapporteur of the ITU SG15/Q2 Study Group. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Effenberger '773's teachings with those of He. For similar reasons, a person of ordinary skill in the art would be motivated to combine He with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

(6) Exemplary Masayuki Solutions

A person of ordinary skill in the art would be motivated to combine Masayuki with Platnic '622 for many reasons. For example, Masayuki describes "generating a multicast encryption key for encrypting a message to be multicast to the subscriber apparatus." *See, e.g.*, Masayuki at [0008]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Masayuki to implement the details of a "method and a system enabling multicast

transmission of multicast services in a communication network, for example comprising a PON (passive optical network), and with various levels of security" taught by Platnic '622 because, it is also directed at encryption of communications systems. Platnic '622 at [0008]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as transmitting the code key message and data traffic in different channels. Platnic '622 at [0101]. In addition, a person of ordinary skill in the art would be motivated to combine Masayuki with Platnic '622 because (a) Masayuki and Platnic '622 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Platnic '622 's teachings with those of Masayuki. For similar reasons, a person of ordinary skill in the art would be motivated to combine Masayuki with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Masayuki with Yen '097 for many reasons. For example, Masayuki describes "generating a multicast encryption key for encrypting a message to be multicast to the subscriber apparatus." *See, e.g.*, Masayuki at [0008]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Masayuki to implement the details of a "multicast connection in accordance with a preferred embodiment of the present invention is also secured via a multicasting churning key (i.e., encryption key) to prevent eavesdropping by unauthorized users" taught by Yen '097 because, it is also directed at encryption of communications systems. Yen '097 at [0013]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as reducing the risk of a security breach. Yen '097 at [0017]-[0018]. In addition, a person of ordinary skill in the art would be motivated to combine Masayuki with Yen '097 because (a) Masayuki and

Yen ’097 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Yen ’097’s teachings with those of Masayuki. For similar reasons, a person of ordinary skill in the art would be motivated to combine Masayuki with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Masayuki with Platnic ’575 for many reasons. For example, Masayuki describes “generating a multicast encryption key for encrypting a message to be multicast to the subscriber apparatus.” *See, e.g.*, Masayuki at [0008]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as using encryption in a multicast system. Platnic ’575 at 5-11-12. In addition, a person of ordinary skill in the art would be motivated to combine Masayuki with Platnic ’575 because (a) Masayuki and Platnic ’575 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Platnic ’575’s teachings with those of Masayuki. For similar reasons, a person of ordinary skill in the art would be motivated to combine Masayuki with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Masayuki with Niemi ’907 for many reasons. For example, Masayuki describes “generating a multicast encryption key for encrypting a message to be multicast to the subscriber apparatus.” *See, e.g.*, Masayuki at [0008]. A person having ordinary skill in the art would have been motivated to modify the method

and/or device of Masayuki to implement the details of a "encrypting a multicast message by using ciphering" taught by Niemi '907 because, it is also directed at encryption of communications systems. Niemi '907 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "sending the encrypted multicast message to the plurality of user entities simultaneously." Niemi '907 at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Masayuki with Niemi '907 because (a) Masayuki and Niemi '907 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Niemi '907's teachings with those of Masayuki. For similar reasons, a person of ordinary skill in the art would be motivated to combine Masayuki with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Masayuki with He for many reasons. For example, Masayuki describes "generating a multicast encryption key for encrypting a message to be multicast to the subscriber apparatus." *See, e.g.*, Masayuki at [0008]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Masayuki to implement the details of a "generating a key at the optical network line terminal, and said key is used as the public key of the multicast and is used to encrypt the multicast bit-stream" taught by He because, it is also directed at encryption of communications systems. He at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such the use of multiple channels for transmitting the multicast bit-stream and key. He at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Masayuki with He because (a) Masayuki and He disclose similar products, methods, and solutions;

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and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating He's teachings with those of Masayuki. For similar reasons, a person of ordinary skill in the art would be motivated to combine Masayuki with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Masayuki with Masayuki '006 for many reasons. For example, Masayuki describes "generating a multicast encryption key for encrypting a message to be multicast to the subscriber apparatus." *See, e.g.*, Masayuki at [0008]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Masayuki to implement the details of a "An encryption key sending means for sending a key to a plurality of subscriber-side devices that should receive the multicast data" taught by Masayuki '006 because, it is also directed at encryption of communications systems. Masayuki '006 at 4. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "receiving the encryption key sent from the network side device to the client side device" and means of encryption and decryption. Masayuki '006 at 4. In addition, a person of ordinary skill in the art would be motivated to combine Masayuki with Masayuki '006 because (a) Masayuki and Masayuki '006 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Masayuki '006's teachings with those of Masayuki. For similar reasons, a person of ordinary skill in the art would be motivated to combine Masayuki with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

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A person of ordinary skill in the art would be motivated to combine Masayuki with Ming '553 for many reasons. For example, Masayuki describes "generating a multicast encryption key for encrypting a message to be multicast to the subscriber apparatus." *See, e.g.*, Masayuki at [0008]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Masayuki to implement the details of a "a method and a device for controlling multicast right in a passive optical network system" taught by Ming '553 because, it is also directed at encryption of communications systems. Ming '553 at 3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as regular updating of the security key. Ming '553 at 3. In addition, a person of ordinary skill in the art would be motivated to combine Masayuki with Ming '553 because (a) Masayuki and Ming '553 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ming '553's teachings with those of Masayuki. For similar reasons, a person of ordinary skill in the art would be motivated to combine Masayuki with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Masayuki with Qi for many reasons. For example, Masayuki describes "generating a multicast encryption key for encrypting a message to be multicast to the subscriber apparatus." *See, e.g.*, Masayuki at [0008]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Masayuki to implement the details of a "a key generation means 43 for generating and transmitting a key to the optical network unit" taught by Qi because, it is also directed at encryption of communications systems. Qi at [0061]. A person of ordinary skill in the art would be motivated

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by the advantages of such functionality, such as the systems identification of the ONU participating in the multicast. Qi at [0061]. In addition, a person of ordinary skill in the art would be motivated to combine Masayuki with Qi because (a) Masayuki and Qi disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Qi's teachings with those of Masayuki. For similar reasons, a person of ordinary skill in the art would be motivated to combine Masayuki with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Masayuki with Kim for many reasons. For example, Masayuki describes "generating a multicast encryption key for encrypting a message to be multicast to the subscriber apparatus." *See, e.g.*, Masayuki at [0008]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Masayuki to implement the details of a "method for setting a security channel based on a multi-point control protocol" taught by Kim because, it is also directed at encryption of communications systems. Kim at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the automatic registration of an ONU with security capability. Kim at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Masayuki with Kim because (a) Masayuki and Kim disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kim's teachings with those of Masayuki. For similar reasons, a person of ordinary skill in the art would be motivated to

combine Masayuki with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Masayuki with G.987.3 for many reasons. For example, Masayuki describes "generating a multicast encryption key for encrypting a message to be multicast to the subscriber apparatus." *See, e.g.*, Masayuki at [0008]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Masayuki to implement the details of "Downstream multicast encryption" taught by G.987.3 because, it is also directed at encryption of communications systems. G.987.3 at 15.5.2. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as transmission of the encryption key via the OMCI. G.987.3 at 15.5.2. In addition, a person of ordinary skill in the art would be motivated to combine Masayuki with G.987.3 because (a) Masayuki and G.987.3 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3's teachings with those of Masayuki. For similar reasons, a person of ordinary skill in the art would be motivated to combine Masayuki with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Masayuki with G.988 for many reasons. For example, Masayuki describes "generating a multicast encryption key for encrypting a message to be multicast to the subscriber apparatus." *See, e.g.*, Masayuki at [0008]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Masayuki to implement the details of a "Broadcast (multicast) encryption" taught by G.988 because, it is also directed at encryption of communications systems. G.988 at 81. A person

of ordinary skill in the art would be motivated by the advantages of such functionality, such as "keys are generated by the OLT and distributed via OMCI." G.988 at 81. In addition, a person of ordinary skill in the art would be motivated to combine Masayuki with G.988 because (a) Masayuki and G.988 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.988's teachings with those of Masayuki. For similar reasons, a person of ordinary skill in the art would be motivated to combine Masayuki with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Masayuki with G.984.3 for many reasons. For example, Masayuki describes "generating a multicast encryption key for encrypting a message to be multicast to the subscriber apparatus." *See, e.g.*, Masayuki at [0008]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Masayuki to implement the details of a "Key exchange and switch-over" taught by G.984.3 because, it is also directed at encryption of communications systems. G.984.3 at 12.3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as sending the "Request_Key message in the PLOAM channel." G.984.3 at 91. In addition, a person of ordinary skill in the art would be motivated to combine Masayuki with G.984.3 because (a) Masayuki and G.984.3 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.984.3's teachings with those of Masayuki. For similar reasons, a person

of ordinary skill in the art would be motivated to combine Masayuki with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Masayuki with Effenberger '155 for many reasons. For example, Masayuki describes "generating a multicast encryption key for encrypting a message to be multicast to the subscriber apparatus." *See, e.g.*, Masayuki at [0008]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Masayuki to implement the details of a "apparatus and method for providing security in a Passive Optical Network (PON) using an Enhanced Security Control management entity (ME)" taught by Effenberger '155 because, it is also directed at encryption of communications systems. Effenberger '155 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as sending the exchanging security information with an optical line terminal (OLT) via an ONU management control interface (OMCI) channel by using a plurality of attributes in an Enhanced Security Control management entity (ME) in the ONU." Effenberger '155 at Claim 1. In addition, a person of ordinary skill in the art would be motivated to combine Masayuki with Effenberger '155 because (a) Masayuki and Effenberger '155 disclose similar products, methods, and solutions, (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption, and Effenberger was a primary contributor and now Rapporteur of the ITU SG15/Q2 Study Group. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Effenberger '155's teachings with those of Masayuki. For similar reasons, a person of ordinary skill in the art would be motivated to combine Masayuki with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Masayuki with Effenberger '773 for many reasons. For example, Masayuki describes "generating a multicast encryption key for encrypting a message to be multicast to the subscriber apparatus." *See, e.g.*, Masayuki at [0008]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Masayuki to implement the details of a "apparatus and method for providing security in a Passive Optical Network (PON) using an Enhanced Security Control management entity (ME)" taught by Effenberger '155 because, it is also directed at encryption of communications systems. Effenberger '155 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Masayuki to implement the details of a "network component comprising at least one processor coupled to a memory and configured to exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel," taught by Effenberger '773 because, it is also directed at security of communications systems. Effenberger '773 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel." Effenberger '773 at Claim 1. In addition, a person of ordinary skill in the art would be motivated to combine Masayuki with Effenberger '773 because (a) Masayuki and Effenberger '773 disclose similar products, methods, and solutions, (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption, and Effenberger was a primary contributor and now Rapporteur of the ITU SG15/Q2 Study Group. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Effenberger '773's teachings with those of Masayuki. For similar

reasons, a person of ordinary skill in the art would be motivated to combine Masayuki with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

(7) Exemplary Masayuki '006 Solutions

A person of ordinary skill in the art would be motivated to combine Masayuki '006 with Platnic '622 for many reasons. For example, Masayuki '006 describes "An encryption key sending means for sending a key to a plurality of subscriber-side devices that should receive the multicast data." *See, e.g.*, Masayuki '006 at 4. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Masayuki '006 to implement the details of a "method and a system enabling multicast transmission of multicast services in a communication network, for example comprising a PON (passive optical network), and with various levels of security" taught by Platnic '622 because, it is also directed at encryption of communications systems. Platnic '622 at [0008]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as transmitting the code key message and data traffic in different channels. Platnic '622 at [0101]. In addition, a person of ordinary skill in the art would be motivated to combine Masayuki '006 with Platnic '622 because (a) Masayuki '006 and Platnic '622 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Platnic '622 's teachings with those of Masayuki '006. For similar reasons, a person of ordinary skill in the art would be motivated to combine Masayuki '006 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Masayuki '006 with Yen '097 for many reasons. For example, Masayuki '006 describes "An encryption key sending means for sending a key to a plurality of subscriber-side devices that should receive the multicast

data." *See, e.g.*, Masayuki '006 at 4. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Masayuki '006 to implement the details of a "multicast connection in accordance with a preferred embodiment of the present invention is also secured via a multicasting churning key (i.e., encryption key) to prevent eavesdropping by unauthorized users" taught by Yen '097 because, it is also directed at encryption of communications systems. Yen '097 at [0013]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as reducing the risk of a security breach. Yen '097 at [0017]-[0018]. In addition, a person of ordinary skill in the art would be motivated to combine Masayuki '006 with Yen '097 because (a) Masayuki '006 and Yen '097 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Yen '097's teachings with those of Masayuki '006. For similar reasons, a person of ordinary skill in the art would be motivated to combine Masayuki '006 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Masayuki '006 with Platnic '575 for many reasons. For example, Masayuki '006 describes "An encryption key sending means for sending a key to a plurality of subscriber-side devices that should receive the multicast data." *See, e.g.*, Masayuki '006 at 4. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as using encryption in a multicast system. Platnic '575 at 5-11-12. In addition, a person of ordinary skill in the art would be motivated to combine Masayuki '006 with Platnic '575 because (a) Masayuki '006 and Platnic '575 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of

endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Platnic '575's teachings with those of Masayuki '006. For similar reasons, a person of ordinary skill in the art would be motivated to combine Masayuki '006 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Masayuki '006 with Niemi '907 for many reasons. For example, Masayuki '006 describes "An encryption key sending means for sending a key to a plurality of subscriber-side devices that should receive the multicast data." *See, e.g.*, Masayuki '006 at 4. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Masayuki '006 to implement the details of a "encrypting a multicast message by using ciphering" taught by Niemi '907 because, it is also directed at encryption of communications systems. Niemi '907 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "sending the encrypted multicast message to the plurality of user entities simultaneously." Niemi '907 at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Masayuki '006 with Niemi '907 because (a) Masayuki '006 and Niemi '907 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Niemi '907's teachings with those of Masayuki '006. For similar reasons, a person of ordinary skill in the art would be motivated to combine Masayuki '006 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

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A person of ordinary skill in the art would be motivated to combine Masayuki '006 with He for many reasons. For example, Masayuki '006 describes "An encryption key sending means for sending a key to a plurality of subscriber-side devices that should receive the multicast data." *See, e.g.*, Masayuki '006 at 4. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Masayuki '006 to implement the details of a "generating a key at the optical network line terminal, and said key is used as the public key of the multicast and is used to encrypt the multicast bit-stream" taught by He because, it is also directed at encryption of communications systems. He at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such the use of multiple channels for transmitting the multicast bit-stream and key. He at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Masayuki '006 with He because (a) Masayuki '006 and He disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating He's teachings with those of Masayuki '006. For similar reasons, a person of ordinary skill in the art would be motivated to combine Masayuki '006 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Masayuki '006 with Masayuki for many reasons. For example, Masayuki '006 describes "An encryption key sending means for sending a key to a plurality of subscriber-side devices that should receive the multicast data." *See, e.g.*, Masayuki '006 at 4. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Masayuki '006 to implement the details of a "generating a multicast encryption key for encrypting a message to be multicast to the subscriber

apparatus" taught by Masayuki because, it is also directed at encryption of communications systems. Masayuki at [0008]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as storing the multicast encryption key on the subscriber side. Masayuki at [0008]. In addition, a person of ordinary skill in the art would be motivated to combine Masayuki '006 with Masayuki because (a) Masayuki '006 and Masayuki disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Masayuki's teachings with those of Masayuki '006. For similar reasons, a person of ordinary skill in the art would be motivated to combine Masayuki '006 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Masayuki '006 with Ming '553 for many reasons. For example, Masayuki '006 describes "An encryption key sending means for sending a key to a plurality of subscriber-side devices that should receive the multicast data." *See, e.g.*, Masayuki '006 at 4. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Masayuki '006 to implement the details of a "a method and a device for controlling multicast right in a passive optical network system" taught by Ming '553 because, it is also directed at encryption of communications systems. Ming '553 at 3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as regular updating of the security key. Ming '553 at 3. In addition, a person of ordinary skill in the art would be motivated to combine Masayuki '006 with Ming '553 because (a) Masayuki '006 and Ming '553 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same

concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ming '553's teachings with those of Masayuki '006. For similar reasons, a person of ordinary skill in the art would be motivated to combine Masayuki '006 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Masayuki '006 with Qi for many reasons. For example, Masayuki '006 describes "An encryption key sending means for sending a key to a plurality of subscriber-side devices that should receive the multicast data." *See, e.g.*, Masayuki '006 at 4. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Masayuki '006 to implement the details of a "a key generation means 43 for generating and transmitting a key to the optical network unit" taught by Qi because, it is also directed at encryption of communications systems. Qi at [0061]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the systems identification of the ONU participating in the multicast. Qi at [0061]. In addition, a person of ordinary skill in the art would be motivated to combine Masayuki '006 with Qi because (a) Masayuki '006 and Qi disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Qi's teachings with those of Masayuki '006. For similar reasons, a person of ordinary skill in the art would be motivated to combine Masayuki '006 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Masayuki '006 with Kim for many reasons. For example, Masayuki '006 describes "An encryption key sending means for sending a key to a plurality of subscriber-side devices that should receive the multicast data."

See, e.g., Masayuki '006 at 4. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Masayuki '006 to implement the details of a "method for setting a security channel based on a multi-point control protocol" taught by Kim because, it is also directed at encryption of communications systems. Kim at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the automatic registration of an ONU with security capability. Kim at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Masayuki '006 with Kim because (a) Masayuki '006 and Kim disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kim's teachings with those of Masayuki '006. For similar reasons, a person of ordinary skill in the art would be motivated to combine Masayuki '006 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Masayuki '006 with G.987.3 for many reasons. For example, Masayuki '006 describes "An encryption key sending means for sending a key to a plurality of subscriber-side devices that should receive the multicast data." *See, e.g.*, Masayuki '006 at 4. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Masayuki '006 to implement the details of "Downstream multicast encryption" taught by G.987.3 because, it is also directed at encryption of communications systems. G.987.3 at 15.5.2. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as transmission of the encryption key via the OMCI. G.987.3 at 15.5.2. In addition, a person of ordinary skill in the art would be motivated to combine Masayuki '006 with G.987.3 because (a) Masayuki '006 and G.987.3 disclose similar

products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3's teachings with those of Masayuki '006. For similar reasons, a person of ordinary skill in the art would be motivated to combine Masayuki '006 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Masayuki '006 with G.988 for many reasons. For example, Masayuki '006 describes "An encryption key sending means for sending a key to a plurality of subscriber-side devices that should receive the multicast data." *See, e.g.*, Masayuki '006 at 4. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Masayuki '006 to implement the details of a "Broadcast (multicast) encryption" taught by G.988 because, it is also directed at encryption of communications systems. G.988 at 81. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "keys are generated by the OLT and distributed via OMCI." G.988 at 81. In addition, a person of ordinary skill in the art would be motivated to combine Masayuki '006 with G.988 because (a) Masayuki '006 and G.988 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.988's teachings with those of Masayuki '006. For similar reasons, a person of ordinary skill in the art would be motivated to combine Masayuki '006 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

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A person of ordinary skill in the art would be motivated to combine Masayuki '006 with G.984.3 for many reasons. For example, Masayuki '006 describes "An encryption key sending means for sending a key to a plurality of subscriber-side devices that should receive the multicast data." *See, e.g.*, Masayuki '006 at 4. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Masayuki '006 to implement the details of a "Key exchange and switch-over" taught by G.984.3 because, it is also directed at encryption of communications systems. G.984.3 at 12.3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as sending the "Request_Key message in the PLOAM channel." G.984.3 at 91. In addition, a person of ordinary skill in the art would be motivated to combine Masayuki '006 with G.984.3 because (a) Masayuki '006 and G.984.3 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.984.3's teachings with those of Masayuki '006. For similar reasons, a person of ordinary skill in the art would be motivated to combine Masayuki '006 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Masayuki '006 with Effenberger '155 for many reasons. For example, Masayuki '006 describes "An encryption key sending means for sending a key to a plurality of subscriber-side devices that should receive the multicast data." *See, e.g.*, Masayuki '006 at 4. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Masayuki '006 to implement the details of a "apparatus and method for providing security in a Passive Optical Network (PON) using an Enhanced Security Control management entity (ME)" taught by Effenberger '155 because, it is

also directed at encryption of communications systems. Effenberger ’155 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as sending the exchanging security information with an optical line terminal (OLT) via an ONU management control interface (OMCI) channel by using a plurality of attributes in an Enhanced Security Control management entity (ME) in the ONU.” Effenberger ’155 at Claim 1. In addition, a person of ordinary skill in the art would be motivated to combine Masayuki ’006 with Effenberger ’155 because (a) Masayuki ’006 and Effenberger ’155 disclose similar products, methods, and solutions, (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption, and Effenberger was a primary contributor and now Rapporteur of the ITU SG15/Q2 Study Group. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Effenberger ’155’s teachings with those of Masayuki ’006. For similar reasons, a person of ordinary skill in the art would be motivated to combine Masayuki ’006 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Masayuki ’006 with Effenberger ’773 for many reasons. For example, Masayuki ’006 describes “An encryption key sending means for sending a key to a plurality of subscriber-side devices that should receive the multicast data.” *See, e.g.*, Masayuki ’006 at 4. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Masayuki ’006 to implement the details of a “network component comprising at least one processor coupled to a memory and configured to exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel,” taught by Effenberger ’773 because, it is also directed at security of communications systems.

Effenberger ’773 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel.” Effenberger ’773 at Claim 1. In addition, a person of ordinary skill in the art would be motivated to combine Masayuki ’006 with Effenberger ’773 because (a) Masayuki ’006 and Effenberger ’773 disclose similar products, methods, and solutions, (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption, and Effenberger was a primary contributor and now Rapporteur of the ITU SG15/Q2 Study Group. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Effenberger ’773’s teachings with those of Masayuki ’006. For similar reasons, a person of ordinary skill in the art would be motivated to combine Masayuki ’006 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

(8) Exemplary Ming ’553 Solutions

A person of ordinary skill in the art would be motivated to combine Ming ’553 with Platnic ’622 for many reasons. For example, Ming ’553 describes “a method and a device for controlling multicast right in a passive optical network system.” *See, e.g.*, Ming ’553 at 3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Ming ’553 to implement the details of a “method and a system enabling multicast transmission of multicast services in a communication network, for example comprising a PON (passive optical network), and with various levels of security” taught by Platnic ’622 because, it is also directed at encryption of communications systems. Platnic ’622 at [0008]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as transmitting the code key message and data traffic in different channels. Platnic ’622 at [0101]. In addition, a person of ordinary skill in the art would be motivated to combine Ming ’553 with Platnic ’622 because

(a) Ming ’553 and Platnic ’622 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Platnic ’622 ’s teachings with those of Ming ’553. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ming ’553 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Ming ’553 with Yen ’097 for many reasons. For example, Ming ’553 describes “a method and a device for controlling multicast right in a passive optical network system.” *See, e.g.*, Ming ’553 at 3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Ming ’553 to implement the details of a “multicast connection in accordance with a preferred embodiment of the present invention is also secured via a multicasting churning key (i.e., encryption key) to prevent eavesdropping by unauthorized users” taught by Yen ’097 because, it is also directed at encryption of communications systems. Yen ’097 at [0013]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as reducing the risk of a security breach. Yen ’097 at [0017]-[0018]. In addition, a person of ordinary skill in the art would be motivated to combine Ming ’553 with Yen ’097 because (a) Ming ’553 and Yen ’097 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Yen ’097’s teachings with those of Ming ’553. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ming ’553 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

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A person of ordinary skill in the art would be motivated to combine Ming '553 with Platnic '575 for many reasons. For example, Ming '553 describes "a method and a device for controlling multicast right in a passive optical network system." *See, e.g.*, Ming '553 at 3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as using encryption in a multicast system. Platnic '575 at 5-11-12. In addition, a person of ordinary skill in the art would be motivated to combine Ming '553 with Platnic '575 because (a) Ming '553 and Platnic '575 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Platnic '575's teachings with those of Ming '553. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ming '553 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Ming '553 with Niemi '907 for many reasons. For example, Ming '553 describes "a method and a device for controlling multicast right in a passive optical network system." *See, e.g.*, Ming '553 at 3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Ming '553 to implement the details of a "encrypting a multicast message by using ciphering" taught by Niemi '907 because, it is also directed at encryption of communications systems. Niemi '907 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "sending the encrypted multicast message to the plurality of user entities simultaneously." Niemi '907 at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Ming '553 with Niemi '907 because (a) Ming '553 and Niemi '907 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same

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field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Niemi ’907’s teachings with those of Ming ’553. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ming ’553 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Ming ’553 with He for many reasons. For example, Ming ’553 describes “a method and a device for controlling multicast right in a passive optical network system.” *See, e.g.*, Ming ’553 at 3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Ming ’553 to implement the details of a “generating a key at the optical network line terminal, and said key is used as the public key of the multicast and is used to encrypt the multicast bit-stream” taught by He because, it is also directed at encryption of communications systems. He at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such the use of multiple channels for transmitting the multicast bit-stream and key. He at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Ming ’553 with He because (a) Ming ’553 and He disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating He’s teachings with those of Ming ’553. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ming ’553 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Ming ’553 with Masayuki for many reasons. For example, Ming ’553 describes “a method and a device for

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controlling multicast right in a passive optical network system." *See, e.g.*, Ming '553 at 3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Ming '553 to implement the details of a "generating a multicast encryption key for encrypting a message to be multicast to the subscriber apparatus" taught by Masayuki because, it is also directed at encryption of communications systems. Masayuki at [0008]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as storing the multicast encryption key on the subscriber side. Masayuki at [0008]. In addition, a person of ordinary skill in the art would be motivated to combine Ming '553 with Masayuki because (a) Ming '553 and Masayuki disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Masayuki's teachings with those of Ming '553. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ming '553 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Ming '553 with Masayuki '006 for many reasons. For example, Ming '553 describes "a method and a device for controlling multicast right in a passive optical network system." *See, e.g.*, Ming '553 at 3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Ming '553 to implement the details of a "An encryption key sending means for sending a key to a plurality of subscriber-side devices that should receive the multicast data" taught by Masayuki '006 because, it is also directed at encryption of communications systems. Masayuki '006 at 4. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "receiving the encryption key sent from the network side device to the client side device" and

means of encryption and decryption. Masayuki '006 at 4. In addition, a person of ordinary skill in the art would be motivated to combine Ming '553 with Masayuki '006 because (a) Ming '553 and Masayuki '006 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Masayuki '006's teachings with those of Ming '553. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ming '553 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Ming '553 with Qi for many reasons. For example, Ming '553 describes "a method and a device for controlling multicast right in a passive optical network system." *See, e.g.*, Ming '553 at 3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Ming '553 to implement the details of a "a key generation means 43 for generating and transmitting a key to the optical network unit" taught by Qi because, it is also directed at encryption of communications systems. Qi at [0061]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the systems identification of the ONU participating in the multicast. Qi at [0061]. In addition, a person of ordinary skill in the art would be motivated to combine Ming '553 with Qi because (a) Ming '553 and Qi disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Qi's teachings with those of Ming '553. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ming '553 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

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A person of ordinary skill in the art would be motivated to combine Ming '553 with Kim for many reasons. For example, Ming '553 describes "a method and a device for controlling multicast right in a passive optical network system." *See, e.g.*, Ming '553 at 3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Ming '553 to implement the details of a "method for setting a security channel based on a multi-point control protocol" taught by Kim because, it is also directed at encryption of communications systems. Kim at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the automatic registration of an ONU with security capability. Kim at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Ming '553 with Kim because (a) Ming '553 and Kim disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kim's teachings with those of Ming '553. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ming '553 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Ming '553 with G.987.3 for many reasons. For example, Ming '553 describes "a method and a device for controlling multicast right in a passive optical network system." *See, e.g.*, Ming '553 at 3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Ming '553 to implement the details of "Downstream multicast encryption" taught by G.987.3 because, it is also directed at encryption of communications systems. G.987.3 at 15.5.2. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as

transmission of the encryption key via the OMCI. G.987.3 at 15.5.2. In addition, a person of ordinary skill in the art would be motivated to combine Ming '553 with G.987.3 because (a) Ming '553 and G.987.3 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3's teachings with those of Ming '553. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ming '553 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Ming '553 with G.988 for many reasons. For example, Ming '553 describes "a method and a device for controlling multicast right in a passive optical network system." *See, e.g.*, Ming '553 at 3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Ming '553 to implement the details of a "Broadcast (multicast) encryption" taught by G.988 because, it is also directed at encryption of communications systems. G.988 at 81. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "keys are generated by the OLT and distributed via OMCI." G.988 at 81. In addition, a person of ordinary skill in the art would be motivated to combine Ming '553 with G.988 because (a) Ming '553 and G.988 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.988's teachings with those of Ming '553. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ming '553 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

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A person of ordinary skill in the art would be motivated to combine Ming '553 with G.984.3 for many reasons. For example, Ming '553 describes "a method and a device for controlling multicast right in a passive optical network system." *See, e.g.*, Ming '553 at 3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Ming '553 to implement the details of a "Key exchange and switch-over" taught by G.984.3 because, it is also directed at encryption of communications systems. G.984.3 at 12.3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as sending the "Request_Key message in the PLOAM channel." G.984.3 at 91. In addition, a person of ordinary skill in the art would be motivated to combine Ming '553 with G.984.3 because (a) Ming '553 and G.984.3 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.984.3's teachings with those of Ming '553. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ming '553 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Ming '553 with Effenberger '155 for many reasons. For example, Ming '553 describes "a method and a device for controlling multicast right in a passive optical network system." *See, e.g.*, Ming '553 at 3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Ming '553 to implement the details of a "apparatus and method for providing security in a Passive Optical Network (PON) using an Enhanced Security Control management entity (ME)" taught by Effenberger '155 because, it is also directed at encryption of communications systems. Effenberger '155 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of

such functionality, such as sending the exchanging security information with an optical line terminal (OLT) via an ONU management control interface (OMCI) channel by using a plurality of attributes in an Enhanced Security Control management entity (ME) in the ONU." Effenberger '155 at Claim 1. In addition, a person of ordinary skill in the art would be motivated to combine Ming '553 with Effenberger '155 because (a) Ming '553 and Effenberger '155 disclose similar products, methods, and solutions, (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption, and Effenberger was a primary contributor and now Rapporteur of the ITU SG15/Q2 Study Group. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Effenberger '155's teachings with those of Ming '553. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ming '553 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Ming '553 with Effenberger '773 for many reasons. For example, Ming '553 describes "a method and a device for controlling multicast right in a passive optical network system." *See, e.g.*, Ming '553 at 3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Ming '553 to implement the details of a "network component comprising at least one processor coupled to a memory and configured to exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel," taught by Effenberger '773 because, it is also directed at security of communications systems. Effenberger '773 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit

(ONU) via an ONU management control interface (OMCI) channel." Effenberger '773 at Claim 1. In addition, a person of ordinary skill in the art would be motivated to combine Ming '553 with Effenberger '773 because (a) Ming '553 and Effenberger '773 disclose similar products, methods, and solutions, (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption, and Effenberger was a primary contributor and now Rapporteur of the ITU SG15/Q2 Study Group. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Effenberger '773's teachings with those of Ming '553. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ming '553 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

(9) Exemplary Qi Solutions

A person of ordinary skill in the art would be motivated to combine Qi with Platnic '622 for many reasons. For example, Qi describes "a key generation means 43 for generating and transmitting a key to the optical network unit." *See, e.g.*, Qi at [0061]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Qi to implement the details of a "method and a system enabling multicast transmission of multicast services in a communication network, for example comprising a PON (passive optical network), and with various levels of security" taught by Platnic '622 because, it is also directed at encryption of communications systems. Platnic '622 at [0008]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as transmitting the code key message and data traffic in different channels. Platnic '622 at [0101]. In addition, a person of ordinary skill in the art would be motivated to combine Qi with Platnic '622 because (a) Qi and Platnic '622 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption.

Moreover, a POSITA would have had a reasonable expectation of success in incorporating Platnic '622 's teachings with those of Qi. For similar reasons, a person of ordinary skill in the art would be motivated to combine Qi with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Qi with Yen '097 for many reasons. For example, Qi describes "a key generation means 43 for generating and transmitting a key to the optical network unit." *See, e.g.*, Qi at [0061]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Qi to implement the details of a "multicast connection in accordance with a preferred embodiment of the present invention is also secured via a multicasting churning key (i.e., encryption key) to prevent eavesdropping by unauthorized users" taught by Yen '097 because, it is also directed at encryption of communications systems. Yen '097 at [0013]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as reducing the risk of a security breach. Yen '097 at [0017]-[0018]. In addition, a person of ordinary skill in the art would be motivated to combine Qi with Yen '097 because (a) Qi and Yen '097 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Yen '097's teachings with those of Qi. For similar reasons, a person of ordinary skill in the art would be motivated to combine Qi with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Qi with Platnic '575 for many reasons. For example, Qi describes "a key generation means 43 for generating and transmitting a key to the optical network unit." *See, e.g.*, Qi at [0061]. A person of ordinary skill

in the art would be motivated by the advantages of such functionality, such as using encryption in a multicast system. Platnic '575 at 5-11-12. In addition, a person of ordinary skill in the art would be motivated to combine Qi with Platnic '575 because (a) Qi and Platnic '575 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Platnic '575's teachings with those of Qi. For similar reasons, a person of ordinary skill in the art would be motivated to combine Qi with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Qi with Niemi '907 for many reasons. For example, Qi describes "a key generation means 43 for generating and transmitting a key to the optical network unit." *See, e.g.*, Qi at [0061]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Qi to implement the details of a "encrypting a multicast message by using ciphering" taught by Niemi '907 because, it is also directed at encryption of communications systems. Niemi '907 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "sending the encrypted multicast message to the plurality of user entities simultaneously." Niemi '907 at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Qi with Niemi '907 because (a) Qi and Niemi '907 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Niemi '907's teachings with those

of Qi. For similar reasons, a person of ordinary skill in the art would be motivated to combine Qi with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Qi with He for many reasons. For example, Qi describes "a key generation means 43 for generating and transmitting a key to the optical network unit." *See, e.g.*, Qi at [0061]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Qi to implement the details of a "generating a key at the optical network line terminal, and said key is used as the public key of the multicast and is used to encrypt the multicast bit-stream" taught by He because, it is also directed at encryption of communications systems. He at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such the use of multiple channels for transmitting the multicast bit-stream and key. He at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Qi with He because (a) Qi and He disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating He's teachings with those of Qi. For similar reasons, a person of ordinary skill in the art would be motivated to combine Qi with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Qi with Masayuki for many reasons. For example, Qi describes "a key generation means 43 for generating and transmitting a key to the optical network unit." *See, e.g.*, Qi at [0061]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Qi to implement the details of a "generating a multicast encryption key for encrypting a message to be multicast to

the subscriber apparatus" taught by Masayuki because, it is also directed at encryption of communications systems. Masayuki at [0008]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as storing the multicast encryption key on the subscriber side. Masayuki at [0008]. In addition, a person of ordinary skill in the art would be motivated to combine Qi with Masayuki because (a) Qi and Masayuki disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Masayuki's teachings with those of Qi. For similar reasons, a person of ordinary skill in the art would be motivated to combine Qi with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Qi with Masayuki '006 for many reasons. For example, Qi describes "a key generation means 43 for generating and transmitting a key to the optical network unit." *See, e.g.*, Qi at [0061]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Qi to implement the details of a "An encryption key sending means for sending a key to a plurality of subscriber-side devices that should receive the multicast data" taught by Masayuki '006 because, it is also directed at encryption of communications systems. Masayuki '006 at 4. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "receiving the encryption key sent from the network side device to the client side device" and means of encryption and decryption. Masayuki '006 at 4. In addition, a person of ordinary skill in the art would be motivated to combine Qi with Masayuki '006 because (a) Qi and Masayuki '006 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of

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endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Masayuki '006's teachings with those of Qi. For similar reasons, a person of ordinary skill in the art would be motivated to combine Qi with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Qi with Ming '553 for many reasons. For example, Qi describes "a key generation means 43 for generating and transmitting a key to the optical network unit." *See, e.g.*, Qi at [0061]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Qi to implement the details of a "a method and a device for controlling multicast right in a passive optical network system" taught by Ming '553 because, it is also directed at encryption of communications systems. Ming '553 at 3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as regular updating of the security key. Ming '553 at 3. In addition, a person of ordinary skill in the art would be motivated to combine Qi with Ming '553 because (a) Qi and Ming '553 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ming '553's teachings with those of Qi. For similar reasons, a person of ordinary skill in the art would be motivated to combine Qi with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Qi with Kim for many reasons. For example, Qi describes "a key generation means 43 for generating and transmitting a key to the optical network unit." *See, e.g.*, Qi at [0061]. A person having ordinary skill in the art

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would have been motivated to modify the method and/or device of Qi to implement the details of a "method for setting a security channel based on a multi-point control protocol" taught by Kim because, it is also directed at encryption of communications systems. Kim at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the automatic registration of an ONU with security capability. Kim at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Qi with Kim because (a) Qi and Kim disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kim's teachings with those of Qi. For similar reasons, a person of ordinary skill in the art would be motivated to combine Qi with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Qi with G.987.3 for many reasons. For example, Qi describes "a key generation means 43 for generating and transmitting a key to the optical network unit." *See, e.g.*, Qi at [0061]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Qi to implement the details of "Downstream multicast encryption" taught by G.987.3 because, it is also directed at encryption of communications systems. G.987.3 at 15.5.2. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as transmission of the encryption key via the OMCI. G.987.3 at 15.5.2. In addition, a person of ordinary skill in the art would be motivated to combine Qi with G.987.3 because (a) Qi and G.987.3 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a

POSITA would have had a reasonable expectation of success in incorporating G.987.3's teachings with those of Qi. For similar reasons, a person of ordinary skill in the art would be motivated to combine Qi with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Qi with G.988 for many reasons. For example, Qi describes "a key generation means 43 for generating and transmitting a key to the optical network unit." *See, e.g.*, Qi at [0061]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Qi to implement the details of a "Broadcast (multicast) encryption" taught by G.988 because, it is also directed at encryption of communications systems. G.988 at 81. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "keys are generated by the OLT and distributed via OMCI." G.988 at 81. In addition, a person of ordinary skill in the art would be motivated to combine Qi with G.988 because (a) Qi and G.988 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.988's teachings with those of Qi. For similar reasons, a person of ordinary skill in the art would be motivated to combine Qi with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Qi with G.984.3 for many reasons. For example, Qi describes "a key generation means 43 for generating and transmitting a key to the optical network unit." *See, e.g.*, Qi at [0061]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Qi to implement the details of a "Key exchange and switch-over" taught by G.984.3 because, it is also directed at

encryption of communications systems. G.984.3 at 12.3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as sending the "Request_Key message in the PLOAM channel." G.984.3 at 91. In addition, a person of ordinary skill in the art would be motivated to combine Qi with G.984.3 because (a) Qi and G.984.3 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.984.3's teachings with those of Qi. For similar reasons, a person of ordinary skill in the art would be motivated to combine Qi with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Qi with Effenberger '155 for many reasons. For example, Qi describes "a key generation means 43 for generating and transmitting a key to the optical network unit." *See, e.g.*, Qi at [0061]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Qi to implement the details of a "apparatus and method for providing security in a Passive Optical Network (PON) using an Enhanced Security Control management entity (ME)" taught by Effenberger '155 because, it is also directed at encryption of communications systems. Effenberger '155 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as sending the exchanging security information with an optical line terminal (OLT) via an ONU management control interface (OMCI) channel by using a plurality of attributes in an Enhanced Security Control management entity (ME) in the ONU." Effenberger '155 at Claim 1. In addition, a person of ordinary skill in the art would be motivated to combine Qi with Effenberger '155 because (a) Qi and Effenberger '155 disclose similar products, methods, and solutions, (b) both patents are analogous art and in the same field of endeavor as each other, for example, both

relate to the same concept of encryption, and Effenberger was a primary contributor and now Rapporteur of the ITU SG15/Q2 Study Group. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Effenberger '155's teachings with those of Qi. For similar reasons, a person of ordinary skill in the art would be motivated to combine Qi with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Qi with Effenberger '773 for many reasons. For example, Qi describes "a key generation means 43 for generating and transmitting a key to the optical network unit." *See, e.g.*, Qi at [0061]. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Qi to implement the details of a "network component comprising at least one processor coupled to a memory and configured to exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel," taught by Effenberger '773 because, it is also directed at security of communications systems. Effenberger '773 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel." Effenberger '773 at Claim 1. In addition, a person of ordinary skill in the art would be motivated to combine Qi with Effenberger '773 because (a) Qi and Effenberger '773 disclose similar products, methods, and solutions, (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption, and Effenberger was a primary contributor and now Rapporteur of the ITU SG15/Q2 Study Group. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Effenberger '773's teachings with those of Qi. For similar reasons, a person of

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ordinary skill in the art would be motivated to combine Qi with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

(10) Exemplary Kim Solutions

A person of ordinary skill in the art would be motivated to combine Kim with Platnic '622 for many reasons. For example, Kim describes "method for setting a security channel based on a multi-point control protocol." *See, e.g.*, Kim at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Kim to implement the details of a "method and a system enabling multicast transmission of multicast services in a communication network, for example comprising a PON (passive optical network), and with various levels of security" taught by Platnic '622 because, it is also directed at encryption of communications systems. Platnic '622 at [0008]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as transmitting the code key message and data traffic in different channels. Platnic '622 at [0101]. In addition, a person of ordinary skill in the art would be motivated to combine Kim with Platnic '622 because (a) Kim and Platnic '622 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Platnic '622 's teachings with those of Kim. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kim with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kim with Yen '097 for many reasons. For example, Kim describes "method for setting a security channel based on a multi-point control protocol." *See, e.g.*, Kim at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Kim to implement the details

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of a "multicast connection in accordance with a preferred embodiment of the present invention is also secured via a multicasting churning key (i.e., encryption key) to prevent eavesdropping by unauthorized users" taught by Yen '097 because, it is also directed at encryption of communications systems. Yen '097 at [0013]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as reducing the risk of a security breach. Yen '097 at [0017]-[0018]. In addition, a person of ordinary skill in the art would be motivated to combine Kim with Yen '097 because (a) Kim and Yen '097 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Yen '097's teachings with those of Kim. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kim with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kim with Platnic '575 for many reasons. For example, Kim describes "method for setting a security channel based on a multi-point control protocol." *See, e.g.*, Kim at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as using encryption in a multicast system. Platnic '575 at 5-11-12. In addition, a person of ordinary skill in the art would be motivated to combine Kim with Platnic '575 because (a) Kim and Platnic '575 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Platnic '575's teachings with those of Kim. For similar reasons, a person of ordinary skill in the art would be

motivated to combine Kim with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kim with Niemi '907 for many reasons. For example, Kim describes "method for setting a security channel based on a multi-point control protocol." *See, e.g.*, Kim at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Kim to implement the details of a "encrypting a multicast message by using ciphering" taught by Niemi '907 because, it is also directed at encryption of communications systems. Niemi '907 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "sending the encrypted multicast message to the plurality of user entities simultaneously." Niemi '907 at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Kim with Niemi '907 because (a) Kim and Niemi '907 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Niemi '907's teachings with those of Kim. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kim with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kim with He for many reasons. For example, Kim describes "method for setting a security channel based on a multi-point control protocol." *See, e.g.*, Kim at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Kim to implement the details of a "generating a key at the optical network line terminal, and said key is used as the public key of the multicast and is used to encrypt the multicast bit-stream" taught by He because, it is also directed

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at encryption of communications systems. He at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such the use of multiple channels for transmitting the multicast bit-stream and key. He at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Kim with He because (a) Kim and He disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating He's teachings with those of Kim. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kim with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kim with Masayuki for many reasons. For example, Kim describes "method for setting a security channel based on a multi-point control protocol." *See, e.g.*, Kim at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Kim to implement the details of a "generating a multicast encryption key for encrypting a message to be multicast to the subscriber apparatus" taught by Masayuki because, it is also directed at encryption of communications systems. Masayuki at [0008]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as storing the multicast encryption key on the subscriber side. Masayuki at [0008]. In addition, a person of ordinary skill in the art would be motivated to combine Kim with Masayuki because (a) Kim and Masayuki disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating

Masayuki's teachings with those of Kim. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kim with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kim with Masayuki '006 for many reasons. For example, Kim describes "method for setting a security channel based on a multi-point control protocol." *See, e.g.*, Kim at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Kim to implement the details of a "An encryption key sending means for sending a key to a plurality of subscriber-side devices that should receive the multicast data" taught by Masayuki '006 because, it is also directed at encryption of communications systems. Masayuki '006 at 4. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "receiving the encryption key sent from the network side device to the client side device" and means of encryption and decryption. Masayuki '006 at 4. In addition, a person of ordinary skill in the art would be motivated to combine Kim with Masayuki '006 because (a) Kim and Masayuki '006 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Masayuki '006's teachings with those of Kim. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kim with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kim with Ming '553 for many reasons. For example, Kim describes "method for setting a security channel based on a multi-point control protocol." *See, e.g.*, Kim at Abstract. A person having ordinary skill in the art

would have been motivated to modify the method and/or device of Kim to implement the details of a "a method and a device for controlling multicast right in a passive optical network system" taught by Ming '553 because, it is also directed at encryption of communications systems. Ming '553 at 3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as regular updating of the security key. Ming '553 at 3. In addition, a person of ordinary skill in the art would be motivated to combine Kim with Ming '553 because (a) Kim and Ming '553 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ming '553's teachings with those of Kim. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kim with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kim with Qi for many reasons. For example, Kim describes "method for setting a security channel based on a multi-point control protocol." *See, e.g.*, Kim at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Kim to implement the details of a "a key generation means 43 for generating and transmitting a key to the optical network unit" taught by Qi because, it is also directed at encryption of communications systems. Qi at [0061]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the systems identification of the ONU participating in the multicast. Qi at [0061]. In addition, a person of ordinary skill in the art would be motivated to combine Kim with Qi because (a) Kim and Qi disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast

encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Qi's teachings with those of Kim. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kim with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kim with G.987.3 for many reasons. For example, Kim describes "method for setting a security channel based on a multi-point control protocol." *See, e.g.*, Kim at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Kim to implement the details of "Downstream multicast encryption" taught by G.987.3 because, it is also directed at encryption of communications systems. G.987.3 at 15.5.2. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as transmission of the encryption key via the OMCI. G.987.3 at 15.5.2. In addition, a person of ordinary skill in the art would be motivated to combine Kim with G.987.3 because (a) Kim and G.987.3 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3's teachings with those of Kim. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kim with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kim with G.988 for many reasons. For example, Kim describes "method for setting a security channel based on a multi-point control protocol." *See, e.g.*, Kim at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Kim to implement the details of a

"Broadcast (multicast) encryption" taught by G.988 because, it is also directed at encryption of communications systems. G.988 at 81. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "keys are generated by the OLT and distributed via OMCI." G.988 at 81. In addition, a person of ordinary skill in the art would be motivated to combine Kim with G.988 because (a) Kim and G.988 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.988's teachings with those of Kim. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kim with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kim with G.984.3 for many reasons. For example, Kim describes "method for setting a security channel based on a multi-point control protocol." *See, e.g.*, Kim at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Kim to implement the details of a "Key exchange and switch-over" taught by G.984.3 because, it is also directed at encryption of communications systems. G.984.3 at 12.3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as sending the "Request_Key message in the PLOAM channel." G.984.3 at 91. In addition, a person of ordinary skill in the art would be motivated to combine Kim with G.984.3 because (a) Kim and G.984.3 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.984.3's teachings with those of Kim. For similar reasons, a person of ordinary skill in the art would be motivated to

combine Kim with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kim with Effenberger '155 for many reasons. For example, Kim describes "method for setting a security channel based on a multi-point control protocol." *See, e.g.*, Kim at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Kim to implement the details of a "apparatus and method for providing security in a Passive Optical Network (PON) using an Enhanced Security Control management entity (ME)" taught by Effenberger '155 because, it is also directed at encryption of communications systems. Effenberger '155 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as sending the exchanging security information with an optical line terminal (OLT) via an ONU management control interface (OMCI) channel by using a plurality of attributes in an Enhanced Security Control management entity (ME) in the ONU." Effenberger '155 at Claim 1. In addition, a person of ordinary skill in the art would be motivated to combine Kim with Effenberger '155 because (a) Kim and Effenberger '155 disclose similar products, methods, and solutions, (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption, and Effenberger was a primary contributor and now Rapporteur of the ITU SG15/Q2 Study Group. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Effenberger '155's teachings with those of Kim. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kim with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Kim with Effenberger '773 for many reasons. For example, Kim describes "method for setting a security channel based

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on a multi-point control protocol." *See, e.g.*, Kim at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Kim to implement the details of a "network component comprising at least one processor coupled to a memory and configured to exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel," taught by Effenberger '773 because, it is also directed at security of communications systems. Effenberger '773 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel." Effenberger '773 at Claim 1. In addition, a person of ordinary skill in the art would be motivated to combine Kim with Effenberger '773 because (a) Kim and Effenberger '773 disclose similar products, methods, and solutions, (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption, and Effenberger was a primary contributor and now Rapporteur of the ITU SG15/Q2 Study Group. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Effenberger '773's teachings with those of Kim. For similar reasons, a person of ordinary skill in the art would be motivated to combine Kim with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

(11) Exemplary G.987.3 Solutions

A person of ordinary skill in the art would be motivated to combine G.987.3 with Platnic '622 for many reasons. For example, G.987.3 describes "Downstream multicast encryption." *See, e.g.*, G.987.3 at 15.5.2. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 to implement the details of a "method and a system enabling multicast transmission of multicast services in a communication network, for example

comprising a PON (passive optical network), and with various levels of security" taught by Platnic '622 because, it is also directed at encryption of communications systems. Platnic '622 at [0008]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as transmitting the code key message and data traffic in different channels. Platnic '622 at [0101]. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 with Platnic '622 because (a) G.987.3 and Platnic '622 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Platnic '622 's teachings with those of G.987.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.3 with Yen '097 for many reasons. For example, G.987.3 describes "Downstream multicast encryption." *See, e.g.*, G.987.3 at 15.5.2. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 to implement the details of a "multicast connection in accordance with a preferred embodiment of the present invention is also secured via a multicasting churning key (i.e., encryption key) to prevent eavesdropping by unauthorized users" taught by Yen '097 because, it is also directed at encryption of communications systems. Yen '097 at [0013]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as reducing the risk of a security breach. Yen '097 at [0017]-[0018]. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 with Yen '097 because (a) G.987.3 and Yen '097 disclose similar products, methods, and solutions; and (b) both patents are analogous

art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Yen '097's teachings with those of G.987.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.3 with Platnic '575 for many reasons. For example, G.987.3 describes "Downstream multicast encryption." *See, e.g.*, G.987.3 at 15.5.2. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as using encryption in a multicast system. Platnic '575 at 5-11-12. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 with Platnic '575 because (a) G.987.3 and Platnic '575 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Platnic '575's teachings with those of G.987.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.3 with Niemi '907 for many reasons. For example, G.987.3 describes "Downstream multicast encryption." *See, e.g.*, G.987.3 at 15.5.2. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 to implement the details of a "encrypting a multicast message by using ciphering" taught by Niemi '907 because, it is also directed at encryption of communications systems. Niemi '907 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "sending the encrypted multicast

message to the plurality of user entities simultaneously." Niemi '907 at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 with Niemi '907 because (a) G.987.3 and Niemi '907 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Niemi '907's teachings with those of G.987.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.3 with He for many reasons. For example, G.987.3 describes "Downstream multicast encryption." *See, e.g.*, G.987.3 at 15.5.2. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 to implement the details of a "generating a key at the optical network line terminal, and said key is used as the public key of the multicast and is used to encrypt the multicast bit-stream" taught by He because, it is also directed at encryption of communications systems. He at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such the use of multiple channels for transmitting the multicast bit-stream and key. He at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 with He because (a) G.987.3 and He disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating He's teachings with those of G.987.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine

G.987.3 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.3 with Masayuki for many reasons. For example, G.987.3 describes "Downstream multicast encryption." *See, e.g.*, G.987.3 at 15.5.2. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 to implement the details of a "generating a multicast encryption key for encrypting a message to be multicast to the subscriber apparatus" taught by Masayuki because, it is also directed at encryption of communications systems. Masayuki at [0008]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as storing the multicast encryption key on the subscriber side. Masayuki at [0008]. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 with Masayuki because (a) G.987.3 and Masayuki disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Masayuki's teachings with those of G.987.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.3 with Masayuki '006 for many reasons. For example, G.987.3 describes "Downstream multicast encryption." *See, e.g.*, G.987.3 at 15.5.2. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 to implement the details of a "An encryption key sending means for sending a key to a plurality of subscriber-side devices that should receive the

multicast data" taught by Masayuki '006 because, it is also directed at encryption of communications systems. Masayuki '006 at 4. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "receiving the encryption key sent from the network side device to the client side device" and means of encryption and decryption. Masayuki '006 at 4. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 with Masayuki '006 because (a) G.987.3 and Masayuki '006 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Masayuki '006's teachings with those of G.987.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.3 with Ming '553 for many reasons. For example, G.987.3 describes "Downstream multicast encryption." *See, e.g.*, G.987.3 at 15.5.2. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 to implement the details of a "a method and a device for controlling multicast right in a passive optical network system" taught by Ming '553 because, it is also directed at encryption of communications systems. Ming '553 at 3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as regular updating of the security key. Ming '553 at 3. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 with Ming '553 because (a) G.987.3 and Ming '553 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption.

Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ming '553's teachings with those of G.987.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.3 with Qi for many reasons. For example, G.987.3 describes "Downstream multicast encryption." *See, e.g.*, G.987.3 at 15.5.2. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 to implement the details of a "a key generation means 43 for generating and transmitting a key to the optical network unit" taught by Qi because, it is also directed at encryption of communications systems. Qi at [0061]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the systems identification of the ONU participating in the multicast. Qi at [0061]. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 with Qi because (a) G.987.3 and Qi disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Qi's teachings with those of G.987.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.3 with Kim for many reasons. For example, G.987.3 describes "Downstream multicast encryption." *See, e.g.*, G.987.3 at 15.5.2. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 to implement the details of a "method for setting a security

channel based on a multi-point control protocol" taught by Kim because, it is also directed at encryption of communications systems. Kim at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the automatic registration of an ONU with security capability. Kim at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 with Kim because (a) G.987.3 and Kim disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kim's teachings with those of G.987.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.3 with G.988 for many reasons. For example, G.987.3 describes "Downstream multicast encryption." *See, e.g.*, G.987.3 at 15.5.2. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 to implement the details of a "Broadcast (multicast) encryption" taught by G.988 because, it is also directed at encryption of communications systems. G.988 at 81. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "keys are generated by the OLT and distributed via OMCI." G.988 at 81. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 with G.988 because (a) G.987.3 and G.988 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.988's teachings with those of G.987.3. For similar

reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.3 with G.984.3 for many reasons. For example, G.987.3 describes "Downstream multicast encryption." *See, e.g.*, G.987.3 at 15.5.2. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 to implement the details of a "Key exchange and switch-over" taught by G.984.3 because, it is also directed at encryption of communications systems. G.984.3 at 12.3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as sending the "Request_Key message in the PLOAM channel." G.984.3 at 91. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 with G.984.3 because (a) G.987.3 and G.984.3 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.984.3's teachings with those of G.987.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.3 with Effenberger '155 for many reasons. For example, G.987.3 describes "Downstream multicast encryption." *See, e.g.*, G.987.3 at 15.5.2. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 to implement the details of a "apparatus and method for providing security in a Passive Optical Network (PON) using an Enhanced Security Control management entity (ME)" taught by Effenberger '155 because, it is also directed at encryption of communications systems. Effenberger '155 at Abstract. A person of ordinary skill

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in the art would be motivated by the advantages of such functionality, such as sending the exchanging security information with an optical line terminal (OLT) via an ONU management control interface (OMCI) channel by using a plurality of attributes in an Enhanced Security Control management entity (ME) in the ONU." Effenberger '155 at Claim 1. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 with Effenberger '155 because (a) G.987.3 and Effenberger '155 disclose similar products, methods, and solutions, (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption, and Effenberger was a primary contributor and now Rapporteur of the ITU SG15/Q2 Study Group. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Effenberger '155's teachings with those of G.987.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.3 with Effenberger '773 for many reasons. For example, G.987.3 describes "Downstream multicast encryption." *See, e.g.*, G.987.3 at 15.5.2. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 to implement the details of a "network component comprising at least one processor coupled to a memory and configured to exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel," taught by Effenberger '773 because, it is also directed at security of communications systems. Effenberger '773 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control

interface (OMCI) channel." Effenberger '773 at Claim 1. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 with Effenberger '773 because (a) G.987.3 and Effenberger '773 disclose similar products, methods, and solutions, (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption, and Effenberger was a primary contributor and now Rapporteur of the ITU SG15/Q2 Study Group. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Effenberger '773's teachings with those of G.987.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

(12) Exemplary G.988 Solutions

A person of ordinary skill in the art would be motivated to combine G.988 with Platnic '622 for many reasons. For example, G.988 describes "Broadcast (multicast) encryption." *See, e.g.*, G.988 at 81. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.988 to implement the details of a "method and a system enabling multicast transmission of multicast services in a communication network, for example comprising a PON (passive optical network), and with various levels of security" taught by Platnic '622 because, it is also directed at encryption of communications systems. Platnic '622 at [0008]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as transmitting the code key message and data traffic in different channels. Platnic '622 at [0101]. In addition, a person of ordinary skill in the art would be motivated to combine G.988 with Platnic '622 because (a) G.988 and Platnic '622 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Platnic '622 's teachings with those of G.988. For similar

reasons, a person of ordinary skill in the art would be motivated to combine G.988 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.988 with Yen '097 for many reasons. For example, G.988 describes "Broadcast (multicast) encryption." *See, e.g.*, G.988 at 81. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.988 to implement the details of a "multicast connection in accordance with a preferred embodiment of the present invention is also secured via a multicasting churning key (i.e., encryption key) to prevent eavesdropping by unauthorized users" taught by Yen '097 because, it is also directed at encryption of communications systems. Yen '097 at [0013]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as reducing the risk of a security breach. Yen '097 at [0017]-[0018]. In addition, a person of ordinary skill in the art would be motivated to combine G.988 with Yen '097 because (a) G.988 and Yen '097 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Yen '097's teachings with those of G.988. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.988 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.988 with Platnic '575 for many reasons. For example, G.988 describes "Broadcast (multicast) encryption." *See, e.g.*, G.988 at 81. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as using encryption in a multicast system. Platnic '575 at 5-11-12. In addition, a person of ordinary skill in the art would be motivated to combine G.988 with Platnic

’575 because (a) G.988 and Platnic ’575 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Platnic ’575’s teachings with those of G.988. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.988 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.988 with Niemi ’907 for many reasons. For example, G.988 describes “Broadcast (multicast) encryption.” *See, e.g.*, G.988 at 81. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.988 to implement the details of a “encrypting a multicast message by using ciphering” taught by Niemi ’907 because, it is also directed at encryption of communications systems. Niemi ’907 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as “sending the encrypted multicast message to the plurality of user entities simultaneously.” Niemi ’907 at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine G.988 with Niemi ’907 because (a) G.988 and Niemi ’907 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Niemi ’907’s teachings with those of G.988. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.988 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.988 with He for many reasons. For example, G.988 describes “Broadcast (multicast) encryption.” *See, e.g.*, G.988

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at 81. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.988 to implement the details of a "generating a key at the optical network line terminal, and said key is used as the public key of the multicast and is used to encrypt the multicast bit-stream" taught by He because, it is also directed at encryption of communications systems. He at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such the use of multiple channels for transmitting the multicast bit-stream and key. He at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine G.988 with He because (a) G.988 and He disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating He's teachings with those of G.988. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.988 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.988 with Masayuki for many reasons. For example, G.988 describes "Broadcast (multicast) encryption." *See, e.g.*, G.988 at 81. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.988 to implement the details of a "generating a multicast encryption key for encrypting a message to be multicast to the subscriber apparatus" taught by Masayuki because, it is also directed at encryption of communications systems. Masayuki at [0008]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as storing the multicast encryption key on the subscriber side. Masayuki at [0008]. In addition, a person of ordinary skill in the art would be motivated to combine G.988 with Masayuki because (a) G.988 and Masayuki disclose similar products, methods, and solutions; and (b) both patents

are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Masayuki's teachings with those of G.988. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.988 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.988 with Masayuki '006 for many reasons. For example, G.988 describes "Broadcast (multicast) encryption." *See, e.g.*, G.988 at 81. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.988 to implement the details of a "An encryption key sending means for sending a key to a plurality of subscriber-side devices that should receive the multicast data" taught by Masayuki '006 because, it is also directed at encryption of communications systems. Masayuki '006 at 4. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "receiving the encryption key sent from the network side device to the client side device" and means of encryption and decryption. Masayuki '006 at 4. In addition, a person of ordinary skill in the art would be motivated to combine G.988 with Masayuki '006 because (a) G.988 and Masayuki '006 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Masayuki '006's teachings with those of G.988. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.988 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.988 with Ming '553 for many reasons. For example, G.988 describes "Broadcast (multicast) encryption." *See, e.g.*,

G.988 at 81. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.988 to implement the details of a "a method and a device for controlling multicast right in a passive optical network system" taught by Ming '553 because, it is also directed at encryption of communications systems. Ming '553 at 3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as regular updating of the security key. Ming '553 at 3. In addition, a person of ordinary skill in the art would be motivated to combine G.988 with Ming '553 because (a) G.988 and Ming '553 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ming '553's teachings with those of G.988. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.988 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.988 with Qi for many reasons. For example, G.988 describes "Broadcast (multicast) encryption." *See, e.g.*, G.988 at 81. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.988 to implement the details of a "a key generation means 43 for generating and transmitting a key to the optical network unit" taught by Qi because, it is also directed at encryption of communications systems. Qi at [0061]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the systems identification of the ONU participating in the multicast. Qi at [0061]. In addition, a person of ordinary skill in the art would be motivated to combine G.988 with Qi because (a) G.988 and Qi disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor

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as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Qi's teachings with those of G.988. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.988 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.988 with Kim for many reasons. For example, G.988 describes "Broadcast (multicast) encryption." *See, e.g.*, G.988 at 81. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.988 to implement the details of a "method for setting a security channel based on a multi-point control protocol" taught by Kim because, it is also directed at encryption of communications systems. Kim at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the automatic registration of an ONU with security capability. Kim at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine G.988 with Kim because (a) G.988 and Kim disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kim's teachings with those of G.988. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.988 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.988 with G.987.3 for many reasons. For example, G.988 describes "Broadcast (multicast) encryption." *See, e.g.*, G.988 at 81. A person having ordinary skill in the art would have been motivated to modify the

method and/or device of G.988 to implement the details of "Downstream multicast encryption" taught by G.987.3 because, it is also directed at encryption of communications systems. G.987.3 at 15.5.2. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as transmission of the encryption key via the OMCI. G.987.3 at 15.5.2. In addition, a person of ordinary skill in the art would be motivated to combine G.988 with G.987.3 because (a) G.988 and G.987.3 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3's teachings with those of G.988. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.988 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.988 with G.984.3 for many reasons. For example, G.988 describes "Broadcast (multicast) encryption." *See, e.g.*, G.988 at 81. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.988 to implement the details of a "Key exchange and switch-over" taught by G.984.3 because, it is also directed at encryption of communications systems. G.984.3 at 12.3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as sending the "Request_Key message in the PLOAM channel." G.984.3 at 91. In addition, a person of ordinary skill in the art would be motivated to combine G.988 with G.984.3 because (a) G.988 and G.984.3 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.984.3's teachings with those of G.988. For similar reasons, a person

of ordinary skill in the art would be motivated to combine G.988 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.988 with Effenberger '155 for many reasons. For example, G.988 describes "Broadcast (multicast) encryption." *See, e.g.*, G.988 at 81. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.988 to implement the details of a "apparatus and method for providing security in a Passive Optical Network (PON) using an Enhanced Security Control management entity (ME)" taught by Effenberger '155 because, it is also directed at encryption of communications systems. Effenberger '155 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as sending the exchanging security information with an optical line terminal (OLT) via an ONU management control interface (OMCI) channel by using a plurality of attributes in an Enhanced Security Control management entity (ME) in the ONU." Effenberger '155 at Claim 1. In addition, a person of ordinary skill in the art would be motivated to combine G.988 with Effenberger '155 because (a) G.988 and Effenberger '155 disclose similar products, methods, and solutions, (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption, and Effenberger was a primary contributor and now Rapporteur of the ITU SG15/Q2 Study Group. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Effenberger '155's teachings with those of G.988. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.988 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.988 with Effenberger '773 for many reasons. For example, G.988 describes "Broadcast (multicast) encryption." *See,*

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e.g., G.988 at 81. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.988 to implement the details of a "network component comprising at least one processor coupled to a memory and configured to exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel," taught by Effenberger '773 because, it is also directed at security of communications systems. Effenberger '773 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel." Effenberger '773 at Claim 1. In addition, a person of ordinary skill in the art would be motivated to combine G.988 with Effenberger '773 because (a) G.988 and Effenberger '773 disclose similar products, methods, and solutions, (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption, and Effenberger was a primary contributor and now Rapporteur of the ITU SG15/Q2 Study Group. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Effenberger '773's teachings with those of G.988. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.988 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

(13) Exemplary G.984.3 Solutions

A person of ordinary skill in the art would be motivated to combine G.984.3 with Platnic '622 for many reasons. For example, G.984.3 describes "Key exchange and switch-over." *See, e.g.*, G.984.3 at 12.3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.984.3 to implement the details of a "method and a system enabling multicast transmission of multicast services in a communication network, for example

comprising a PON (passive optical network), and with various levels of security" taught by Platnic '622 because, it is also directed at encryption of communications systems. Platnic '622 at [0008]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as transmitting the code key message and data traffic in different channels. Platnic '622 at [0101]. In addition, a person of ordinary skill in the art would be motivated to combine G.984.3 with Platnic '622 because (a) G.984.3 and Platnic '622 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Platnic '622 's teachings with those of G.984.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.984.3 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.984.3 with Yen '097 for many reasons. For example, G.984.3 describes "Key exchange and switch-over." *See, e.g.*, G.984.3 at 12.3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.984.3 to implement the details of a "multicast connection in accordance with a preferred embodiment of the present invention is also secured via a multicasting churning key (i.e., encryption key) to prevent eavesdropping by unauthorized users" taught by Yen '097 because, it is also directed at encryption of communications systems. Yen '097 at [0013]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as reducing the risk of a security breach. Yen '097 at [0017]-[0018]. In addition, a person of ordinary skill in the art would be motivated to combine G.984.3 with Yen '097 because (a) G.984.3 and Yen '097 disclose similar products, methods, and solutions; and (b) both patents are analogous

art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Yen '097's teachings with those of G.984.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.984.3 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.984.3 with Platnic '575 for many reasons. For example, G.984.3 describes "Key exchange and switch-over." *See, e.g.*, G.984.3 at 12.3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as using encryption in a multicast system. Platnic '575 at 5-11-12. In addition, a person of ordinary skill in the art would be motivated to combine G.984.3 with Platnic '575 because (a) G.984.3 and Platnic '575 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Platnic '575's teachings with those of G.984.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.984.3 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.984.3 with Niemi '907 for many reasons. For example, G.984.3 describes "Key exchange and switch-over." *See, e.g.*, G.984.3 at 12.3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.984.3 to implement the details of a "encrypting a multicast message by using ciphering" taught by Niemi '907 because, it is also directed at encryption of communications systems. Niemi '907 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "sending the encrypted multicast

message to the plurality of user entities simultaneously." Niemi '907 at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine G.984.3 with Niemi '907 because (a) G.984.3 and Niemi '907 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Niemi '907's teachings with those of G.984.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.984.3 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.984.3 with He for many reasons. For example, G.984.3 describes "Key exchange and switch-over." *See, e.g.*, G.984.3 at 12.3. G.987.3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.984.3 to implement the details of a "generating a key at the optical network line terminal, and said key is used as the public key of the multicast and is used to encrypt the multicast bit-stream" taught by He because, it is also directed at encryption of communications systems. He at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such the use of multiple channels for transmitting the multicast bit-stream and key. He at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine G.984.3 with He because (a) G.984.3 and He disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating He's teachings with those of G.984.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine

G.984.3 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.984.3 with Masayuki '006 for many reasons. For example, G.984.3 describes "Key exchange and switch-over." *See, e.g.*, G.984.3 at 12.3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.984.3 to implement the details of a "An encryption key sending means for sending a key to a plurality of subscriber-side devices that should receive the multicast data" taught by Masayuki '006 because, it is also directed at encryption of communications systems. Masayuki '006 at 4. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "receiving the encryption key sent from the network side device to the client side device" and means of encryption and decryption. Masayuki '006 at 4. In addition, a person of ordinary skill in the art would be motivated to combine G.984.3 with Masayuki '006 because (a) G.984.3 and Masayuki '006 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Masayuki '006's teachings with those of G.984.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.984.3 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.984.3 with Ming '553 for many reasons. For example, G.984.3 describes "Key exchange and switch-over." *See, e.g.*, G.984.3 at 12.3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.984.3 to implement the details of a "a method and a device

for controlling multicast right in a passive optical network system" taught by Ming '553 because, it is also directed at encryption of communications systems. Ming '553 at 3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as regular updating of the security key. Ming '553 at 3. In addition, a person of ordinary skill in the art would be motivated to combine G.984.3 with Ming '553 because (a) G.984.3 and Ming '553 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ming '553's teachings with those of G.984.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.984.3 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.984.3 with Qi for many reasons. For example, G.984.3 describes "Key exchange and switch-over." *See, e.g.*, G.984.3 at 12.3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.984.3 to implement the details of a "a key generation means 43 for generating and transmitting a key to the optical network unit" taught by Qi because, it is also directed at encryption of communications systems. Qi at [0061]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the systems identification of the ONU participating in the multicast. Qi at [0061]. In addition, a person of ordinary skill in the art would be motivated to combine G.984.3 with Qi because (a) G.984.3 and Qi disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Qi's

teachings with those of G.984.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.984.3 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.984.3 with Kim for many reasons. For example, G.984.3 describes "Key exchange and switch-over." *See, e.g.*, G.984.3 at 12.3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.984.3 to implement the details of a "method for setting a security channel based on a multi-point control protocol" taught by Kim because, it is also directed at encryption of communications systems. Kim at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the automatic registration of an ONU with security capability. Kim at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine G.984.3 with Kim because (a) G.984.3 and Kim disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kim's teachings with those of G.984.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.984.3 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.984.3 with G.987.3 for many reasons. For example, G.984.3 describes "Key exchange and switch-over." *See, e.g.*, G.984.3 at 12.3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.984.3 to implement the details of "Downstream multicast encryption" taught by G.987.3 because, it is also directed at encryption of communications

systems. G.987.3 at 15.5.2. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as transmission of the encryption key via the OMCI. G.987.3 at 15.5.2. In addition, a person of ordinary skill in the art would be motivated to combine G.984.3 with G.987.3 because (a) G.984.3 and G.987.3 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3's teachings with those of G.984.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.984.3 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.984.3 with G.988 for many reasons. For example, G.984.3 describes "Key exchange and switch-over." *See, e.g.*, G.984.3 at 12.3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.984.3 to implement the details of a "Broadcast (multicast) encryption" taught by G.988 because, it is also directed at encryption of communications systems. G.988 at 81. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "keys are generated by the OLT and distributed via OMCI." G.988 at 81. In addition, a person of ordinary skill in the art would be motivated to combine G.984.3 with G.988 because (a) G.984.3 and G.988 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.988's teachings with those of G.984.3. For similar

reasons, a person of ordinary skill in the art would be motivated to combine G.984.3 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.984.3 with Effenberger '155 for many reasons. For example, G.984.3 describes "Key exchange and switch-over." *See, e.g.*, G.984.3 at 12.3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.984.3 to implement the details of a "apparatus and method for providing security in a Passive Optical Network (PON) using an Enhanced Security Control management entity (ME)" taught by Effenberger '155 because, it is also directed at encryption of communications systems. Effenberger '155 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as sending the exchanging security information with an optical line terminal (OLT) via an ONU management control interface (OMCI) channel by using a plurality of attributes in an Enhanced Security Control management entity (ME) in the ONU." Effenberger '155 at Claim 1. In addition, a person of ordinary skill in the art would be motivated to combine G.984.3 with Effenberger '155 because (a) G.984.3 and Effenberger '155 disclose similar products, methods, and solutions, (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption, and Effenberger was a primary contributor and now Rapporteur of the ITU SG15/Q2 Study Group. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Effenberger '155's teachings with those of G.984.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.984.3 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.984.3 with Effenberger '773 for many reasons. For example, G.984.3 describes "Key exchange and switch-

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over." *See, e.g.*, G.984.3 at 12.3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.984.3 to implement the details of a "network component comprising at least one processor coupled to a memory and configured to exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel," taught by Effenberger '773 because, it is also directed at security of communications systems. Effenberger '773 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel." Effenberger '773 at Claim 1. In addition, a person of ordinary skill in the art would be motivated to combine G.984.3 with Effenberger '773 because (a) G.984.3 and Effenberger '773 disclose similar products, methods, and solutions, (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption, and Effenberger was a primary contributor and now Rapporteur of the ITU SG15/Q2 Study Group. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Effenberger '773's teachings with those of G.984.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.984.3 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.984.3 with the Liaison Statement and LS Reply for many reasons. For example, G.984.3 describes "Key exchange and switch-over" as used in a GPON system. *See, e.g.*, G.984.3 at 12.3. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.984.3 to implement the details of a "Carrying multicast traffic through AES encrypted GEM ports" taught

by Liaison Statement and LS Reply because, it is also directed at adding encryption to a multicast PON system. Liaison Statement and LS Reply at 2 and 2-3, respectively. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as transmitting encrypted information in a multicast system through GEM ports. Liaison Statement and LS Reply at 2 and 2-3, respectively. In addition, a person of ordinary skill in the art would be motivated to combine G.984.3 with Liaison Statement and LS Reply because (a) G.984.3 and Liaison Statement and LS Reply disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption within a PON system. Moreover, a POSITA would have had a reasonable expectation of success in incorporating the Liaison Statement and LS Reply's teachings with those of G.984.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.984.3 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

(14) Exemplary Effenberger '155 Solutions

A person of ordinary skill in the art would be motivated to combine Effenberger '155 with Platnic '622 for many reasons. For example, Effenberger '155 describes "apparatus and method for providing security in a Passive Optical Network (PON) using an Enhanced Security Control management entity (ME)." *See, e.g.*, Effenberger '155 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Effenberger '155 to implement the details of a "method and a system enabling multicast transmission of multicast services in a communication network, for example comprising a PON (passive optical network), and with various levels of security" taught by Platnic '622 because, it is also directed at encryption of communications systems. Platnic '622 at [0008]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as transmitting the code key message and

data traffic in different channels. Platnic '622 at [0101]. In addition, a person of ordinary skill in the art would be motivated to combine Effenberger '155 with Platnic '622 because (a) Effenberger '155 and Platnic '622 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Platnic '622 's teachings with those of Effenberger '155. For similar reasons, a person of ordinary skill in the art would be motivated to combine Effenberger '155 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Effenberger '155 with Yen '097 for many reasons. For example, Effenberger '155 describes "apparatus and method for providing security in a Passive Optical Network (PON) using an Enhanced Security Control management entity (ME)." *See, e.g.*, Effenberger '155 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Effenberger '155 to implement the details of a "multicast connection in accordance with a preferred embodiment of the present invention is also secured via a multicasting churning key (i.e., encryption key) to prevent eavesdropping by unauthorized users" taught by Yen '097 because, it is also directed at encryption of communications systems. Yen '097 at [0013]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as reducing the risk of a security breach. Yen '097 at [0017]-[0018]. In addition, a person of ordinary skill in the art would be motivated to combine Effenberger '155 with Yen '097 because (a) Effenberger '155 and Yen '097 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in

incorporating Yen ’097’s teachings with those of Effenberger ’155. For similar reasons, a person of ordinary skill in the art would be motivated to combine Effenberger ’155 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Effenberger ’155 with Platnic ’575 for many reasons. For example, Effenberger ’155 describes “apparatus and method for providing security in a Passive Optical Network (PON) using an Enhanced Security Control management entity (ME).” *See, e.g.*, Effenberger ’155 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as using encryption in a multicast system. Platnic ’575 at 5-11-12. In addition, a person of ordinary skill in the art would be motivated to combine Effenberger ’155 with Platnic ’575 because (a) Effenberger ’155 and Platnic ’575 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Platnic ’575’s teachings with those of Effenberger ’155. For similar reasons, a person of ordinary skill in the art would be motivated to combine Effenberger ’155 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Effenberger ’155 with Niemi ’907 for many reasons. For example, Effenberger ’155 describes “apparatus and method for providing security in a Passive Optical Network (PON) using an Enhanced Security Control management entity (ME).” *See, e.g.*, Effenberger ’155 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Effenberger ’155 to implement the details of a “encrypting a multicast message by using ciphering” taught by Niemi ’907 because, it is also directed at encryption of communications systems. Niemi ’907 at Abstract.

A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "sending the encrypted multicast message to the plurality of user entities simultaneously." Niemi '907 at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Effenberger '155 with Niemi '907 because (a) Effenberger '155 and Niemi '907 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Niemi '907's teachings with those of Effenberger '155. For similar reasons, a person of ordinary skill in the art would be motivated to combine Effenberger '155 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Effenberger '155 with He for many reasons. For example, Effenberger '155 describes "apparatus and method for providing security in a Passive Optical Network (PON) using an Enhanced Security Control management entity (ME)." *See, e.g.*, Effenberger '155 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Effenberger '155 to implement the details of a "generating a key at the optical network line terminal, and said key is used as the public key of the multicast and is used to encrypt the multicast bit-stream" taught by He because, it is also directed at encryption of communications systems. He at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such the use of multiple channels for transmitting the multicast bit-stream and key. He at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Effenberger '155 with He because (a) Effenberger '155 and He disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both

relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating He's teachings with those of Effenberger '155. For similar reasons, a person of ordinary skill in the art would be motivated to combine Effenberger '155 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Effenberger '155 with Masayuki for many reasons. For example, Effenberger '155 describes "apparatus and method for providing security in a Passive Optical Network (PON) using an Enhanced Security Control management entity (ME)." *See, e.g.*, Effenberger '155 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Effenberger '155 to implement the details of a "generating a multicast encryption key for encrypting a message to be multicast to the subscriber apparatus" taught by Masayuki because, it is also directed at encryption of communications systems. Masayuki at [0008]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as storing the multicast encryption key on the subscriber side. Masayuki at [0008]. In addition, a person of ordinary skill in the art would be motivated to combine Effenberger '155 with Masayuki because (a) Effenberger '155 and Masayuki disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Masayuki's teachings with those of Effenberger '155. For similar reasons, a person of ordinary skill in the art would be motivated to combine Effenberger '155 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

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A person of ordinary skill in the art would be motivated to combine Effenberger '155 with Masayuki '006 for many reasons. For example, Effenberger '155 describes "apparatus and method for providing security in a Passive Optical Network (PON) using an Enhanced Security Control management entity (ME)." *See, e.g.*, Effenberger '155 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Effenberger '155 to implement the details of a "An encryption key sending means for sending a key to a plurality of subscriber-side devices that should receive the multicast data" taught by Masayuki '006 because, it is also directed at encryption of communications systems. Masayuki '006 at 4. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "receiving the encryption key sent from the network side device to the client side device" and means of encryption and decryption. Masayuki '006 at 4. In addition, a person of ordinary skill in the art would be motivated to combine Effenberger '155 with Masayuki '006 because (a) Effenberger '155 and Masayuki '006 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Masayuki '006's teachings with those of Effenberger '155. For similar reasons, a person of ordinary skill in the art would be motivated to combine Effenberger '155 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Effenberger '155 with Ming '553 for many reasons. For example, Effenberger '155 describes "apparatus and method for providing security in a Passive Optical Network (PON) using an Enhanced Security Control management entity (ME)." *See, e.g.*, Effenberger '155 at Abstract. A person having ordinary skill

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in the art would have been motivated to modify the method and/or device of Effenberger '155 to implement the details of a "a method and a device for controlling multicast right in a passive optical network system" taught by Ming '553 because, it is also directed at encryption of communications systems. Ming '553 at 3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as regular updating of the security key. Ming '553 at 3. In addition, a person of ordinary skill in the art would be motivated to combine Effenberger '155 with Ming '553 because (a) Effenberger '155 and Ming '553 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ming '553's teachings with those of Effenberger '155. For similar reasons, a person of ordinary skill in the art would be motivated to combine Effenberger '155 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Effenberger '155 with Qi for many reasons. For example, Effenberger '155 describes "apparatus and method for providing security in a Passive Optical Network (PON) using an Enhanced Security Control management entity (ME)." *See, e.g.*, Effenberger '155 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Effenberger '155 to implement the details of a "a key generation means 43 for generating and transmitting a key to the optical network unit" taught by Qi because, it is also directed at encryption of communications systems. Qi at [0061]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the systems identification of the ONU participating in the multicast. Qi at [0061]. In addition, a person of ordinary skill in the art would be motivated to combine

Effenberger ’155 with Qi because (a) Effenberger ’155 and Qi disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Qi’s teachings with those of Effenberger ’155. For similar reasons, a person of ordinary skill in the art would be motivated to combine Effenberger ’155 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Effenberger ’155 with Kim for many reasons. For example, Effenberger ’155 describes “apparatus and method for providing security in a Passive Optical Network (PON) using an Enhanced Security Control management entity (ME).” *See, e.g.*, Effenberger ’155 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Effenberger ’155 to implement the details of a “method for setting a security channel based on a multi-point control protocol” taught by Kim because, it is also directed at encryption of communications systems. Kim at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the automatic registration of an ONU with security capability. Kim at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Effenberger ’155 with Kim because (a) Effenberger ’155 and Kim disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kim’s teachings with those of Effenberger ’155. For similar reasons, a person of ordinary skill in the art would be

motivated to combine Effenberger '155 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Effenberger '155 with G.987.3 for many reasons. For example, Effenberger '155 describes "apparatus and method for providing security in a Passive Optical Network (PON) using an Enhanced Security Control management entity (ME)." *See, e.g.*, Effenberger '155 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Effenberger '155 to implement the details of "Downstream multicast encryption" taught by G.987.3 because, it is also directed at encryption of communications systems. G.987.3 at 15.5.2. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as transmission of the encryption key via the OMCI. G.987.3 at 15.5.2. In addition, a person of ordinary skill in the art would be motivated to combine Effenberger '155 with G.987.3 because (a) Effenberger '155 and G.987.3 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3's teachings with those of Effenberger '155. For similar reasons, a person of ordinary skill in the art would be motivated to combine Effenberger '155 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Effenberger '155 with G.988 for many reasons. For example, Effenberger '155 describes "apparatus and method for providing security in a Passive Optical Network (PON) using an Enhanced Security Control management entity (ME)." *See, e.g.*, Effenberger '155 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Effenberger '155 to

implement the details of a "Broadcast (multicast) encryption" taught by G.988 because, it is also directed at encryption of communications systems. G.988 at 81. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "keys are generated by the OLT and distributed via OMCI." G.988 at 81. In addition, a person of ordinary skill in the art would be motivated to combine Effenberger '155 with G.988 because (a) Effenberger '155 and G.988 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.988's teachings with those of Effenberger '155. For similar reasons, a person of ordinary skill in the art would be motivated to combine Effenberger '155 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Effenberger '155 with G.984.3 for many reasons. For example, Effenberger '155 describes "apparatus and method for providing security in a Passive Optical Network (PON) using an Enhanced Security Control management entity (ME)." *See, e.g.*, Effenberger '155 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Effenberger '155 to implement the details of a "Key exchange and switch-over" taught by G.984.3 because, it is also directed at encryption of communications systems. G.984.3 at 12.3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as sending the "Request_Key message in the PLOAM channel." G.984.3 at 91. In addition, a person of ordinary skill in the art would be motivated to combine Effenberger '155 with G.984.3 because (a) Effenberger '155 and G.984.3 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate

to the same concept of encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.984.3's teachings with those of Effenberger '155. For similar reasons, a person of ordinary skill in the art would be motivated to combine Effenberger '155 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Effenberger '155 with Effenberger '773 for many reasons. For example, Effenberger '155 describes "apparatus and method for providing security in a Passive Optical Network (PON) using an Enhanced Security Control management entity (ME)." *See, e.g.*, Effenberger '155 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Effenberger '155 to implement the details of a "network component comprising at least one processor coupled to a memory and configured to exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel," taught by Effenberger '773 because, it is also directed at security of communications systems. Effenberger '773 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel." Effenberger '773 at Claim 1. In addition, a person of ordinary skill in the art would be motivated to combine Effenberger '155 with Effenberger '773 because (a) Effenberger '155 and Effenberger '773 disclose similar products, methods, and solutions, (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption, and Effenberger was a primary contributor and now Rapporteur of the ITU SG15/Q2 Study Group. Moreover, a POSITA would have had a reasonable expectation of success in incorporating

Effenberger ’773’s teachings with those of Effenberger ’155. For similar reasons, a person of ordinary skill in the art would be motivated to combine Effenberger ’155 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

(15) Exemplary Effenberger ’773 Solutions

A person of ordinary skill in the art would be motivated to combine Effenberger ’773 with Platnic ’622 for many reasons. For example, Effenberger ’773 describes “network component comprising at least one processor coupled to a memory and configured to exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel.” *See, e.g.*, Effenberger ’773 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Effenberger ’773 to implement the details of a “method and a system enabling multicast transmission of multicast services in a communication network, for example comprising a PON (passive optical network), and with various levels of security” taught by Platnic ’622 because, it is also directed at encryption of communications systems. Platnic ’622 at [0008]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as transmitting the code key message and data traffic in different channels. Platnic ’622 at [0101]. In addition, a person of ordinary skill in the art would be motivated to combine Effenberger ’773 with Platnic ’622 because (a) Effenberger ’773 and Platnic ’622 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Platnic ’622 ’s teachings with those of Effenberger ’773. For similar reasons, a person of ordinary skill in the art would be motivated to combine Effenberger ’773 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Effenberger '773 with Yen '097 for many reasons. For example, Effenberger '773 describes "network component comprising at least one processor coupled to a memory and configured to exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel." *See, e.g.*, Effenberger '773 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Effenberger '773 to implement the details of a "multicast connection in accordance with a preferred embodiment of the present invention is also secured via a multicasting churning key (i.e., encryption key) to prevent eavesdropping by unauthorized users" taught by Yen '097 because, it is also directed at encryption of communications systems. Yen '097 at [0013]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as reducing the risk of a security breach. Yen '097 at [0017]-[0018]. In addition, a person of ordinary skill in the art would be motivated to combine Effenberger '773 with Yen '097 because (a) Effenberger '773 and Yen '097 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Yen '097's teachings with those of Effenberger '773. For similar reasons, a person of ordinary skill in the art would be motivated to combine Effenberger '773 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Effenberger '773 with Platnic '575 for many reasons. For example, Effenberger '773 describes "network component comprising at least one processor coupled to a memory and configured to exchange security

information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel." *See, e.g.*, Effenberger '773 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as using encryption in a multicast system. Platnic '575 at 5-11-12. In addition, a person of ordinary skill in the art would be motivated to combine Effenberger '773 with Platnic '575 because (a) Effenberger '773 and Platnic '575 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Platnic '575's teachings with those of Effenberger '773. For similar reasons, a person of ordinary skill in the art would be motivated to combine Effenberger '773 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Effenberger '773 with Niemi '907 for many reasons. For example, Effenberger '773 describes "network component comprising at least one processor coupled to a memory and configured to exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel." *See, e.g.*, Effenberger '773 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Effenberger '773 to implement the details of a "encrypting a multicast message by using ciphering" taught by Niemi '907 because, it is also directed at encryption of communications systems. Niemi '907 at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "sending the encrypted multicast message to the plurality of user entities simultaneously." Niemi '907 at Abstract. In addition, a

person of ordinary skill in the art would be motivated to combine Effenberger '773 with Niemi '907 because (a) Effenberger '773 and Niemi '907 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Niemi '907's teachings with those of Effenberger '773. For similar reasons, a person of ordinary skill in the art would be motivated to combine Effenberger '773 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Effenberger '773 with He for many reasons. For example, Effenberger '773 describes "network component comprising at least one processor coupled to a memory and configured to exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel" *See, e.g.*, Effenberger '773 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Effenberger '773 to implement the details of a "generating a key at the optical network line terminal, and said key is used as the public key of the multicast and is used to encrypt the multicast bit-stream" taught by He because, it is also directed at encryption of communications systems. He at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such the use of multiple channels for transmitting the multicast bit-stream and key. He at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Effenberger '773 with He because (a) Effenberger '773 and He disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a

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POSITA would have had a reasonable expectation of success in incorporating He's teachings with those of Effenberger '773. For similar reasons, a person of ordinary skill in the art would be motivated to combine Effenberger '773 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Effenberger '773 with Masayuki for many reasons. For example, Effenberger '773 describes "network component comprising at least one processor coupled to a memory and configured to exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel." *See, e.g.*, Effenberger '773 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Effenberger '773 to implement the details of a "generating a multicast encryption key for encrypting a message to be multicast to the subscriber apparatus" taught by Masayuki because, it is also directed at encryption of communications systems. Masayuki at [0008]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as storing the multicast encryption key on the subscriber side. Masayuki at [0008]. In addition, a person of ordinary skill in the art would be motivated to combine Effenberger '773 with Masayuki because (a) Effenberger '773 and Masayuki disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Masayuki's teachings with those of Effenberger '773. For similar reasons, a person of ordinary skill in the art would be motivated to combine Effenberger '773 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

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A person of ordinary skill in the art would be motivated to combine Effenberger '773 with Masayuki '006 for many reasons. For example, Effenberger '773 describes "network component comprising at least one processor coupled to a memory and configured to exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel." *See, e.g.*, Effenberger '773 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Effenberger '773 to implement the details of a "An encryption key sending means for sending a key to a plurality of subscriber-side devices that should receive the multicast data" taught by Masayuki '006 because, it is also directed at encryption of communications systems. Masayuki '006 at 4. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "receiving the encryption key sent from the network side device to the client side device" and means of encryption and decryption. Masayuki '006 at 4. In addition, a person of ordinary skill in the art would be motivated to combine Effenberger '773 with Masayuki '006 because (a) Effenberger '773 and Masayuki '006 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Masayuki '006's teachings with those of Effenberger '773. For similar reasons, a person of ordinary skill in the art would be motivated to combine Effenberger '773 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Effenberger '773 with Ming '553 for many reasons. For example, Effenberger '773 describes "network component comprising at least one processor coupled to a memory and configured to exchange security

information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel." *See, e.g.*, Effenberger '773 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Effenberger '773 to implement the details of a "a method and a device for controlling multicast right in a passive optical network system" taught by Ming '553 because, it is also directed at encryption of communications systems. Ming '553 at 3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as regular updating of the security key. Ming '553 at 3. In addition, a person of ordinary skill in the art would be motivated to combine Effenberger '773 with Ming '553 because (a) Effenberger '773 and Ming '553 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ming '553's teachings with those of Effenberger '773. For similar reasons, a person of ordinary skill in the art would be motivated to combine Effenberger '773 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Effenberger '773 with Qi for many reasons. For example, Effenberger '773 describes "network component comprising at least one processor coupled to a memory and configured to exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel." *See, e.g.*, Effenberger '773 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Effenberger '773 to implement the details of a "a key generation means 43 for generating and transmitting a key to the optical network unit" taught by Qi because, it is also directed at

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encryption of communications systems. Qi at [0061]. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the systems identification of the ONU participating in the multicast. Qi at [0061]. In addition, a person of ordinary skill in the art would be motivated to combine Effenberger '773 with Qi because (a) Effenberger '773 and Qi disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Qi's teachings with those of Effenberger '773. For similar reasons, a person of ordinary skill in the art would be motivated to combine Effenberger '773 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Effenberger '773 with Kim for many reasons. For example, Effenberger '773 describes "network component comprising at least one processor coupled to a memory and configured to exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel." *See, e.g.*, Effenberger '773 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Effenberger '773 to implement the details of a "method for setting a security channel based on a multi-point control protocol" taught by Kim because, it is also directed at encryption of communications systems. Kim at Abstract. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as the automatic registration of an ONU with security capability. Kim at Abstract. In addition, a person of ordinary skill in the art would be motivated to combine Effenberger '773 with Kim because (a) Effenberger '773 and Kim disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the

same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kim's teachings with those of Effenberger '773. For similar reasons, a person of ordinary skill in the art would be motivated to combine Effenberger '773 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Effenberger '773 with G.987.3 for many reasons. For example, Effenberger '773 describes "network component comprising at least one processor coupled to a memory and configured to exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel." *See, e.g.*, Effenberger '773 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Effenberger '773 to implement the details of "Downstream multicast encryption" taught by G.987.3 because, it is also directed at encryption of communications systems. G.987.3 at 15.5.2. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as transmission of the encryption key via the OMCI. G.987.3 at 15.5.2. In addition, a person of ordinary skill in the art would be motivated to combine Effenberger '773 with G.987.3 because (a) Effenberger '773 and G.987.3 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3's teachings with those of Effenberger '773. For similar reasons, a person of ordinary skill in the art would be motivated to combine Effenberger '773 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

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A person of ordinary skill in the art would be motivated to combine Effenberger '773 with G.988 for many reasons. For example, Effenberger '773 describes "network component comprising at least one processor coupled to a memory and configured to exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel." *See, e.g.*, Effenberger '773 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Effenberger '773 to implement the details of a "Broadcast (multicast) encryption" taught by G.988 because, it is also directed at encryption of communications systems. G.988 at 81. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as "keys are generated by the OLT and distributed via OMCI." G.988 at 81. In addition, a person of ordinary skill in the art would be motivated to combine Effenberger '773 with G.988 because (a) Effenberger '773 and G.988 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of multicast encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.988's teachings with those of Effenberger '773. For similar reasons, a person of ordinary skill in the art would be motivated to combine Effenberger '773 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Effenberger '773 with G.984.3 for many reasons. For example, Effenberger '773 describes "network component comprising at least one processor coupled to a memory and configured to exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel." *See, e.g.*, Effenberger '773

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at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Effenberger '773 to implement the details of a "Key exchange and switch-over" taught by G.984.3 because, it is also directed at encryption of communications systems. G.984.3 at 12.3. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as sending the "Request_Key message in the PLOAM channel." G.984.3 at 91. In addition, a person of ordinary skill in the art would be motivated to combine Effenberger '773 with G.984.3 because (a) Effenberger '773 and G.984.3 disclose similar products, methods, and solutions; and (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.984.3's teachings with those of Effenberger '773. For similar reasons, a person of ordinary skill in the art would be motivated to combine Effenberger '773 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Effenberger '773 with Effenberger '155 for many reasons. For example, Effenberger '773 describes "network component comprising at least one processor coupled to a memory and configured to exchange security information using a plurality of attributes in a management entity (ME) in an optical network unit (ONU) via an ONU management control interface (OMCI) channel." *See, e.g.*, Effenberger '773 at Abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Effenberger '773 to implement the details of a "apparatus and method for providing security in a Passive Optical Network (PON) using an Enhanced Security Control management entity (ME)" taught by Effenberger '155 because, it is also directed at encryption of communications systems. Effenberger '155 at Abstract. A person of ordinary skill in the art would

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be motivated by the advantages of such functionality, such as sending the exchanging security information with an optical line terminal (OLT) via an ONU management control interface (OMCI) channel by using a plurality of attributes in an Enhanced Security Control management entity (ME) in the ONU." Effenberger '155 at Claim 1. In addition, a person of ordinary skill in the art would be motivated to combine Effenberger '773 with Effenberger '155 because (a) Effenberger '773 and Effenberger '155 disclose similar products, methods, and solutions, (b) both patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept of encryption, and Effenberger was a primary contributor and now Rapporteur of the ITU SG15/Q2 Study Group. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Effenberger '155's teachings with those of Effenberger '773. For similar reasons, a person of ordinary skill in the art would be motivated to combine Effenberger '773 with other references in Exhibits C-1 – C-15 and Appendix C-Secondary with similar teachings.

d) The Claims Recite Well-Known Concepts That Would Have Been Obvious to Implement.

The Asserted Claims represent nothing more than an arrangement of well-known concepts and features and add nothing to the state of the art at the time of the alleged invention. For each of the concepts represented by the Asserted Claims, it would have been obvious to add to the teachings of any number of known products and references, including to the teachings of any of the primary references in Exhibits C-1 – C-15 and Appendix C-Secondary to the extent that such reference is alleged to be missing such concept or feature. The following are examples of concepts that would have been obvious, which is not intended to be an exhaustive list of the claimed features that would have been obvious. Defendants reserve the right to supplement these examples as necessary.

(1) It would have been obvious to modify any primary reference "an optical line terminal (OLT) generating a common key" and "OLT sending the common key applied in encrypting the multicast service data via a management control channel to an optical network unit (ONU)" Claim 1

To the extent Iarnach contends that any reference charted in Exhibits C-1 – C-15 and Appendix C-Secondary does not disclose "an optical line terminal (OLT) generating a common key" and "OLT sending the common key applied in encrypting the multicast service data via a management control channel to an optical network unit (ONU)" it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits C-1 – C-15 and Appendix C-Secondary. A person having ordinary skill in the art would have been motivated to employ or implement generating an encryption key at the OLT and sending that key from the OLT to the ONU. *See, e.g.*, Platnic '622 at [0099]; Effenberger '155 at [0003]; Effenberger '773 at [0004]; Platnic '575 at Figure 1; s*ee, generally*, Platnic '622, Yen '097, Platnic '575, Niemi '907, Masayuki, Masayuki '006, Ming '553, Qi, Kim, G.987.3, G.988, G.984.3, Effenberger '155, Effenberger '773. Such a feature would have accomplished encryption for use in a downstream system. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(2) It would have been obvious to modify any primary reference to incorporate "using the common key to encrypt multicast service data of all different multicast services in a same bearer channel" and "the multicast service data of all different multicast services in the same one bearer channel use a same common key to carry out encryption" and "the multicast service data in different bearer channels use different common keys or the same common key" Claims 1 & 7

To the extent Iarnach contends that any reference charted in Exhibits C-1 – C-15 and Appendix C-Secondary does not disclose "using the common key to encrypt multicast service data of all different multicast services in a same bearer channel" and "the multicast service data of all

different multicast services in the same one bearer channel use a same common key to carry out encryption" and "the multicast service data in different bearer channels use different common keys or the same common key" it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits C-1 – C-15 and Appendix C-Secondary. A person having ordinary skill in the art would have been motivated to employ or implement use of a "common key" for services in a "same bearer channel." *See, e.g.*, Platnic '622 at [0006], [0099], [0100], [0101]; Effenberger '155 at Abstract; Effenberger '773 at Abstract; Platnic '575 at 2:3-13; s*ee, generally*, Platnic '622, Yen '097, Platnic '575, Niemi '907, Masayuki, Masayuki '006, Ming '553, Qi, Kim, G.987.3, G.988, G.984.3, Effenberger '155, Effenberger '773. Such a feature would have reduced complexity of an encryption system. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

> (3) It would have been obvious to modify any primary reference to incorporate based on the ONT applying for an encryption key, a "OLT sending the common key applied in encrypting the multicast service data via a management control channel to an optical network unit (ONU) that is activated successfully and applies to receive said multicast service data" Claims 1 & 6

To the extent Iarnach contends that any reference charted in Exhibits C-1 – C-15 and Appendix C-Secondary does not disclose "OLT sending the common key applied in encrypting the multicast service data via a management control channel" it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits C-1 – C-15 and Appendix C-Secondary. A person having ordinary skill in the art would have been motivated to employ or implement sending the encryption key via a specific management channel, such as a PLOAM or OMCI channel. *See, e.g.*, Platnic '622 at [0099] & [00101]; Effenberger '155 at Abstract; Effenberger '773 at Abstract; Platnic '575 at 7:10-15; s*ee, generally*, Platnic '622, Yen

’097, Platnic ’575, Niemi ’907, Masayuki, Masayuki ’006, Ming ’553, Qi, Kim, G.987.3, G.988, G.984.3, Effenberger ’155, Effenberger ’773. Using such a feature would have streamlined transmission of the common key. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

> (4) It would have been obvious to modify any primary reference for after “obtaining the common key, said ONU using said common key to decrypt all the multicast service data, which the ONU applies to receive, in the bearer channel” (Claim 2)

To the extent Iarnach contends that any reference charted in Exhibits B-1 – B-14 and Appendix B-Secondary does not disclose “after obtaining the common key, said ONU using said common key to decrypt all the multicast service data, which the ONU applies to receive, in the bearer channel” it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits B-1 – B-14 and Appendix B-Secondary. A person having ordinary skill in the art would have been motivated to employ or implement decryption following encryption. *See, e.g.*, Platnic ’622, Yen ’097, Platnic ’575, Niemi ’907, Masayuki, Masayuki ’006, Ming ’553, Qi, Kim, G.987.3, G.988, G.984.3, Effenberger ’155, Effenberger ’773. Using decryption would have allowed the ONU to access the encrypted information. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

> (5) It would have been obvious to modify any primary reference for said “OLT generating the common key and setting an aging time for the common key, and after the aging time arrives, it regenerating a new common key, and using the new common key to encrypt the multicast service data in the bearer channel, and sending the new common key to the ONU that is activated

successfully and applies for the multicast service data" (Claims 3 & 5)

To the extent Iarnach contends that any reference charted in Exhibits B-1 – B-14 and Appendix B-Secondary does not disclose "said OLT generating the common key and setting an aging time for the common key, and after the aging time arrives, it regenerating a new common key, and using the new common key to encrypt the multicast service data in the bearer channel, and sending the new common key to the ONU that is activated successfully and applies for the multicast service data" it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits B-1 – B-14 and Appendix B-Secondary. A person having ordinary skill in the art would have been motivated to employ or implement an aging time to reset the security key. *See, e.g.*, Platnic '622, Yen '097, Platnic '575, Niemi '907, Masayuki, Masayuki '006, Ming '553, Qi, Kim, G.987.3, G.988, G.984.3, Effenberger '155, Effenberger '773. Resetting the security key after a given time would have allowed for increased security. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(6) It would have been obvious to modify any primary reference for in the step of said OLT sending the common key to the ONU that is activated successfully and applies to receive said multicast service data, said OLT also sends the ONU a bearer channel identification of the bearer channel where all multicast service data are encrypted with the common key. (Claims 4 & 8)

To the extent Iarnach contends that any reference charted in Exhibits B-1 – B-14 and Appendix B-Secondary does not disclose "in the step of said OLT sending the common key to the ONU that is activated successfully and applies to receive said multicast service data, said OLT also sends the ONU a bearer channel identification of the bearer channel where all multicast service data are encrypted with the common key." it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits B-1 – B-14 and Appendix B-

Secondary. A person having ordinary skill in the art would have been motivated to employ or implement identification of the relevant channel. *See, e.g.*, Platnic '622, Yen '097, Platnic '575, Niemi '907, Masayuki, Masayuki '006, Ming '553, Qi, Kim, G.987.3, G.988, G.984.3, Effenberger '155, Effenberger '773. Channel identification would allow for insight into what channel corresponds to what feature and whether that feature is encrypted. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

e) Additional Reasons to Combine.

In addition to the information contained elsewhere in these invalidity contentions, including in Exhibits C-1 – C-15 and Appendix C-Secondary, Defendants have identified additional motivations and reasons to combine the various references. Defendants note that in *KSR Int'l Co. v. Teleflex Inc.*, the Supreme Court held that "[i]n determining whether the subject matter of a patent claim is obvious, neither the particular motivation nor the avowed purpose of the patentee controls. What matters is the objective reach of the claim. If the claim extends to what is obvious, it is invalid under § 103." 127 S. Ct. 1727, 1742 (2007).

KSR further illustrated several ways in which the subject matter of a patent claim may be shown to have been obvious. For instance, "[o]ne of the ways in which a patent's subject matter can be proved obvious is by noting that there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent's claims." *KSR*, 127 S. Ct. at 1742. The Supreme Court held that it was error to "look only to the problem the patentee was trying to solve." *Id*. As the Court explained, "[t]he question is not whether the combination was obvious to the patentee but whether the combination was obvious to a person with ordinary skill in the art. Under the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the

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manner claimed." *Id*. Further, "[c]ommon sense teaches … that familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle." *Id.* Further, a showing that a combination of elements was "obvious to try" may demonstrate that it was obvious under § 103. *Id.* For instance, the Supreme Court held that "predictable solutions" using a combination of "known options" may render the subject matter of a patent claim obvious. *Id.*

When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product was not of innovation but of ordinary skill and common sense. *Id.* The ways in which the subject matter of a patent claim may be shown to be obvious, identified by *KSR*, are merely illustrative. A core thrust of *KSR* was that "[r]igid preventative rules that deny factfinders recourse to common sense are neither necessary under our case law nor consistent with it." *KSR*, 127 S. Ct. at 1742-43 (quoting *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1367 (Fed. Cir. 2006) ("Our suggestion test is in actuality quite flexible and not only permits, but requires, consideration of common knowledge and common sense"), and *Alza Corp. v. Mylan Labs., Inc.*, 464 F.3d 1286, 1291 (Fed. Cir. 2006) ("There is flexibility in our obviousness jurisprudence because a motivation may be found *implicitly* in the prior art. We do not have a rigid test that requires an actual teaching to combine ...").

Although Defendants note that there is no longer a rigid requirement regarding motivation to combine under *KSR*, Defendants provide the following statements regarding motivation to combine. Multiple teachings, suggestions, and/or reasons to modify any of the references and/or to combine any two or more of the references in Exhibits C-1 – C-15 and Appendix C-Secondary

come from many sources, including the prior art (specific and as a whole), common knowledge, common sense, predictability, expectations, industry trends, design incentives or need, market demands or pressure, market forces, obvious to try, the nature of the problem faced, and/or knowledge possessed by one of ordinary skill. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field of endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one.

The combination of prior art references identified in these contentions would have been obvious because the combination represents the known potential options with a reasonable expectation of success. Additionally, one of ordinary skill in the art would have been motivated to create combinations identified in these contentions using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or teaching, suggestion, or motivation in the prior art generally. Also, market forces in the industry, and the desire to improve features and performance, would motivate the addition of features to systems as they became available, became less expensive, became more commonly used, provided better performance, reduced costs, size or weight, or predictably achieved other desirable results.

C. Other Grounds for Invalidity

Defendants identify the following additional grounds for invalidity of the Asserted Claims of the ’378 Patent. Defendants reserve the right to supplement these disclosures based on further investigation and discovery.

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1. Invalidity of the ’378 Patent Based on 35 U.S.C. § 112, ¶ 1 (Enablement and Written Description)

Based on Defendants’ present understanding of Iarnach’s asserted scope of the claims of the ’378 Patent, to the extent such positions can be understood from Iarnach’s Preliminary Infringement Contentions, the Asserted Claims of the ’378 Patent are invalid for reciting at least the following claim terms, phrases, or limitations that lack enablement or sufficient written description: 1-8

- “an optical line terminal (OLT) generating a common key” (’378 Patent, claim 1)
- “using the common key to encrypt multicast service data of all different multicast services in a same bearer channel and then sending encrypted data” (’378 Patent, claim 1)
- “wherein the multicast service data of all different multicast services in the same one bearer channel use a same common key to carry out encryption” (’378 Patent, claim 1)
- “OLT sending the common key applied in encrypting the multicast service data via a management control channel to an optical network unit (ONU) that is activated successfully and applies to receive said multicast service data” (’378 Patent, claim 1)
- “after obtaining the common key, said ONU using said common key to decrypt all the multicast service data, which the ONU applies to receive, in the bearer channel” (’378 Patent, claim 2)
- “said OLT generating the common key and setting an aging time for the common key, and after the aging time arrives, it regenerating a new common key, and using the new common key to encrypt the multicast service data in the bearer channel, and sending the new common key to the ONU that is activated successfully and applies for the multicast service data” (’378 Patent, claim 3)
- “in the step of said OLT sending the common key to the ONU that is activated successfully and applies to receive said multicast service data, said OLT also sends the ONU a bearer channel identification of the bearer channel where all multicast service data are encrypted with the common key” (’378 Patent, claim 4)
- “said OLT generating the common key and setting an aging time for the common key, and after the aging time arrives, it regenerating a new common key, and using the new common key to encrypt the multicast service data in the bearer channel, and sending the new common key to the ONU that is activated successfully and applies for the multicast service data” (’378 Patent, claim 5)

- "the step of said OLT sending the common key applied in encrypting the multicast service data to the ONU that is activated successfully and applies to receive said multicast service data comprises" ('378 Patent, claim 6)

- "the OLT judging that the ONU is activated successfully and applies to receive the multicast service data, and actively sending the common key applied in encrypting the multicast service data to said ONU" ('378 Patent, claim 6)

- "the ONU sending a key request to the OLT, and said OLT detecting that the ONU is activated successfully and applies to receive the multicast service data, then the OLT sending the common key applied in encrypting said multicast service data to the ONU" ('378 Patent, claim 6)

- "the multicast service data in different bearer channels use different common keys or the same common key" ('378 Patent, claim 7)

- "in the step of said OLT sending the common key to the ONU that is activated successfully and applies to receive said multicast service data, said OLT also sends the ONU a bearer channel identification of the bearer channel where all multicast service data are encrypted with the common key" ('378 Patent, claim 8)

These claim terms, phrases, and limitations, as apparently construed by Iarnach, fail to satisfy the enablement and/or written description requirements of 35 U.S.C. § 112. This is at least because the specifications of the '378 Patent demonstrate that the patentee neither conceived of nor demonstrated possession of all that Iarnach now contends the claims cover. In addition, based on Defendant's present understanding of Iarnach's Preliminary Infringement Contentions, each of the Asserted Claims of the '378 Patent in which these claim terms, phrases, and limitations appear is invalid because the specification fails to provide sufficient disclosure to enable a person of ordinary skill in the art to which the alleged invention pertains, or with which it is most nearly connected, to implement the alleged invention without undue experimentation.

2. Invalidity of the '378 Patent Based on 35 U.S.C. § 112, ¶ 2 (Indefiniteness)

Based on the Defendants' present understanding of Iarnach's asserted scope of the claims of the '378 Patent, to the extent such positions can be understood from Iarnach's Preliminary

Infringement Contentions, the Defendants assert that the Asserted Claims of the '378 Patent are invalid for reciting at least the following indefinite claim terms, phrases, or limitations:

- "an optical line terminal (OLT) generating a common key" ('378 Patent, claim 1)
- "using the common key to encrypt multicast service data of all different multicast services in a same bearer channel and then sending encrypted data" ('378 Patent, claim 1)
- "wherein the multicast service data of all different multicast services in the same one bearer channel use a same common key to carry out encryption" ('378 Patent, claim 1)
- "OLT sending the common key applied in encrypting the multicast service data via a management control channel to an optical network unit (ONU) that is activated successfully and applies to receive said multicast service data" ('378 Patent, claim 1)
- "after obtaining the common key, said ONU using said common key to decrypt all the multicast service data, which the ONU applies to receive, in the bearer channel" ('378 Patent, claim 2)
- "said OLT generating the common key and setting an aging time for the common key, and after the aging time arrives, it regenerating a new common key, and using the new common key to encrypt the multicast service data in the bearer channel, and sending the new common key to the ONU that is activated successfully and applies for the multicast service data" ('378 Patent, claim 3)
- "in the step of said OLT sending the common key to the ONU that is activated successfully and applies to receive said multicast service data, said OLT also sends the ONU a bearer channel identification of the bearer channel where all multicast service data are encrypted with the common key" ('378 Patent, claim 4)
- "said OLT generating the common key and setting an aging time for the common key, and after the aging time arrives, it regenerating a new common key, and using the new common key to encrypt the multicast service data in the bearer channel, and sending the new common key to the ONU that is activated successfully and applies for the multicast service data" ('378 Patent, claim 5)
- "the step of said OLT sending the common key applied in encrypting the multicast service data to the ONU that is activated successfully and applies to receive said multicast service data comprises" ('378 Patent, claim 6)
- "the OLT judging that the ONU is activated successfully and applies to receive the multicast service data, and actively sending the common key applied in encrypting the multicast service data to said ONU" ('378 Patent, claim 6)
- "the ONU sending a key request to the OLT, and said OLT detecting that the ONU is activated successfully and applies to receive the multicast service data, then the OLT

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sending the common key applied in encrypting said multicast service data to the ONU" ('378 Patent, claim 6)

- "the multicast service data in different bearer channels use different common keys or the same common key" ('378 Patent, claim 7)
- "in the step of said OLT sending the common key to the ONU that is activated successfully and applies to receive said multicast service data, said OLT also sends the ONU a bearer channel identification of the bearer channel where all multicast service data are encrypted with the common key" ('378 Patent, claim 8)

These claim terms, phrases, and limitations, as apparently construed by Iarnach, violate the definiteness requirements of 35 U.S.C. § 112.

Based on Defendants' present understanding of Iarnach's Preliminary Infringement Contentions, these claim terms, phrases, and limitations are indefinite because they are inconsistent with and broader than the alleged invention disclosed in the specification and during prosecution. And given Iarnach's apparent constructions of the claim terms, phrases, and limitations, POSITA at the time of the invention would not have understood what is claimed with reasonable certainty, even when the claims are read in light of the specification and prosecution history.

3. Additional Grounds for Invalidity of the '378 Patent

In addition to the preceding invalidity contentions, Defendants reserve the right to assert that the Asserted Claims are invalid under 35 U.S.C. § 102(f) and/or § 102(g) in the event that Defendants obtain evidence that the named inventor of the '378 Patent did not invent (either alone or in conjunction with other parties) the subject matter claimed in the '378 Patent. Should Defendants obtain such evidence, Defendants will provide the name of the person(s) from whom and the circumstances under which the invention or any part of it was derived, and/or the circumstances surrounding the making of the invention before the patent application.

4. Collateral Estoppel

In the event the PTAB or any other judicial body issues an applicable decision or ruling such as, but not limited to, a ruling in Inter Partes Review, Iarnach is estopped from asserting the claims of the ’378 Patent in view of such decisions or rulings.

Defendants reserve the right to supplement these disclosures based on further investigation and discovery.

5. Secondary Considerations

There are no objective indicia of non-obviousness evidencing the validity of any of the Asserted Claims. If Iarnach identifies any alleged objective indicia of non-obviousness or secondary considerations supporting the validity of any Asserted Claims, Defendants reserve the right to supplement these contentions to respond to any such evidence. Further, to the extent any products allegedly practicing the claims have been successful, there is no nexus between the claimed inventions and the products’ alleged success.

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VI. THE ’013 PATENT IS INVALID.

A. Identification of Prior Art

Defendants contend that the prior art references described and charted in Exhibits D-1 to D-8 and Appendix D—Secondary anticipate and/or render obvious, alone or in combination, one or more of the Asserted Claims of the ’013 Patent.

B. The Asserted Claims Are Anticipated and/or Rendered Obvious.

Iarnach asserts claims 1-7 of the ’013 Patent against the Defendants in this lawsuit. These claims are invalid because the ’013 Patent fails to meet one or more of the requirements for patentability. The individual bases for invalidity are provided below and in Exhibits D-1 to D-8 and Appendix D—Secondary. Each of the prior art references, the underlying work, and/or the underlying apparatus or method qualifies as prior art under one or more sections of 35 U.S.C. §§ 102 and/or 103. D-1 to D-8 and Appendix D—Secondary

In an effort to focus the issues, the Defendants have cited representative portions of identified references, even where a reference may contain additional disclosures or support for a particular claim element. Each and every disclosure of the same limitation in the same reference is not necessarily identified. In addition, POSITA generally read a prior art reference as a whole and in the context of other publications and literature and in the context of their knowledge as persons of ordinary skill in the art. Thus, to understand and interpret any specific statement or disclosure within a prior art reference, such persons would rely on other information within the reference, along with other publications and their general scientific knowledge and experience in the field. Thus, each prior art reference identified herein should be understood in the context of the reference itself, in conjunction with anything incorporated by reference or described as relevant technology by the reference, any documents that are referred to for further understanding by the reference, any system embodying the reference, and any testimony by those with knowledge of

the reference, such as the named authors and inventors. The Defendants may rely on uncited portions of the prior art references and on other publications and expert testimony to provide context, and as aids to understanding and interpreting the portions that are cited. The Defendants may also rely on uncited portions of the prior art references, other disclosed publications, and the testimony of experts to establish that a person of ordinary skill in the art would have been motivated to modify or combine certain of the cited references so as to render the claims obvious.

1. The '013 Patent Priority Date.

Iarnach's Preliminary Infringement Contentions allege that the Asserted Claims of the '013 Patent are entitled at least to the priority date April 13, 2011. To the extent Iarnach alleges that any prior art relied on in these invalidity contentions does not qualify as prior art to an Asserted Patent, Defendants reserve the right to rebut those allegations (*e.g.*, by demonstrating an earlier relevant date for the challenged prior art and/or a later priority date for the Asserted Patent and/or Asserted Claim).

2. The '013 Patent Is Anticipated and/or Rendered Obvious by the Prior Art.

Some or all of the Asserted Claims of the '013 Patent are invalid as anticipated and/or rendered obvious under 35 U.S.C. §§ 102 and/or 103 in view of each of the primary prior art references identified in the claim charts included in Exhibits D-1 to D-8, which identify specific examples of where each limitation of the Asserted Claims is found in the prior art references. As explained above, the cited portions of prior art references identified in the attached claim charts are exemplary in nature and representative of the content and teaching of the prior art references, and should be understood in the context of the reference as a whole and as they would be understood by a person of ordinary skill in the art.

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Defendants identify the following references as anticipating and/or rendering obvious one or more of the Asserted Claims of the '013 Patent under 35 U.S.C. §§ 102 and/or 103. The table of anticipating and/or rending obvious references below is exemplary, and it does not constitute an admission that any reference not listed below does not also anticipate and/or render obvious the claims of the '013 Patent. Further, Defendants contend that any prior art reference in the attached charts that is charted for each limitation of any given claim, anticipates that claim, regardless of whether that prior art reference is listed in the following table.

Exhibit	**Primary Prior Art**	**Date**[8]
D-1	US2003/0177216 to Sutherland et. al. ("Sutherland")	September 18, 2003
D-2	Comparison of collision avoidance mechanisms for the discovery process in xPON to Hadjuczenia et. al. ("Hadjuczenia")	March 3, 2009
D-3	US2004/0146064 to Kramer ("Kramer")	July 29, 2004
D-4	G Supplement 49 (02/2011) ("G.Sup49")	February 25, 2011
D-5	US2008/0285969 to Kida et. al. ("Kida")	November 20, 2008
D-6	US7301968 to Haran et. al. ("Haran")	December 26, 2002
D-7	US7545813 to Davis et. al. ("Davis")	March 3, 2005

[8] Defendants reserve the right to identify additional bases for qualification as prior art for each of the identified references in the event that it is determined that the Asserted Patents are not entitled to the claimed priority date.

Exhibit	Primary Prior Art	Date[8]
D-8	G.987.3 (10/2010) ("G.987.3")	October 7, 2010

To the extent any item of prior art cited above is deemed not to disclose and/or render obvious, explicitly or inherently, any limitation of an Asserted Claim of the '013 Patent, Defendants reserve the right to argue that any difference between that prior art and the corresponding patent claim would have been either inherent in the art or obvious to a person of ordinary skill in the art, even if Defendants have not specifically denoted that the art is to be combined with the knowledge of a person of ordinary skill in the art.

3. The '013 Patent Is Obvious Over the Prior Art.

To the extent Iarnach argues that any limitation of the Asserted Claims of the '013 Patent are not explicitly disclosed and/or rendered obvious by an item of prior art identified above and in Exhibits D-1 to D-8 and Appendix D—Secondary, any purported differences are such that the claimed subject matter as a whole would have been obvious to one skilled in the art at the time of the alleged invention, in view of the state of the art and knowledge of those skilled in the art. The item of prior art would, therefore, render such claims invalid as obvious under 35 U.S.C. § 103.

a) The Claims Are Obvious Over the Primary References in Light of One or More Secondary References.

To the extent the foregoing references are found not to anticipate and/or render obvious the Asserted Claims of the '013 Patent, the foregoing references render the Asserted Claims obvious, either alone or in combination with one or more of the other references identified above. One of ordinary skill in the art would have been motivated to combine the various references cited above and herein so as to disclose each and every limitation of the Asserted Claims of the '013 Patent.

Prior art references rendering the Asserted Claims of the ’013 Patent obvious, either alone or in combination with other references in Exhibits D-1 to D-8 and Appendix D—Secondary, are provided in the tables above and below and in Exhibits D-1 to D-8 and Appendix D—Secondary. The prior art identified in Exhibits D-1 to D-8 render one or more asserted claims of the ’013 Patent obvious when the references are read in combination with one or more of each other, when read in combination with any of the prior art identified in Appendix D—Secondary, and/or when read in view of the state of the art and knowledge of those skilled in the art.

Appendix D—Secondary Exhibits	**Date**
Probabilistic Model Checking of Contention Resolution in the IEEE 802.15.4 Low-Rate Wireless Personal Area Network Protocol ("Fruth")	November 15, 2006
IEEE 802.3 ("802.3")	December 9, 2005
US20050058139A1 ("Monzawa")	March 17, 2005
US20050078682A1 ("Kim")	April 14, 2005
US6650841B1 ("Matsuo")	November 18, 2003
Ethernet in the First Mile Consortium ("UNH")	July 28, 2005
US20060093356A1 ("Vereen")	May 4, 2006
WO2007123692A2 ("Delew 692")	November 1, 2007
US20070274719A1 (“Ferguson”)	January 3, 2007

To the extent Iarnach argues that any Asserted Claim of the ’013 Patent is not disclosed or rendered obvious by any Exhibits D-1 to D-8 and Appendix D—Secondary reference, the Asserted Claims nevertheless would have been obvious in light of one or more other Exhibits D-1 to D-8 references and/or one or more references identified and charted in Appendix D—Secondary and in view of the knowledge, experience, and understanding of persons of ordinary skill in the art.

Each and every reference identified is also relevant to the state of the art at the time of the alleged invention. Any of the references disclosed above may be combined with another to render

obvious (and therefore invalid) each of Iarnach's Asserted Claims. Defendants may rely on a subset of (or all of) the above-identified references, including all references in Exhibits D-1 to D-8 and Appendix D—Secondary, for purposes of obviousness in view of the Court's claim construction, positions taken by Iarnach during this litigation, and further investigation and discovery.

b) Exemplary Combinations of the Prior Art.

The table below provides an identification of exemplary combinations of prior art references that, based on Defendants' present understanding of Iarnach's Preliminary Infringement Contentions and apparent reading of the Asserted Claims, render obvious one or more of the Asserted Claims of the '013 Patent. The combinations of references identified below are non-exhaustive, and additional examples are apparent from other combinations of references addressed in Exhibits D-1 to D-8 and Appendix D—Secondary. Defendants expressly note that, although certain references charted in Exhibits D-1 to D-8 are listed variously in the left or right column below, Defendants do not thereby imply any restriction as to which Exhibits D-1 to D-8 reference is primary and which Exhibits D-1 to D-8 reference is secondary in such a combination. Defendants reserve the right to rely on either identified reference in the identified combinations as a primary and/or secondary reference.

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Reference	Combination References
Sutherland	Hadjuczenia, Kramer, G.Sup49, Kida, Haran, Davis, G.987.3, and/or Appendix D-Secondary
Hadjuczenia	Sutherland, Kramer, G.Sup49, Kida, Haran, Davis, G.987.3, and/or Appendix D-Secondary
Kramer	Sutherland, Hadjuczenia, G.Sup49, Kida, Haran, Davis, G.987.3, and/or Appendix D-Secondary
G.Sup49	Sutherland, Hadjuczenia, Kramer, Kida, Haran, Davis, G.987.3, and/or Appendix D-Secondary
Kida	Sutherland, Hadjuczenia, Kramer, G.Sup49, Haran, Davis, G.987.3, and/or Appendix D-Secondary
Haran	Sutherland, Hadjuczenia, Kramer, G.Sup49, Kida, Davis, G.987.3, and/or Appendix D-Secondary
Davis	Sutherland, Hadjuczenia, Kramer, G.Sup49, Kida, Haran, G.987.3, and/or Appendix D-Secondary
G.987.3	Sutherland, Hadjuczenia, Kramer, G.Sup49, Kida, Haran, Davis, and/or Appendix D-Secondary

It would have been obvious to combine these references for reasons that are readily apparent to one of ordinary skill in the art, and for reasons explained herein.

c) Prior Art Solutions

In addition to the exemplary combinations provided above, to the extent Iarnach alleges the references in Exhibits D-1 to D-8 and Appendix D—Secondary do not disclose any particular limitation of the Asserted Claims of the ’013 Patent, either expressly or inherently, it would have been obvious to a person of ordinary skill in the art as of the alleged invention date of the ’013 Patent to modify the references in Exhibits D-1 to D-8 and Appendix D—Secondary and/or combine the teachings of the references in Exhibits D-1 to D-8 and Appendix D—Secondary with

the other prior art references in Exhibits D-1 to D-8 and Appendix D—Secondary in a manner that would have rendered the Asserted Claims invalid as obvious. The Defendants provide examples of such combinations below. The exemplary combinations below are non-exhaustive, and the Defendants reserve the right to rely on additional combinations as may be apparent from the prior art references in Exhibits D-1 to D-8 and Appendix D—Secondary. These obviousness combinations should not be construed to suggest that any reference included in any combination is not anticipatory in its own right. Appendix D—Secondary

(1) Exemplary Sutherland Solutions

POSITA would have been motivated to combine Sutherland with Hadjuczenia for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Sutherland teaches waiting a random period of time to reduce the probability of a data collision. *See, e.g.,* Sutherland at [0025-26]. POSITA would have been motivated to modify the method and/or device of Sutherland to implement the details of reducing data collisions in PONs taught by Hadjuczenia because of the need for techniques to isolate and address malfunctions or faults in a network, as described in Sutherland. *See, e.g.*, Sutherland at [0005]; Hadjuczenia at Abstract. In addition, POSITA would be motivated to combine Sutherland with Hadjuczenia because (a) Sutherland and Hadjuczenia disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the ’013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Hadjuczenia’s teachings with those of Sutherland. For similar reasons, POSITA would be motivated to combine Sutherland with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

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POSITA would have been motivated to combine Sutherland with Kramer for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Sutherland teaches waiting a random period of time to reduce the probability of a data collision. *See, e.g.,* Sutherland at [0025-26]. POSITA would have been motivated to modify the method and/or device of Sutherland to implement the details of reducing data collisions in PONs taught by Kramer because of the need for techniques to isolate and address malfunctions or faults in a network, as described in Sutherland. *See, e.g.*, Sutherland at [0005]; Kramer at [0010]. In addition, POSITA would be motivated to combine Sutherland with Kramer because (a) Sutherland and Kramer disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kramer's teachings with those of Sutherland. For similar reasons, POSITA would be motivated to combine Sutherland with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Sutherland with G.Sup49 for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Sutherland teaches waiting a random period of time to reduce the probability of a data collision. *See, e.g.*, Sutherland at [0025-26]. POSITA would have reason to modify Sutherland with G.Sup49 because it was the ITU recommendation on how to detect and mitigate rogue ONUs, and POSITA would understand that G.Sup49 offered alternative yet potentially advantageous ways of improving Sutherland. In addition, POSITA would be motivated to combine Sutherland with G.Sup49 because (a)

Sutherland and G.Sup49 disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the ’013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.Sup49’s teachings with those of Sutherland. For similar reasons, POSITA would be motivated to combine Sutherland with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Sutherland with Kida for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Sutherland teaches waiting a random period of time to reduce the probability of a data collision. *See, e.g.,* Sutherland at [0025-26]. POSITA would have been motivated to modify the method and/or device of Sutherland to implement the details of reducing data collisions in PONs taught by Kida because of the need for techniques to isolate and address malfunctions or faults in a network, as described in Sutherland. *See, e.g.*, Sutherland at [0005]; Kida at Abstract. In addition, POSITA would be motivated to combine Sutherland with Kida because (a) Sutherland and Kida disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the ’013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kida’s teachings with those of Sutherland. For similar reasons, POSITA would be motivated to combine Sutherland with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Sutherland with Haran for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate,

and/or prevent rogue ONU/ONTs and data collisions. For example, Sutherland teaches waiting a random period of time to reduce the probability of a data collision. *See, e.g.,* Sutherland at [0025-26]. POSITA would have been motivated to modify the method and/or device of Sutherland to implement the details of preventing collisions between uplink transmissions taught by Haran because of the need for techniques to isolate and address malfunctions or faults in a network, as described in Sutherland. *See, e.g.*, Sutherland at [0005]; Haran at 2:28-38. In addition, POSITA would be motivated to combine Sutherland with Haran because (a) Sutherland and Haran disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Haran's teachings with those of Sutherland. For similar reasons, POSITA would be motivated to combine Sutherland with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Sutherland with Davis for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Sutherland teaches waiting a random period of time to reduce the probability of a data collision. *See, e.g.,* Sutherland at [0025-26]. POSITA would have been motivated to modify the method and/or device of Sutherland to implement the details of avoiding collisions between response nodes taught by Davis because of the need for techniques to isolate and address malfunctions or faults in a network, as described in Sutherland. *See, e.g.*, Sutherland at [0005]; Davis at Abstract. In addition, POSITA would be motivated to combine Sutherland with Davis because (a) Sutherland and Davis disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field

of endeavor as the ’013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Davis’s teachings with those of Sutherland. For similar reasons, POSITA would be motivated to combine Sutherland with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Sutherland with G.987.3 for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Sutherland teaches waiting a random period of time to reduce the probability of a data collision. *See, e.g.*, Sutherland at [0025-26]. POSITA would have reason to modify Sutherland with G.987.3 because it was the ITU recommendation on the transmission convergence layer for passive optical network systems, and POSITA would understand that G.987.3 offered alternative yet potentially advantageous ways of improving Sutherland. In addition, POSITA would be motivated to combine Sutherland with G.987.3 because (a) Sutherland and G.987.3 disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the ’013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3’s teachings with those of Sutherland. For similar reasons, POSITA would be motivated to combine Sutherland with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

(2) Exemplary Hadjuczenia Solutions

POSITA would have been motivated to combine Hadjuczenia with Sutherland for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Hadjuczenia teaches comparing collision avoidance mechanisms in PONs. *See, e.g.*, Hajduczenia at Abstract. POSITA

would have been motivated to modify the method and/or device of Hadjuczenia to implement the details of reducing the probability of data collisions taught by Sutherland because of the need to identify the most efficient collision avoidance mechanisms, as described in Hadjuczenia. *See, e.g.,* Hadjuczenia at Abstract; Sutherland at [0026]. In addition, POSITA would be motivated to combine Hadjuczenia with Sutherland because (a) Hadjuczenia and Sutherland disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Sutherland's teachings with those of Hadjuczenia. For similar reasons, POSITA would be motivated to combine Hadjuczenia with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Hadjuczenia with Kramer for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Hadjuczenia teaches comparing collision avoidance mechanisms in PONs. *See, e.g.*, Hajduczenia at Abstract. POSITA would have been motivated to modify the method and/or device of Hadjuczenia to implement the details of reducing collisions in PONs taught by Kramer because of the need to identify the most efficient collision avoidance mechanisms, as described in Hadjuczenia. *See, e.g.,* Hadjuczenia at Abstract; Kramer at [0010]. In addition, POSITA would be motivated to combine Hadjuczenia with Kramer because (a) Hadjuczenia and Kramer disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating

Kramer's teachings with those of Hadjuczenia. For similar reasons, POSITA would be motivated to combine Hadjuczenia with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Hadjuczenia with G.Sup49 for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Hadjuczenia teaches comparing collision avoidance mechanisms in PONs. *See, e.g.*, Hajduczenia at Abstract. POSITA would have reason to modify Hadjuczenia with G.Sup49 because it was the ITU recommendation on how to detect and mitigate rogue ONUs, and POSITA would understand that G.Sup49 offered alternative yet potentially advantageous ways of improving Hadjuczenia. In addition, POSITA would be motivated to combine Hadjuczenia with G.Sup49 because (a) Hadjuczenia and G.Sup49 disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.Sup49's teachings with those of Hadjuczenia. For similar reasons, POSITA would be motivated to combine Hadjuczenia with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Hadjuczenia with Kida for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Hadjuczenia teaches comparing collision avoidance mechanisms in PONs. *See, e.g.*, Hajduczenia at Abstract. POSITA would have been motivated to modify the method and/or device of Hadjuczenia to implement the details of reducing data collisions in PONs taught by Kida because of the need to identify the most

efficient collision avoidance mechanisms, as described in Hadjuczenia. *See, e.g.,* Hadjuczenia at Abstract; Kida at Abstract. In addition, POSITA would be motivated to combine Hadjuczenia with Kida because (a) Hadjuczenia and Kida disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kida's teachings with those of Hadjuczenia. For similar reasons, POSITA would be motivated to combine Hadjuczenia with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Hadjuczenia with Haran for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Hadjuczenia teaches comparing collision avoidance mechanisms in PONs. *See, e.g.*, Hajduczenia at Abstract. POSITA would have been motivated to modify the method and/or device of Hadjuczenia to implement the details of preventing collisions between uplink transmissions taught by Haran because of the need to identify the most efficient collision avoidance mechanisms, as described in Hadjuczenia. *See, e.g.,* Hadjuczenia at Abstract; Haran at 2:28-38. In addition, POSITA would be motivated to combine Hadjuczenia with Haran because (a) Hadjuczenia and Haran disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Haran's teachings with those of Hadjuczenia. For similar reasons, POSITA would be motivated to combine Hadjuczenia with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Hadjuczenia with Davis for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Hadjuczenia teaches comparing collision avoidance mechanisms in PONs. *See, e.g.*, Hajduczenia at Abstract. POSITA would have been motivated to modify the method and/or device of Hadjuczenia to implement the details of avoiding collisions between response nodes taught by Davis because of the need to identify the most efficient collision avoidance mechanisms, as described in Hadjuczenia. *See, e.g.,* Hadjuczenia at Abstract; Davis at Abstract. In addition, POSITA would be motivated to combine Hadjuczenia with Davis because (a) Hadjuczenia and Davis disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Davis's teachings with those of Hadjuczenia. For similar reasons, POSITA would be motivated to combine Hadjuczenia with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Hadjuczenia with G.987.3 for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Hadjuczenia teaches comparing collision avoidance mechanisms in PONs. *See, e.g.*, Hajduczenia at Abstract. POSITA would have reason to modify Hadjuczenia with G.987.3 because it was the ITU recommendation on the transmission convergence layer for passive optical network systems, and POSITA would understand that G.987.3 offered alternative yet potentially advantageous ways of improving Hadjuczenia. In addition, POSITA would be motivated to combine Hadjuczenia with G.987.3

because (a) Hadjuczenia and G.987.3 disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the ’013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3’s teachings with those of Hadjuczenia. For similar reasons, POSITA would be motivated to combine Hadjuczenia with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

(3) Exemplary Kramer Solutions

POSITA would have been motivated to combine Kramer with Sutherland for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Kramer teaches avoiding data collision by allocating a transmission window (timeslot) to each ONU. *See, e.g.*, Kramer at [0010]. POSITA would have been motivated to modify the method and/or device of Kramer to implement the details of reducing the probability of data collisions] taught by Sutherland because of the need for a method and/or apparatus for discovering remote nodes and provide more efficient bandwidth utilization, as described in Kramer. *See, e.g.*, Kramer at [0013]; Sutherland at [0026]. In addition, POSITA would be motivated to combine Kramer with Sutherland because (a) Kramer and Sutherland disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the ’013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Sutherland’s teachings with those of Kramer. For similar reasons, POSITA would be motivated to combine Kramer with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Kramer with Hadjuczenia for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Kramer teaches avoiding data collision by allocating a transmission window (timeslot) to each ONU. *See, e.g.*, Kramer at [0010]. POSITA would have been motivated to modify the method and/or device of Kramer to implement the details of reducing data collisions in PONs taught by Hadjuczenia because of the need for a method and/or apparatus for discovering remote nodes and provide more efficient bandwidth utilization, as described in Kramer. *See, e.g.*, Kramer at [0013]; Hadjuczenia at Abstract. In addition, POSITA would be motivated to combine Kramer with Hadjuczenia because (a) Kramer and Hadjuczenia disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Hadjuczenia's teachings with those of Kramer. For similar reasons, POSITA would be motivated to combine Kramer with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Kramer with G.Sup49 for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Kramer teaches avoiding data collision by allocating a transmission window (timeslot) to each ONU. *See, e.g.*, Kramer at [0010]. POSITA would have reason to modify Kramer with G.Sup49 because it was the ITU recommendation on how to detect and mitigate rogue ONUs, and POSITA would understand that G.Sup49 offered alternative yet potentially advantageous ways of improving Kramer. In addition, POSITA would be motivated to combine Kramer with G.Sup49 because (a) Kramer and G.Sup49

disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the ’013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.Sup49’s teachings with those of Kramer. For similar reasons, POSITA would be motivated to combine Kramer with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Kramer with Kida for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Kramer teaches avoiding data collision by allocating a transmission window (timeslot) to each ONU. *See, e.g.*, Kramer at [0010]. POSITA would have been motivated to modify the method and/or device of Kramer to implement the details of reducing data collisions in PONs taught by Kida because of the need for a method and/or apparatus for discovering remote nodes and provide more efficient bandwidth utilization, as described in Kramer. *See, e.g.*, Kramer at [0013]; Kida at Abstract. In addition, POSITA would be motivated to combine Kramer with Kida because (a) Kramer and Kida disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the ’013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kida’s teachings with those of Kramer. For similar reasons, POSITA would be motivated to combine Kramer with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Kramer with Haran for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate,

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and/or prevent rogue ONU/ONTs and data collisions. For example, Kramer teaches avoiding data collision by allocating a transmission window (timeslot) to each ONU. *See, e.g.*, Kramer at [0010]. POSITA would have been motivated to modify the method and/or device of Kramer to implement the details of preventing collisions between uplink transmissions taught by Haran because of the need for a method and/or apparatus for discovering remote nodes and provide more efficient bandwidth utilization, as described in Kramer. *See, e.g.*, Kramer at [0013]; Haran at 2:28-38. In addition, POSITA would be motivated to combine Kramer with Haran because (a) Kramer and Haran disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Haran's teachings with those of Kramer. For similar reasons, POSITA would be motivated to combine Kramer with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Kramer with Davis for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Kramer teaches avoiding data collision by allocating a transmission window (timeslot) to each ONU. *See, e.g.*, Kramer at [0010]. POSITA would have been motivated to modify the method and/or device of Kramer to implement the details of avoiding collisions between response nodes taught by Davis because of the need for a method and/or apparatus for discovering remote nodes and provide more efficient bandwidth utilization, as described in Kramer. *See, e.g.*, Kramer at [0013]; Davis at Abstract. In addition, POSITA would be motivated to combine Kramer with Davis because (a) Kramer and Davis disclose similar products, methods, and solutions, and (b) both references are analogous art and in

the same field of endeavor as the ’013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Davis’s teachings with those of Kramer. For similar reasons, POSITA would be motivated to combine Kramer with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Kramer with G.987.3 for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Kramer teaches avoiding data collision by allocating a transmission window (timeslot) to each ONU. *See, e.g.*, Kramer at [0010]. POSITA would have reason to modify Kramer with G.987.3 because it was the ITU recommendation on the transmission convergence layer for passive optical network systems, and POSITA would understand that G.987.3 offered alternative yet potentially advantageous ways of improving Kramer. In addition, POSITA would be motivated to combine Kramer with G.987.3 because (a) Kramer and G.987.3 disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the ’013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3’s teachings with those of Kramer. For similar reasons, POSITA would be motivated to combine Kramer with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

(4) Exemplary G.Sup49 Solutions

POSITA would have been motivated to combine G.Sup49 with Sutherland for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, G.Sup49 was the ITU recommendation on how to detect and mitigate rogue ONUs. POSITA would have been

motivated to supplement the disclosures of G.Sup49 to implement the details of reducing the probability of data collisions taught by Sutherland to address the issue of rogue ONUs. *See, e.g.*, G.Sup49 at i. In addition, POSITA would be motivated to combine G.Sup49 with Sutherland because (a) G.Sup49 and Sutherland disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Sutherland's teachings with those of G.Sup49. For similar reasons, POSITA would be motivated to combine G.Sup49 with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine G.Sup49 with Hadjuczenia for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, G.Sup49 was the ITU recommendation on how to detect and mitigate rogue ONUs. POSITA would have been motivated to supplement the disclosures of G.Sup49 to implement the details of reducing data collisions in PONs taught by Hadjuczenia to address the issue of rogue ONUs. *See, e.g.*, G.Sup49 at i. In addition, POSITA would be motivated to combine G.Sup49 with Hadjuczenia because (a) G.Sup49 and Hadjuczenia disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Hadjuczenia's teachings with those of G.Sup49. For similar reasons, POSITA would be motivated to combine G.Sup49 with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

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POSITA would have been motivated to combine G.Sup49 with Kramer for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, G.Sup49 was the ITU recommendation on how to detect and mitigate rogue ONUs. POSITA would have been motivated to supplement the disclosures of G.Sup49 to implement the details of reducing data collisions in PONs taught by Kramer to address the issue of rogue ONUs. *See, e.g.*, G.Sup49 at i. In addition, POSITA would be motivated to combine G.Sup49 with Kramer because (a) G.Sup49 and Kramer disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kramer's teachings with those of G.Sup49. For similar reasons, POSITA would be motivated to combine G.Sup49 with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine G.Sup49 with Kida for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, G.Sup49 was the ITU recommendation on how to detect and mitigate rogue ONUs. POSITA would have been motivated to supplement the disclosures of G.Sup49 to implement the details of reducing data collisions in PONs taught by Kida to address the issue of rogue ONUs. *See, e.g.*, G.Sup49 at i. In addition, POSITA would be motivated to combine G.Sup49 with Kida because (a) G.Sup49 and Kida disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable

expectation of success in incorporating Kida's teachings with those of G.Sup49. For similar reasons, POSITA would be motivated to combine G.Sup49 with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine G.Sup49 with Haran for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, G.Sup49 was the ITU recommendation on how to detect and mitigate rogue ONUs. POSITA would have been motivated to supplement the disclosures of G.Sup49 to implement the details of preventing collisions between uplink transmissions taught by Haran to address the issue of rogue ONUs. *See, e.g.*, G.Sup49 at i. In addition, POSITA would be motivated to combine G.Sup49 with Haran because (a) G.Sup49 and Haran disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Haran's teachings with those of G.Sup49. For similar reasons, POSITA would be motivated to combine G.Sup49 with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine G.Sup49 with Davis for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, G.Sup49 was the ITU recommendation on how to detect and mitigate rogue ONUs. POSITA would have been motivated to supplement the disclosures of G.Sup49 to implement the details of avoiding collisions between response nodes taught by Davis to address the issue of rogue ONUs. *See, e.g.*, G.Sup49 at i. In addition, POSITA would be motivated to combine G.Sup49 with Davis because (a) G.Sup49 and

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Davis disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the ’013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Davis’s teachings with those of G.Sup49. For similar reasons, POSITA would be motivated to combine G.Sup49 with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

(5) Exemplary Kida Solutions

POSITA would have been motivated to combine Kida with Sutherland for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Kida teaches methods to specify and stop an ONU with abnormal transmission to prevent collisions. *See, e.g.*, Kida at [0013]. POSITA would have been motivated to modify the method and/or device of Kida to implement the details of reducing the probability of data collisions taught by Sutherland because of the need for mitigating ONUs with abnormal transmissions, as described in Kida. *See, e.g.*, Kida at [0013]; Sutherland at [0026]. In addition, POSITA would be motivated to combine Kida with Sutherland because (a) Kida and Sutherland disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the ’013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Sutherland’s teachings with those of Kida. For similar reasons, POSITA would be motivated to combine Kida with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Kida with Hadjuczenia for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Kida teaches methods to

specify and stop an ONU with abnormal transmission to prevent collisions. *See, e.g.*, Kida at [0013]. POSITA would have been motivated to modify the method and/or device of Kida to implement the details of reducing data collisions in PONs taught by Hadjuczenia because of the need for mitigating ONUs with abnormal transmissions, as described in Kida. *See, e.g.*, Kida at [0013]; Hadjuczenia at Abstract. In addition, POSITA would be motivated to combine Kida with Hadjuczenia because (a) Kida and Hadjuczenia disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Hadjuczenia's teachings with those of Kida. For similar reasons, POSITA would be motivated to combine Kida with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Kida with Kramer for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Kida teaches methods to specify and stop an ONU with abnormal transmission to prevent collisions. *See, e.g.*, Kida at [0013]. POSITA would have been motivated to modify the method and/or device of Kida to implement the details of reducing data collisions in PONs taught by Kramer because of the need for mitigating ONUs with abnormal transmissions, as described in Kida. *See, e.g.*, Kida at [0013]; Kramer at [0010]. In addition, POSITA would be motivated to combine Kida with Kramer because (a) Kida and Kramer disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kramer's teachings with those of Kida. For similar reasons,

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POSITA would be motivated to combine Kida with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Kida with G.Sup49 for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Kida teaches methods to specify and stop an ONU with abnormal transmission to prevent collisions. *See, e.g.*, Kida at [0013]. POSITA would have reason to modify Kida with G.Sup49 because it was the ITU recommendation on how to detect and mitigate rogue ONUs, and POSITA would understand that G.Sup49 offered alternative yet potentially advantageous ways of improving Kida. In addition, POSITA would be motivated to combine Kida with G.Sup49 because (a) Kida and G.Sup49 disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the ’013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.Sup49’s teachings with those of Kida. For similar reasons, POSITA would be motivated to combine Kida with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Kida with Haran for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Kida teaches methods to specify and stop an ONU with abnormal transmission to prevent collisions. *See, e.g.*, Kida at [0013]. POSITA would have been motivated to modify the method and/or device of Kida to implement the details of preventing collisions between uplink transmissions taught by Haran because of the need for mitigating ONUs with abnormal transmissions, as described in Kida. *See, e.g.*, Kida at [0013];

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Haran at 2:28-38. In addition, POSITA would be motivated to combine Kida with Haran because (a) Kida and Haran disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the ’013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Haran’s teachings with those of Kida. For similar reasons, POSITA would be motivated to combine Kida with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Kida with Davis for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Kida teaches methods to specify and stop an ONU with abnormal transmission to prevent collisions. *See, e.g.*, Kida at [0013]. POSITA would have been motivated to modify the method and/or device of Kida to implement the details of avoiding collisions between response nodes taught by Davis because of the need for mitigating ONUs with abnormal transmissions, as described in Kida. *See, e.g.*, Kida at [0013]; Davis at Abstract. In addition, POSITA would be motivated to combine Kida with Davis because (a) Kida and Davis disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the ’013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Davis’s teachings with those of Kida. For similar reasons, POSITA would be motivated to combine Kida with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Kida with G.987.3 for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate,

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and/or prevent rogue ONU/ONTs and data collisions. For example, Kida teaches methods to specify and stop an ONU with abnormal transmission to prevent collisions. *See, e.g.*, Kida at [0013]. POSITA would have reason to modify Kida with G.987.3 because it was the ITU recommendation on the transmission convergence layer for passive optical network systems, and POSITA would understand that G.987.3 offered alternative yet potentially advantageous ways of improving Kida. In addition, POSITA would be motivated to combine Kida with G.987.3 because (a) Kida and G.987.3 disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3's teachings with those of Kida. For similar reasons, POSITA would be motivated to combine Kida with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

(6) Exemplary Haran Solutions

POSITA would have been motivated to combine Haran with Sutherland for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Haran teaches using a time-division multiplexing (TDM) scheme to prevent collisions between uplink transmissions. *See, e.g.,* Haran at 2:28-38. POSITA would have been motivated to modify the method and/or device of Haran to implement the details of reducing the probability of data collisions taught by Sutherland because of the need for a flexible and efficient means of preventing collisions on a PON, as described in Haran. *See, e.g.*, Haran at 2:28-38; Sutherland at [0026]. In addition, POSITA would be motivated to combine Haran with Sutherland because (a) Haran and Sutherland disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue

ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Sutherland's teachings with those of Haran. For similar reasons, POSITA would be motivated to combine Haran with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Haran with Hadjuczenia for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Haran teaches using a time-division multiplexing (TDM) scheme to prevent collisions between uplink transmissions. *See, e.g.,* Haran at 2:28-38. POSITA would have been motivated to modify the method and/or device of Haran to implement the details of reducing data collisions in PONs taught by Hadjuczenia because of the need for a flexible and efficient means of preventing collisions on a PON, as described in Haran. *See, e.g.*, Haran at 2:28-38; Hadjuczenia at Abstract. In addition, POSITA would be motivated to combine Haran with Hadjuczenia because (a) Haran and Hadjuczenia disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Hadjuczenia's teachings with those of Haran. For similar reasons, POSITA would be motivated to combine Haran with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Haran with Kramer for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Haran teaches using a time-division multiplexing (TDM) scheme to prevent collisions between uplink transmissions. *See, e.g.,*

Haran at 2:28-38. POSITA would have been motivated to modify the method and/or device of Haran to implement the details of reducing data collisions in PONs taught by Kramer because of the need for a flexible and efficient means of preventing collisions on a PON, as described in Haran. *See, e.g.*, Haran at 2:28-38; Kramer at [0010]. In addition, POSITA would be motivated to combine Haran with Kramer because (a) Haran and Kramer disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kramer's teachings with those of Haran. For similar reasons, POSITA would be motivated to combine Haran with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Haran with G.Sup49 for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Haran teaches using a time-division multiplexing (TDM) scheme to prevent collisions between uplink transmissions. *See, e.g.*, Haran at 2:28-38. POSITA would have reason to modify Haran with G.Sup49 because it was the ITU recommendation on how to detect and mitigate rogue ONUs, and POSITA would understand that G.Sup49 offered alternative yet potentially advantageous ways of improving Haran. In addition, POSITA would be motivated to combine Haran with G.Sup49 because (a) Haran and G.Sup49 disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.Sup49's teachings with those of Haran. For similar

reasons, POSITA would be motivated to combine Haran with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Haran with Kida for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Haran teaches using a time-division multiplexing (TDM) scheme to prevent collisions between uplink transmissions. *See, e.g.,* Haran at 2:28-38. POSITA would have been motivated to modify the method and/or device of Haran to implement the details of reducing data collisions in PONs taught by Kida because of the need for a flexible and efficient means of preventing collisions on a PON, as described in Haran. *See, e.g.*, Haran at 2:28-38; Kida at Abstract. In addition, POSITA would be motivated to combine Haran with Kida because (a) Haran and Kida disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kida's teachings with those of Haran. For similar reasons, POSITA would be motivated to combine Haran with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Haran with Davis for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Haran teaches using a time-division multiplexing (TDM) scheme to prevent collisions between uplink transmissions. *See, e.g.,* Haran at 2:28-38. POSITA would have been motivated to modify the method and/or device of Haran to implement the details of avoiding collisions between response nodes taught by Davis because of the need for a flexible and efficient means of preventing collisions on a PON, as described in

Haran. *See, e.g.*, Davis at Abstract. Haran at 2:28-38; In addition, POSITA would be motivated to combine Haran with Davis because (a) Haran and Davis disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Davis's teachings with those of Haran. For similar reasons, POSITA would be motivated to combine Haran with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Haran with G.987.3 for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Haran teaches using a time-division multiplexing (TDM) scheme to prevent collisions between uplink transmissions. See, e.g., Haran at 2:28-38. POSITA would have reason to modify Haran with G.987.3 because it was the ITU recommendation on the transmission convergence layer for passive optical network systems, and POSITA would understand that G.987.3 offered alternative yet potentially advantageous ways of improving Haran. In addition, POSITA would be motivated to combine Haran with G.987.3 because (a) Haran and G.987.3 disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3's teachings with those of Haran. For similar reasons, POSITA would be motivated to combine Haran with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

(7) Exemplary Davis Solutions

POSITA would have been motivated to combine Davis with Sutherland for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate,

and/or prevent rogue ONU/ONTs and data collisions. For example, Davis teaches a system of controlling response messages from virtual nodes to avoid collisions between response messages from different nodes. *See, e.g.,* Davis at Abstract. POSITA would have been motivated to modify the method and/or device of Davis to implement the details of reducing the probability of data collisions taught by Sutherland because of the need for method and apparatus which reduces collision during the discovery process, as described in Davis. *See, e.g.*, Davis at 2:57-60; Sutherland at [0026]. In addition, POSITA would be motivated to combine Davis with Sutherland because (a) Davis and Sutherland disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Sutherland's teachings with those of Davis. For similar reasons, POSITA would be motivated to combine Davis with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Davis with Hadjuczenia for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Davis teaches a system of controlling response messages from virtual nodes to avoid collisions between response messages from different nodes. *See, e.g.,* Davis at Abstract. POSITA would have been motivated to modify the method and/or device of Davis to implement the details of reducing data collisions in PONs taught by Hadjuczenia because of the need for method and apparatus which reduces collision during the discovery process, as described in Davis. *See, e.g.*, Davis at 2:57-60; Hadjuczenia at Abstract. In addition, POSITA would be motivated to combine Davis with Hadjuczenia because (a) Davis and Hadjuczenia disclose similar products, methods, and solutions, and (b) both

references are analogous art and in the same field of endeavor as the ’013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Hadjuczenia’s teachings with those of Davis. For similar reasons, POSITA would be motivated to combine Davis with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Davis with Kramer for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Davis teaches a system of controlling response messages from virtual nodes to avoid collisions between response messages from different nodes. *See, e.g.,* Davis at Abstract. POSITA would have been motivated to modify the method and/or device of Davis to implement the details of reducing data collisions in PONs taught by Kramer because of the need for method and apparatus which reduces collision during the discovery process, as described in Davis. *See, e.g.*, Kramer at [0010]. Davis at 2:57-60; In addition, POSITA would be motivated to combine Davis with Kramer because (a) Davis and Kramer disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the ’013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kramer’s teachings with those of Davis. For similar reasons, POSITA would be motivated to combine Davis with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Davis with G.Sup49 for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Davis teaches a system of

controlling response messages from virtual nodes to avoid collisions between response messages from different nodes. *See, e.g.*, Davis at Abstract. POSITA would have reason to modify Davis with G.Sup49 because it was the ITU recommendation on how to detect and mitigate rogue ONUs, and POSITA would understand that G.Sup49 offered alternative yet potentially advantageous ways of improving Davis. In addition, POSITA would be motivated to combine Davis with G.Sup49 because (a) Davis and G.Sup49 disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.Sup49's teachings with those of Davis. For similar reasons, POSITA would be motivated to combine Davis with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Davis with Kida for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Davis teaches a system of controlling response messages from virtual nodes to avoid collisions between response messages from different nodes. *See, e.g.,* Davis at Abstract. POSITA would have been motivated to modify the method and/or device of Davis to implement the details of reducing data collisions in PONs taught by Kida because of the need for method and apparatus which reduces collision during the discovery process, as described in Davis. *See, e.g.*, Davis at 2:57-60; Kida at [0013]. In addition, POSITA would be motivated to combine Davis with Kida because (a) Davis and Kida disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in

incorporating Kida's teachings with those of Davis. For similar reasons, POSITA would be motivated to combine Davis with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Davis with Haran for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Davis teaches a system of controlling response messages from virtual nodes to avoid collisions between response messages from different nodes. *See, e.g.,* Davis at Abstract. POSITA would have been motivated to modify the method and/or device of Davis to implement the details of preventing collisions between uplink transmissions taught by Haran because of the need for method and apparatus which reduces collision during the discovery process, as described in Davis. *See, e.g.*, Davis at 2:57-60; Haran at 2:28-38. In addition, POSITA would be motivated to combine Davis with Haran because (a) Davis and Haran disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Haran's teachings with those of Davis. For similar reasons, POSITA would be motivated to combine Davis with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine Davis with G.987.3 for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, Davis teaches a system of controlling response messages from virtual nodes to avoid collisions between response messages from different nodes. *See, e.g.*, Davis at Abstract. POSITA would have reason to modify Davis

with G.987.3 because it was the ITU recommendation on the transmission convergence layer for passive optical network systems, and POSITA would understand that G.987.3 offered alternative yet potentially advantageous ways of improving Davis. In addition, POSITA would be motivated to combine Davis with G.987.3 because (a) Davis and G.987.3 disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3's teachings with those of Davis. For similar reasons, POSITA would be motivated to combine Davis with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

(8) Exemplary G.987.3 Solutions

POSITA would have been motivated to combine G.987.3 with Sutherland for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, G.987.3 was the ITU recommendation on the transmission convergence layer for passive optical network systems. POSITA would have been motivated to supplement the disclosures of G.987.3 to implement the details of reducing the probability of data collisions taught by Sutherland to provide the passive network systems with methods of detecting and mitigating rogue ONUs. *See, e.g.*, G.987.3 at 59. In addition, POSITA would be motivated to combine G.987.3 with Sutherland because (a) G.987.3 and Sutherland disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Sutherland's teachings with those of G.987.3.

For similar reasons, POSITA would be motivated to combine G.987.3 with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine G.987.3 with Hadjuczenia for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, G.987.3 was the ITU recommendation on the transmission convergence layer for passive optical network systems. POSITA would have been motivated to supplement the disclosures of G.987.3 to implement the details of reducing data collisions in PONs taught by Hadjuczenia to provide the passive network systems with methods of detecting and mitigating rogue ONUs. *See, e.g.*, G.987.3 at 59. In addition, POSITA would be motivated to combine G.987.3 with Hadjuczenia because (a) G.987.3 and Hadjuczenia disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the ’013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Hadjuczenia’s teachings with those of G.987.3. For similar reasons, POSITA would be motivated to combine G.987.3 with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine G.987.3 with Kramer for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, G.987.3 was the ITU recommendation on the transmission convergence layer for passive optical network systems. POSITA would have been motivated to supplement the disclosures of G.987.3 to implement the details of reducing data collisions in PONs taught by Kramer to provide the passive network systems with methods of detecting and mitigating rogue ONUs. *See, e.g.*, G.987.3 at 59. In

addition, POSITA would be motivated to combine G.987.3 with Kramer because (a) G.987.3 and Kramer disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kramer's teachings with those of G.987.3. For similar reasons, POSITA would be motivated to combine G.987.3 with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine G.987.3 with G.Sup49 for many reasons. While Defendants have referred to these standards separately throughout this cover pleading and the attached exhibits and appendices, they are part of the same body of standards. G.987.3 was the ITU recommendation on the transmission convergence layer for passive optical network systems, and G.Sup49 was the ITU recommendation on how to detect and mitigate rogue ONUs. POSITA would have been motivated to incorporate the methods of isolating, detecting, and/or mitigating rogue ONUs taught by G.Sup49 to address the issue of rogue ONUs in PONs. *See, e.g.*, G.Sup49 at i; G.987.3 at 59. In addition, POSITA would be motivated to combine G.987.3 with G.Sup49 because (a) G.Sup49 and G.987.3 disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.Sup49's teachings with those of G.987.3. For similar reasons, POSITA would be motivated to combine G.987.3 with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine G.987.3 with Kida for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate,

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and/or prevent rogue ONU/ONTs and data collisions. For example, G.987.3 was the ITU recommendation on the transmission convergence layer for passive optical network systems. POSITA would have been motivated to supplement the disclosures of G.987.3 to implement the details of reducing data collisions in PONs taught by Kida to provide the passive network systems with methods of detecting and mitigating rogue ONUs. *See, e.g.*, G.987.3 at 59. In addition, POSITA would be motivated to combine G.987.3 with Kida because (a) G.987.3 and Kida disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Kida's teachings with those of G.987.3. For similar reasons, POSITA would be motivated to combine G.987.3 with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine G.987.3 with Haran for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, G.987.3 was the ITU recommendation on the transmission convergence layer for passive optical network systems. POSITA would have been motivated to supplement the disclosures of G.987.3 to implement the details of preventing collisions between uplink transmissions taught by Haran to provide the passive network systems with methods of detecting and mitigating rogue ONUs. *See, e.g.*, G.987.3 at 59. In addition, POSITA would be motivated to combine G.987.3 with Haran because (a) G.987.3 and Haran disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a

reasonable expectation of success in incorporating Haran's teachings with those of G.987.3. For similar reasons, POSITA would be motivated to combine G.987.3 with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

POSITA would have been motivated to combine G.987.3 with Davis for many reasons. Both concern ONU and/or ONT collisions in a PON system and methods to eliminate, mitigate, and/or prevent rogue ONU/ONTs and data collisions. For example, G.987.3 was the ITU recommendation on the transmission convergence layer for passive optical network systems. POSITA would have been motivated to supplement the disclosures of G.987.3 to implement the details of avoiding collisions between response nodes taught by Davis to provide the passive network systems with methods of detecting and mitigating rogue ONUs. *See, e.g.*, G.987.3 at 59. In addition, POSITA would be motivated to combine G.987.3 with Davis because (a) G.987.3 and Davis disclose similar products, methods, and solutions, and (b) both references are analogous art and in the same field of endeavor as the '013 Patent; for example, both relate to the detection and/or mitigation of rogue ONUs in PONs. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Davis's teachings with those of G.987.3. For similar reasons, POSITA would be motivated to combine G.987.3 with other references in Exhibits D-1 to D-8 and Appendix D—Secondary with similar teachings.

d) The Claims Recite Well-Known Concepts That Would Have Been Obvious to Implement.

The Asserted Claims represent nothing more than an arrangement of well-known concepts and features and add nothing to the state of the art at the time of the alleged invention. For each of the concepts represented by the Asserted Claims, it would have been obvious to add to the teachings of any number of known products and references, including to the teachings of any of the primary references in Exhibits D-1 to D-8 and Appendix D to the extent that such reference is

alleged to be missing such concept or feature. The following are examples of concepts that would have been obvious, which is not intended to be an exhaustive list of the claimed features that would have been obvious. Defendants reserve the right to supplement these examples as necessary.

> (1) It would have been obvious to modify any primary reference to "detect the presence of a rogue ONU on the PON system." (Claim 1)

To the extent Iarnach contends that any reference charted in Exhibits D-1 to D-8 and Appendix D—Secondary does not disclose "detecting [the] presence of a rogue ONU on the PON system," it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits D-1 to D-8 and Appendix D—Secondary. POSITA would have known and been motivated to employ or implement detecting the presence of a rogue ONU on the PON system in order to isolate, mitigate, and resolve any problems such rogue ONU could cause. *See, e.g.*, Sutherland, Hadjuczenia, Kramer, G.Sup49, Kida, Haran, Davis, and/or G.987.3. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

> (2) It would have been obvious to modify any primary reference to "transmit[], based on the detection, a first message addressing only a subset of all ONUs on the PON system." (Claim 1)

To the extent Iarnach contends that any reference charted in Exhibits D-1 to D-8 and Appendix D—Secondary does not disclose "transmitting, based on the detection, a first message addressing only a subset of all ONUs on the PON system," it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits D-1 to D-8 and Appendix D—Secondary. POSITA would have known and been motivated to employ or implement a first message addressing only a subset of the ONUs on the PON system, as one obvious message in response to rogue ONU detection would be to message rogue ONUs, including those that have not

yet been discovered or are not identifiable. *See, e.g.*, Sutherland, Hadjuczenia, Kramer, G.Sup49, Kida, Haran, Davis, and/or G.987.3. Such a feature was known to be used to isolate and mitigate the behavior of rogue ONUs in the PON. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(3) It would have been obvious to modify any primary reference for "probabilistically splitting in time discovery phases of ONUs in the first group of ONUs." (Claim 1)

To the extent Iarnach contends that any reference charted in Exhibits D-1 to D-8 and Appendix D—Secondary does not disclose "probabilistically splitting in time discovery phases of ONUs in the first group of ONUs," it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits D-1 to D-8 and Appendix D—Secondary. POSITA would have known and been motivated to employ or implement a probabilistic splitting method on the multiple rogue ONUs that have not yet been discovered. *See, e.g.*, Sutherland, Hadjuczenia, Kramer, G.Sup49, Kida, Haran, Davis, and/or G.987.3. Indeed, commonly known prior art methods to resolve ONU collisions involved random delays for ONU transmissions, providing a probability *p* to control whether an ONU would transmit information, and/or binary exponential backoff procedures, including those from IEEE 802.3. Thus, it was commonly known these features were used to isolate and mitigate the behavior of rogue ONUs in the PON. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(4) It would have been obvious to modify any primary reference for "applying a second message that includes semantics

> for enabling, with random independent delays, ONUs in the second group that are already in the Emergency Stop state." (Claim 2)

To the extent Iarnach contends that any reference charted in Exhibits D-1 to D-8 and Appendix D—Secondary does not disclose "applying a second message that includes semantics for enabling, with random independent delays, ONUs in the second group that are already in the Emergency Stop state," it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits D-1 to D-8 and Appendix D—Secondary. POSITA would have known and been motivated to employ or implement enabling, with random delays, ONUs in the Emergency Stop state, and provide semantics for doing so, as opposed to leaving them disabled indefinitely. *See, e.g.*, Sutherland, Hadjuczenia, Kramer, G.Sup49, Kida, Haran, Davis, and/or G.987.3. Random delays were well known methods to avoid collisions, and it was also known to disable rogue ONUs to prevent continued disruption. Such a feature was known to be used to isolate and mitigate the behavior of rogue ONUs in the PON. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

> (5) It would have been obvious to modify any primary reference for "applying a second message that includes semantics for enabling, independent of each other and with a probability p, ONUs in the second group that are already in the Emergency Stop state, where p is a rational number between 0 and 1." (Claim 3)

To the extent Iarnach contends that any reference charted in Exhibits D-1 to D-8 and Appendix D—Secondary does not disclose "applying a second message that includes semantics for enabling, independent of each other and with a probability p, ONUs in the second group that are already in the Emergency Stop state, where p is a rational number between 0 and 1," it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits D-1 to D-8 and Appendix D—Secondary. As noted above, POSITA would have known

and been motivated to employ or implement enabling based on a probability ONUs that are in the Emergency Stop state, including independent of each other, because the use of such probabilities were common in the art. *See, e.g.*, Sutherland, Hadjuczenia, Kramer, G.Sup49, Kida, Haran, Davis, and/or G.987.3. Such a feature was known to be used to isolate and mitigate the behavior of rogue ONUs in the PON. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(6) It would have been obvious to modify any primary reference for bit indication flags (Claim 11)

To the extent Iarnach contends that any reference charted in Exhibits D-1 to D-8 and Appendix D—Secondary does not disclose a "first message [that] includes bit indication flags in designated positions of overhead fields," it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits D-1 to D-8 and Appendix D—Secondary. POSITA would have known and been motivated to employ or implement bit indication flags, which are common programming techniques to represent multiple Boolean values or multiple states into a single integer. *See, e.g.*, Sutherland, Hadjuczenia, Kramer, G.Sup49, Kida, Haran, Davis, and/or G.987.3. In fact, the '013 Patent itself does not describe bit indication flags, presumably because POSITA already knew what they were. Such a feature was known to be used to for communication between an OLT and ONUs in a PON. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(7) It would have been obvious to modify any primary reference for a first message with "semantics for transition [sic] a first ONU in an Emergency Stop state in which the ONU is to turn

off transmitter [sic] and is allowed to transmit again only after an explicit permission from the OLT" (Claim 13)

To the extent Iarnach contends that any reference charted in Exhibits D-1 to D-8 and Appendix D—Secondary does not disclose a first message with "semantics for transition [sic] a first ONU in an Emergency Stop state in which the ONU is to turn off transmitter [sic] and is allowed to transmit again only after an explicit permission from the OLT," it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits D-1 to D-8 and Appendix D—Secondary. POSITA would have known and been motivated to employ or implement enabling ONUs in the Emergency Stop state and provide semantics for doing so, as opposed to leaving them disabled indefinitely. *See, e.g.*, Sutherland, Hadjuczenia, Kramer, G.Sup49, Kida, Haran, Davis, and/or G.987.3. It was also known to disable rogue ONUs to prevent continued disruption. Such a feature was known to be used to isolate and mitigate the behavior of rogue ONUs in the PON. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(8) It would have been obvious to modify any primary reference for a "first message [to] include a broadcast disable message including ONU serial number parameters for the subset of all ONUs." (Claim 14)

To the extent Iarnach contends that any reference charted in Exhibits D-1 to D-8 and Appendix D—Secondary does not disclose a "first message [that] include[s] a broadcast disable message including ONU serial number parameters for the subset of all ONUs," it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits D-1 to D-8 and Appendix D—Secondary. POSITA would have known to disable Rogue ONUs, including doing so via broadcast disable messages that identified ONUs by serial number. *See, e.g.*, Sutherland, Hadjuczenia, Kramer, G.Sup49, Kida, Haran, Davis, and/or G.987.3. Such a

feature was known to be used to isolate and mitigate the behavior of rogue ONUs in the PON. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle. Additional Reasons to Combine.

In addition to the information contained elsewhere in these invalidity contentions, including in Exhibits D-1 to D-8 and Appendix D—Secondary, Defendants have identified additional motivations and reasons to combine the various references. Defendants note that in *KSR Int'l Co. v. Teleflex Inc.*, the Supreme Court held that "[i]n determining whether the subject matter of a patent claim is obvious, neither the particular motivation nor the avowed purpose of the patentee controls. What matters is the objective reach of the claim. If the claim extends to what is obvious, it is invalid under § 103." 127 S. Ct. 1727, 1742 (2007).

KSR further illustrated several ways in which the subject matter of a patent claim may be shown to have been obvious. For instance, "[o]ne of the ways in which a patent's subject matter can be proved obvious is by noting that there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent's claims." *KSR*, 127 S. Ct. at 1742. The Supreme Court held that it was error to "look only to the problem the patentee was trying to solve." *Id*. As the Court explained, "[t]he question is not whether the combination was obvious to the patentee but whether the combination was obvious to a person with ordinary skill in the art. Under the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed." *Id*. Further, "[c]ommon sense teaches … that familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle." *Id.* Further, a showing that a

combination of elements was "obvious to try" may demonstrate that it was obvious under § 103. *Id.* For instance, the Supreme Court held that "predictable solutions" using a combination of "known options" may render the subject matter of a patent claim obvious. *Id.*

When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product was not of innovation but of ordinary skill and common sense. *Id.* The ways in which the subject matter of a patent claim may be shown to be obvious, identified by *KSR*, are merely illustrative. A core thrust of *KSR* was that "[r]igid preventative rules that deny factfinders recourse to common sense are neither necessary under our case law nor consistent with it." *KSR*, 127 S. Ct. at 1742-43 (quoting *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1367 (Fed. Cir. 2006) ("Our suggestion test is in actuality quite flexible and not only permits, but requires, consideration of common knowledge and common sense"), and *Alza Corp. v. Mylan Labs., Inc.*, 464 F.3d 1286, 1291 (Fed. Cir. 2006) ("There is flexibility in our obviousness jurisprudence because a motivation may be found *implicitly* in the prior art. We do not have a rigid test that requires an actual teaching to combine ...").

Although Defendants note that there is no longer a rigid requirement regarding motivation to combine under *KSR*, Defendants provide the following statements regarding motivation to combine. Multiple teachings, suggestions, and/or reasons to modify any of the references and/or to combine any two or more of the references in Exhibits D-1 to D-8 and Appendix D—Secondary come from many sources, including the prior art (specific and as a whole), common knowledge, common sense, predictability, expectations, industry trends, design incentives or need, market demands or pressure, market forces, obvious to try, the nature of the problem faced, and/or

knowledge possessed by one of ordinary skill. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field of endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one.

The combination of prior art references identified in these contentions would have been obvious because the combination represents the known potential options with a reasonable expectation of success. Additionally, one of ordinary skill in the art would have been motivated to create combinations identified in these contentions using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or teaching, suggestion, or motivation in the prior art generally. Also, market forces in the industry, and the desire to improve features and performance, would motivate the addition of features to systems as they became available, became less expensive, became more commonly used, provided better performance, reduced costs, size or weight, or predictably achieved other desirable results.

C. Other Grounds for Invalidity

Defendants identify the following additional grounds for invalidity of the Asserted Claims of the ’013 Patent. Defendants reserve the right to supplement these disclosures based on further investigation and discovery.

1. Invalidity of the ’013 Patent Based on 35 U.S.C. § 112, ¶ 1 (Enablement and Written Description)

Based on Defendants’ present understanding of Iarnach’s asserted scope of the claims of the ’013 Patent, to the extent such positions can be understood from Iarnach’s Preliminary Infringement Contentions, the Asserted Claims of the ’013 Patent are invalid for reciting at least

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the following claim terms, phrases, or limitations that lack enablement or sufficient written description:

- "probabilistically splitting in time discovery phases of ONUs in the first group of ONUs" ('013 Patent, claim 1)

These claim terms, phrases, and limitations, as apparently construed by Iarnach, fail to satisfy the enablement and/or written description requirements of 35 U.S.C. § 112. This is at least because the specifications of the '013 Patent demonstrate that the patentee neither conceived of nor demonstrated possession of all that Iarnach now contends the claims cover. In addition, based on Defendant's present understanding of Iarnach's Preliminary Infringement Contentions, each of the Asserted Claims of the '013 Patent in which these claim terms, phrases, and limitations appear is invalid because the specification fails to provide sufficient disclosure to enable a person of ordinary skill in the art to which the alleged invention pertains, or with which it is most nearly connected, to implement the alleged invention without undue experimentation.

2. Invalidity of the '013 Patent Based on 35 U.S.C. § 112, ¶ 2 (Indefiniteness)

Based on the Defendants' present understanding of Iarnach's asserted scope of the claims of the '013 Patent, to the extent such positions can be understood from Iarnach's Preliminary Infringement Contentions, the Defendants assert that the Asserted Claims of the '013 Patent are invalid for reciting at least the following indefinite claim terms, phrases, or limitations:

- "first group of ONUs that have not yet being discovered and a second group of ONUs that are not identifiable" ('013 patent, claim 1)

These claim terms, phrases, and limitations, as apparently construed by Iarnach, violate the definiteness requirements of 35 U.S.C. § 112.

Based on Defendants' present understanding of Iarnach's Preliminary Infringement Contentions, these claim terms, phrases, and limitations are indefinite because they are inconsistent

with and broader than the alleged invention disclosed in the specification and during prosecution. And given Iarnach's apparent constructions of the claim terms, phrases, and limitations, POSITA at the time of the invention would not have understood what is claimed with reasonable certainty, even when the claims are read in light of the specification and prosecution history.

3. Additional Grounds for Invalidity of the '013 Patent

In addition to the preceding invalidity contentions, Defendants reserve the right to assert that the Asserted Claims are invalid under 35 U.S.C. § 102(f) and/or § 102(g) in the event that Defendants obtain evidence that the named inventor of the '013 Patent did not invent (either alone or in conjunction with other parties) the subject matter claimed in the '013 Patent. Should Defendants obtain such evidence, Defendants will provide the name of the person(s) from whom and the circumstances under which the invention or any part of it was derived, and/or the circumstances surrounding the making of the invention before the patent application.

4. Collateral Estoppel

In the event the PTAB or any other judicial body issues an applicable decision or ruling such as, but not limited to, a ruling in Inter Partes Review, Iarnach is estopped from asserting the claims of the '013 Patent in view of such decisions or rulings.

Defendants reserve the right to supplement these disclosures based on further investigation and discovery.

5. Secondary Considerations

There are no objective indicia of non-obviousness evidencing the validity of any of the Asserted Claims. If Iarnach identifies any alleged objective indicia of non-obviousness or secondary considerations supporting the validity of any Asserted Claims, Defendants reserve the right to supplement these contentions to respond to any such evidence. Further, to the extent any

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products allegedly practicing the claims have been successful, there is no nexus between the claimed inventions and the products' alleged success.

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VII. THE ’892 PATENT IS INVALID.

A. Identification of Prior Art

Defendants contend that the prior art references described and charted in Exhibits E1 – E9 and E1 Secondary anticipate and/or render obvious, alone or in combination, one or more of the Asserted Claims of the ’892 Patent.

B. The Asserted Claims Are Anticipated and/or Rendered Obvious.

Iarnach asserts claims 1, 2, 3, and 5 of the ’892 Patent against the Defendants in this lawsuit. These claims are invalid because the ’892 Patent fails to meet one or more of the requirements for patentability. The individual bases for invalidity are provided below and in Exhibits E1 – E9 and E1 Secondary. Each of the prior art references, the underlying work, and/or the underlying apparatus or method qualifies as prior art under one or more sections of 35 U.S.C. §§ 102 and/or 103.

In an effort to focus the issues, the Defendants have cited representative portions of identified references, even where a reference may contain additional disclosures or support for a particular claim element. Each and every disclosure of the same limitation in the same reference is not necessarily identified. In addition, POSITA generally read a prior art reference as a whole and in the context of other publications and literature and in the context of their knowledge as persons of ordinary skill in the art. Thus, to understand and interpret any specific statement or disclosure within a prior art reference, such persons would rely on other information within the reference, along with other publications and their general scientific knowledge and experience in the field. Thus, each prior art reference identified herein should be understood in the context of the reference itself, in conjunction with anything incorporated by reference or described as relevant technology by the reference, any documents that are referred to for further understanding by the reference, any system embodying the reference, and any testimony by those with knowledge of

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the reference, such as the named authors and inventors. The Defendants may rely on uncited portions of the prior art references and on other publications and expert testimony to provide context, and as aids to understanding and interpreting the portions that are cited. The Defendants may also rely on uncited portions of the prior art references, other disclosed publications, and the testimony of experts to establish that a person of ordinary skill in the art would have been motivated to modify or combine certain of the cited references so as to render the claims obvious.

1. The '892 Patent Priority Date.

Iarnach's Preliminary Infringement Contentions allege that the Asserted Claims of the '892 Patent are entitled at least to the priority date July 13, 2012. To the extent Iarnach alleges that any prior art relied on in these invalidity contentions does not qualify as prior art to an Asserted Patent, Defendants reserve the right to rebut those allegations (*e.g.*, by demonstrating an earlier relevant date for the challenged prior art and/or a later priority date for the Asserted Patent and/or Asserted Claim).

2. The '892 Patent Is Anticipated and/or Rendered Obvious by the Prior Art.

Some or all of the Asserted Claims of the '892 Patent are invalid as anticipated and/or rendered obvious under 35 U.S.C. §§ 102 and/or 103 in view of each of the primary prior art references identified in the claim charts included in Exhibits E1-E9, which identify specific examples of where each limitation of the Asserted Claims is found in the prior art references. As explained above, the cited portions of prior art references identified in the attached claim charts are exemplary in nature and representative of the content and teaching of the prior art references, and should be understood in the context of the reference as a whole and as they would be understood by a person of ordinary skill in the art.

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Defendants identify the following references as anticipating and/or rendering obvious one or more of the Asserted Claims of the '892 Patent under 35 U.S.C. §§ 102 and/or 103. The table of anticipating and/or rending obvious references below is exemplary, and it does not constitute an admission that any reference not listed below does not also anticipate and/or render obvious the claims of the '892 Patent. Further, Defendants contend that any prior art reference in the attached charts that is charted for each limitation of any given claim, anticipates that claim, regardless of whether that prior art reference is listed in the following table.

Exhibit	**Primary Prior Art**	**Date**[9]
E-1	"Optically Power Fiber Networks" by M. Röger et al. ("Röger")	As early as December 17, 2008
E-2	"COMMUNICATION SYSTEM, CENTRAL SIDE OPTICAL LINE TERMINAL, USER SIDE OPTICAL NETWORK UNIT, CONTROL DEVICE, AND COMMUNICATION METHOD" JP 2011-223631 ("Mukai 631")	As early as April 13, 2010 and no later than November 4, 2011.
E-3	G.987.3 ("G.987.3")	As early as October 7, 2010 and no later than October 3, 2011
E-4	U.S. Pat. No. 9,084,034 ("Zhang '034")	As early as September 17, 2010 and no later than March 9, 2011
E-5	WO2013/014483A1 ("Ghazidaidi '483")	As early as July 27, 2011
E-6	U.S. Pat. No. 8,873,958 ("Zhang 958")	As early as September 27, 2011

[9] Defendants reserve the right to identify additional bases for qualification as prior art for each of the identified references in the event that it is determined that the Asserted Patents are not entitled to the claimed priority date.

Exhibit	Primary Prior Art	Date[9]
E-7	EP 2333989 ("Schmuck 989")	As early as December 11, 2009 and no later than June 15, 2011
E-8	U.S. Pat. Pub. No. 2012/0166819 ("Skubic")	December 22, 2010
E-9	U.S. Pat. Pub. No. No. 2014/0193150 ("Mukai 150")	As early as Feb. 25, 2011

To the extent any item of prior art cited above is deemed not to disclose and/or render obvious, explicitly or inherently, any limitation of an Asserted Claim of the '892 Patent, Defendants reserve the right to argue that any difference between that prior art and the corresponding patent claim would have been either inherent in the art or obvious to a person of ordinary skill in the art, even if Defendants have not specifically denoted that the art is to be combined with the knowledge of a person of ordinary skill in the art.

3. The '892 Patent Is Obvious Over the Prior Art.

To the extent Iarnach argues that any limitation of the Asserted Claims of the '892 Patent are not explicitly disclosed and/or rendered obvious by an item of prior art identified above and in Exhibits E1 – E9 and E1 Secondary, any purported differences are such that the claimed subject matter as a whole would have been obvious to one skilled in the art at the time of the alleged invention, in view of the state of the art and knowledge of those skilled in the art. The item of prior art would, therefore, render such claims invalid as obvious under 35 U.S.C. § 103.

a) The Claims Are Obvious Over the Primary References in Light of One or More Secondary References.

To the extent the foregoing references are found not to anticipate and/or render obvious the Asserted Claims of the '892 Patent, the foregoing references render the Asserted Claims obvious,

either alone or in combination with one or more of the other references identified above. One of ordinary skill in the art would have been motivated to combine the various references cited above and herein so as to disclose each and every limitation of the Asserted Claims of the ’892 Patent.

Prior art references rendering the Asserted Claims of the ’892 Patent obvious, either alone or in combination with other references in Exhibits E1 – E9 and E1 Secondary, are provided in the tables above and below and in Exhibits E1 – E9 and E1 Secondary. The prior art identified in Exhibits E1 - E9 render one or more asserted claims of the ’892 Patent obvious when the references are read in combination with one or more of each other, when read in combination with any of the prior art identified in Exhibit E Secondary, and/or when read in view of the state of the art and knowledge of those skilled in the art.

Exhibit E Secondary References	**Date**
G.988 (2010) (“G.988”)	As early as Oct. 7, 2010 and no later than September 22, 2011
“Low-energy demarcation device for monitoring FTTx networks” by Moritz Roger, Matthias Hoh, Joerg Hehmann, Thomas Pfeiffer, Michael Huebner, Juergen Becker, Juerg Leuthold, Wolfgang Freude, Published in 2009 ITG Symposium on Photonic Networks by VDE, published to IEEE Xplore. (“Roger FTTx”)	As early as May 4, 2009 and no later than June 1, 2011.
“An Optically Powered Fibre Network for Heterogeneous Subscribers” by Wolfgang Freude, Moritz Roger, Michael Dreschmann, Michael Huebner, Andreas W. Bett, Juergen Becker, published by IEEE, ICTON 2009, published to IEEE Xplore. (“Freude”)	As early as June 28, 2009 and no later than July 31, 2009.

Exhibit E Secondary References	Date
U.S. Pat. No. 7,130,668 to Chang et al. ("Chang 668")	As early as December 23, 2003 and no later than Oct. 31, 2006.
U.S. Pat. Pub. No. 2010/0007521 to Cornwall. ("Cornwall")	As early as September 11, 2006 and no later than September 21, 2009.
U.S. Pat. Pub. No. 2012/0045210 to Kim ("Kim 210")	As early as August 18, 2011
U.S. Pat. Pub. No. 2009/0201840 to Pfeiffer et. al. ("Pfeiffer")	As early as December 9, 2008
U.S. Pat. No. 7,756,972 to Ma ("Ma)	As early as December 6, 2005.
U.S. Pat. Pub. No. 2013/0170826 to Cvijetic et. al. ("Cvijetic")	As early as October 3, 2012.

To the extent Iarnach argues that any Asserted Claim of the '892 Patent is not disclosed or rendered obvious by any Exhibits E1 – E9 and E1 Secondary reference, the Asserted Claims nevertheless would have been obvious in light of one or more other Exhibits E1 – E9 and E1 Secondary references and/or one or more references identified and charted in Exhibits E1 – E9 and E1 Secondary and in view of the knowledge, experience, and understanding of persons of ordinary skill in the art.

Each and every reference identified is also relevant to the state of the art at the time of the alleged invention. Any of the references disclosed above may be combined with another to render obvious (and therefore invalid) each of Iarnach's Asserted Claims. Defendants may rely on a subset of (or all of) the above-identified references, including all references in Exhibits E1 – E9 and E1 Secondary, for purposes of obviousness in view of the Court's claim construction, positions taken by Iarnach during this litigation, and further investigation and discovery.

b) Exemplary Combinations of the Prior Art.

The table below provides an identification of exemplary combinations of prior art references that, based on Defendants' present understanding of Iarnach's Preliminary Infringement Contentions and apparent reading of the Asserted Claims, render obvious one or more of the Asserted Claims of the '892 Patent. The combinations of references identified below are non-exhaustive, and additional examples are apparent from other combinations of references addressed in Exhibits E1 – E9 and E Secondary. Defendants expressly note that, although certain references charted in Exhibits E1 – E9 are listed variously in the left or right column below, Defendants do not thereby imply any restriction as to which Exhibits E1 – E9 reference is primary and which Exhibits E1 – E9 reference is secondary in such a combination. Defendants reserve the right to rely on either identified reference in the identified combinations as a primary and/or secondary reference.

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Reference	Combination References
Röger	Mukai 631, G.987.3, Zhang ’034, Ghazidaidi ’483, Zhang 958, Schmuck 989, Skubic, G.988, Roger FTTx, Freude, Chang 668, Cornwall, Kim 210, Pfeiffer, Ma, and/or Cvijetic
Mukai 631	Röger, G.987.3, Zhang ’034, Ghazidaidi ’483, Zhang 958, Schmuck 989, Skubic, G.988, Roger FTTx, Freude, Chang 668, Cornwall, Kim 210, Pfeiffer, Ma, and/or Cvijetic
G.987.3	Röger, Mukai 631, Zhang ’034, Ghazidaidi ’483, Zhang 958, Schmuck 989, Skubic, G.988, Roger FTTx, Freude, Chang 668, Cornwall, Kim 210, Pfeiffer, Ma, and/or Cvijetic
Zhang ’034	Röger, Mukai 631, G.987.3, Ghazidaidi ’483, Zhang 958, Schmuck 989, Skubic, G.988, Roger FTTx, Freude, Chang 668, Cornwall, Kim 210, Pfeiffer, Ma, and/or Cvijetic
Ghazidaidi ’483	Röger, Mukai 631, G.987.3, Zhang ’034, Zhang 958, Schmuck 989, Skubic, G.988, Roger FTTx, Freude, Chang 668, Cornwall, Kim 210, Pfeiffer, Ma, and/or Cvijetic
Zhang 958	Röger, Mukai 631, G.987.3, Zhang ’034, Ghazidaidi ’483, Schmuck 989, Skubic, G.988, Roger FTTx, Freude, Chang 668, Cornwall, Kim 210, Pfeiffer, Ma, and/or Cvijetic
Schmuck 989	Röger, Mukai 631, G.987.3, Zhang ’034, Ghazidaidi ’483, Zhang 958, Skubic, G.988, Roger FTTx, Freude, Chang 668, Cornwall, Kim 210, Pfeiffer, Ma, and/or Cvijetic
Skubic	Röger, Mukai 631, G.987.3, Zhang ’034, Ghazidaidi ’483, Zhang 958, Schmuck 989, G.988, Roger FTTx, Freude, Chang 668, Cornwall, Kim 210, Pfeiffer, Ma, and/or Cvijetic

It would have been obvious to combine these references for reasons that are readily apparent to one of ordinary skill in the art, and for reasons explained herein.

c) Prior Art Solutions

In addition to the exemplary combinations provided above, to the extent Iarnach alleges the references in Exhibits E1 – E9 and E Secondary do not disclose any particular limitation of the Asserted Claims of the '892 Patent, either expressly or inherently, it would have been obvious to a person of ordinary skill in the art as of the alleged invention date of the '892 Patent to modify the references in Exhibits E1 – E9 and E Secondary and/or combine the teachings of the references in Exhibits E1 – E9 and E Secondary with the other prior art references in Exhibits E1 – E9 and E1 Secondary in a manner that would have rendered the Asserted Claims invalid as obvious. The Defendants provide examples of such combinations below. The exemplary combinations below are non-exhaustive, and the Defendants reserve the right to rely on additional combinations as may be apparent from the prior art references in Exhibits E1 – E9 and E Secondary. These obviousness combinations should not be construed to suggest that any reference included in any combination is not anticipatory in its own right.

(1) Exemplary Röger Solutions

A person of ordinary skill in the art would be motivated to combine Röger with Mukai 631 for many reasons. For example, Röger describes power management of ONUs in a PON. *See, e.g.*, Röger at 21822-21828. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Röger to implement the details of ONU power management taught by Mukai 631 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Röger with Mukai 631 because (a) Röger and Mukai 631 disclose similar methods and solutions; and (b) both patents/publications are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover,

a POSITA would have had a reasonable expectation of success in incorporating Mukai 631's teachings with those of Röger. For similar reasons, a person of ordinary skill in the art would be motivated to combine Röger with other references in E3 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Röger with G.987.3 for many reasons. For example, Röger describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Röger to implement the details of ONU power management taught by G.987.3 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. G.987.3 at Section 16. In addition, a person of ordinary skill in the art would be motivated to combine Röger with G.987.3 because (a) Röger and G.987.3 disclose similar methods and solutions; and (b) both publications are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3's teachings with those of Röger. For similar reasons, a person of ordinary skill in the art would be motivated to combine Röger with other references in E2 – E9 and E Secondary with similar teachings. For example, G.988, like G.987.3, is part of the XG-PON standard and a POSITA looking to G.987.3 would also look to G.988 as it is part of the same XG-PON standard.

A person of ordinary skill in the art would be motivated to combine Röger with Zhang '034 for many reasons. For example, Röger describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Röger to implement the details of ONU power management taught by Zhang '034 because, it is

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also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Röger with Zhang '034 because (a) Röger and Zhang '034 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Zhang '034's teachings with those of Röger. For similar reasons, a person of ordinary skill in the art would be motivated to combine Röger with other references in E2 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Röger with Ghazidaidi '483 for many reasons. For example, Röger describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Röger to implement the details of ONU power management taught by Ghazidaidi '483 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Röger with Ghazidaidi '483 because (a) Röger and Ghazidaidi '483 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ghazidaidi '483's teachings with those of Röger. For similar reasons, a person of ordinary skill in the art would be motivated to combine Röger with other references in E2 – E9 and E Secondary with similar teachings.

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A person of ordinary skill in the art would be motivated to combine Röger with Zhang 958 for many reasons. For example, Röger describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Röger to implement the details of ONU power management taught by Zhang 958 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Röger and Zhang 958 because (a) Röger and Zhang 958 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Zhang 958's teachings with those of Röger. For similar reasons, a person of ordinary skill in the art would be motivated to combine Röger with other references in E2 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Röger with Schmuck 989 for many reasons. For example, Röger describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Röger to implement the details of ONU power management taught by Schmuck 989 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Röger and Schmuck 989 because (a) Röger and Schmuck 989 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA

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would have had a reasonable expectation of success in incorporating Schmuck 989's teachings with those of Röger. For similar reasons, a person of ordinary skill in the art would be motivated to combine Röger with other references in E2 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Röger with Skubic for many reasons. For example, Röger describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Röger to implement the details of ONU power management taught by Skubic because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Röger and Skubic because (a) Röger and Skubic disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Skubic's teachings with those of Röger. For similar reasons, a person of ordinary skill in the art would be motivated to combine Röger with other references in E2 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Röger with Mukai 150 for many reasons. For example, Röger describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Röger to implement the details of ONU power management taught by Mukai 150 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Röger and Mukai 150

because (a) Röger and Mukai 150 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Mukai 150's teachings with those of Röger. For similar reasons, a person of ordinary skill in the art would be motivated to combine Röger with other references in E2 – E9 and E Secondary with similar teachings.

(2) Exemplary Mukai 631 Solutions

A person of ordinary skill in the art would be motivated to combine Mukai 631 with Röger for many reasons. For example, Mukai 631 describes power management of ONUs in a PON. *See, e.g.*, Mukai 631 at abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Mukai 631 to implement the details of ONU power management taught by Röger because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Mukai 631 with Röger because (a) Mukai 631 and Röger disclose similar methods and solutions; and (b) both patents/publications are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Mukai 631's teachings with those of Röger. For similar reasons, a person of ordinary skill in the art would be motivated to combine Mukai 631 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Mukai 631 with G.987.3 for many reasons. For example, Mukai 631 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method

and/or device of Mukai 631 to implement the details of ONU power management taught by G.987.3 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. G.987.3 at Section 16. In addition, a person of ordinary skill in the art would be motivated to combine Mukai 631 with G.987.3 because (a) Mukai 631 and G.987.3 disclose similar methods and solutions; and (b) both publications are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3's teachings with those of Mukai 631. For similar reasons, a person of ordinary skill in the art would be motivated to combine Mukai 631 with other references in E1 – E9 and E Secondary with similar teachings. For example, G.988, like G.987.3, is part of the XG-PON standard and a POSITA looking to G.987.3 would also look to G.988 as it is part of the same XG-PON standard.

A person of ordinary skill in the art would be motivated to combine Mukai 631 with Zhang '034 for many reasons. For example, Mukai 631 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Mukai 631 to implement the details of ONU power management taught by Zhang '034 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Mukai 631 with Zhang '034 because (a) Mukai 631 and Zhang '034 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover,

a POSITA would have had a reasonable expectation of success in incorporating Zhang '034's teachings with those of Mukai 631. For similar reasons, a person of ordinary skill in the art would be motivated to combine Mukai 631 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Mukai 631 with Ghazidaidi '483 for many reasons. For example, Mukai 631 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Mukai 631 to implement the details of ONU power management taught by Ghazidaidi '483 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Mukai 631 with Ghazidaidi '483 because (a) Mukai 631 and Ghazidaidi '483 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ghazidaidi '483's teachings with those of Mukai 631. For similar reasons, a person of ordinary skill in the art would be motivated to combine Mukai 631 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Mukai 631 with Zhang 958 for many reasons. For example, Mukai 631 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Mukai 631 to implement the details of ONU power management taught by Zhang 958 because, it is also directed at ONU power management. A person of ordinary skill in the art would

be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Mukai 631 and Zhang 958 because (a) Mukai 631 and Zhang 958 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Zhang 958's teachings with those of Mukai 631. For similar reasons, a person of ordinary skill in the art would be motivated to combine Mukai 631 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Mukai 631 with Schmuck 989 for many reasons. For example, Mukai 631 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Mukai 631 to implement the details of ONU power management taught by Schmuck 989 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Mukai 631 and Schmuck 989 because (a) Mukai 631 and Schmuck 989 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Schmuck 989's teachings with those of Mukai 631. For similar reasons, a person of ordinary skill in the art would be motivated to combine Mukai 631 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Mukai 631 with Skubic for many reasons. For example, Mukai 631 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Mukai 631 to implement the details of ONU power management taught by Skubic because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Mukai 631 and Skubic because (a) Mukai 631 and Skubic disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Skubic's teachings with those of Mukai 631. For similar reasons, a person of ordinary skill in the art would be motivated to combine Mukai 631 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Mukai 631 with Mukai 150 for many reasons. For example, Mukai 631 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Mukai 631 to implement the details of ONU power management taught by Mukai 150 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Mukai 631 and Mukai 150 because (a) Mukai 631 and Mukai 150 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA

would have had a reasonable expectation of success in incorporating Mukai 150's teachings with those of Mukai 631. For similar reasons, a person of ordinary skill in the art would be motivated to combine Mukai 631 with other references in E1 – E9 and E Secondary with similar teachings.

(3) Exemplary G.987.3 Solutions

A person of ordinary skill in the art would be motivated to combine G.987.3 with Röger for many reasons. For example, G.987.3 describes power management of ONUs in a PON. *See, e.g.*, G.987.3 at Section 16. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 to implement the details of ONU power management taught by Röger because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 with Röger because (a) G.987.3 and Röger disclose similar methods and solutions; and (b) both patents/publications are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3's teachings with those of Röger. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.3 with Mukai 631 for many reasons. For example, G.987.3 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 to implement the details of ONU power management taught by G.987.3 because, it is also directed at ONU power management. A person of ordinary skill in the art would be

motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 with Mukai 631 because (a) G.987.3 and Mukai 631 disclose similar methods and solutions; and (b) both publications are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating G.987.3's teachings with those of Mukai 631. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.3 with Zhang '034 for many reasons. For example, G.987.3 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 to implement the details of ONU power management taught by Zhang '034 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 with Zhang '034 because (a) G.987.3 and Zhang '034 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Zhang '034's teachings with those of G.987.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.3 with Ghazidaidi '483 for many reasons. For example, G.987.3 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 to implement the details of ONU power management taught by Ghazidaidi '483 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 with Ghazidaidi '483 because (a) G.987.3 and Ghazidaidi '483 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ghazidaidi '483's teachings with those of G.987.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.3 with Zhang 958 for many reasons. For example, G.987.3 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 to implement the details of ONU power management taught by Zhang 958 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 and Zhang 958 because (a) G.987.3 and Zhang 958 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as

each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Zhang 958's teachings with those of G.987.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.3 with Schmuck 989 for many reasons. For example, G.987.3 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 to implement the details of ONU power management taught by Schmuck 989 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 and Schmuck 989 because (a) G.987.3 and Schmuck 989 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Schmuck 989's teachings with those of G.987.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.3 with Skubic for many reasons. For example, G.987.3 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 to implement the details of ONU power management taught by Skubic because,

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it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 and Skubic because (a) G.987.3 and Skubic disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Skubic's teachings with those of G.987.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine G.987.3 with Mukai 150 for many reasons. For example, G.987.3 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of G.987.3 to implement the details of ONU power management taught by Mukai 150 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine G.987.3 and Mukai 150 because (a) G.987.3 and Mukai 150 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Mukai 150's teachings with those of G.987.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine G.987.3 with other references in E1 – E9 and E Secondary with similar teachings.

(4) Exemplary Zhang ’034 Solutions

A person of ordinary skill in the art would be motivated to combine Zhang ’034 with Röger for many reasons. For example, Zhang ’034 describes power management of ONUs in a PON. *See, e.g.*, Zhang ’034 at abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Zhang ’034 to implement the details of ONU power management taught by Röger because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Zhang ’034 with Röger because (a) Zhang ’034 and Röger disclose similar methods and solutions; and (b) both patents/publications are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Zhang ’034’s teachings with those of Röger. For similar reasons, a person of ordinary skill in the art would be motivated to combine Zhang ’034 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Zhang ’034 with Mukai 631 for many reasons. For example, Zhang ’034 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Zhang ’034 to implement the details of ONU power management taught by Zhang ’034 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Zhang ’034 with Mukai 631 because (a) Zhang ’034 and Mukai 631 disclose similar methods and

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solutions; and (b) both publications are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Zhang '034's teachings with those of Mukai 631. For similar reasons, a person of ordinary skill in the art would be motivated to combine Zhang '034 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Zhang '034 with G.987.3 for many reasons. For example, Zhang '034 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Zhang '034 to implement the details of ONU power management taught by G.987.3 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Zhang '034 with G.987.3 because (a) Zhang '034 and G.987.3 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Zhang '034's teachings with those of G.987.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine Zhang '034 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Zhang '034 with Ghazidaidi '483 for many reasons. For example, Zhang '034 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify

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the method and/or device of Zhang ’034 to implement the details of ONU power management taught by Ghazidaidi ’483 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Zhang ’034 with Ghazidaidi ’483 because (a) Zhang ’034 and Ghazidaidi ’483 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ghazidaidi ’483’s teachings with those of Zhang ’034. For similar reasons, a person of ordinary skill in the art would be motivated to combine Zhang ’034 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Zhang ’034 with Zhang 958 for many reasons. For example, Zhang ’034 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Zhang ’034 to implement the details of ONU power management taught by Zhang 958 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Zhang ’034 and Zhang 958 because (a) Zhang ’034 and Zhang 958 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Zhang 958’s teachings with those of Zhang ’034. For similar reasons, a person of ordinary skill in the art would

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be motivated to combine Zhang ’034 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Zhang ’034 with Schmuck 989 for many reasons. For example, Zhang ’034 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Zhang ’034 to implement the details of ONU power management taught by Schmuck 989 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Zhang ’034 and Schmuck 989 because (a) Zhang ’034 and Schmuck 989 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Schmuck 989’s teachings with those of Zhang ’034. For similar reasons, a person of ordinary skill in the art would be motivated to combine Zhang ’034 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Zhang ’034 with Skubic for many reasons. For example, Zhang ’034 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Zhang ’034 to implement the details of ONU power management taught by Skubic because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Zhang

’034 and Skubic because (a) Zhang ’034 and Skubic disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Skubic’s teachings with those of Zhang ’034. For similar reasons, a person of ordinary skill in the art would be motivated to combine Zhang ’034 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Zhang ’034 with Mukai 150 for many reasons. For example, Zhang ’034 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Zhang ’034 to implement the details of ONU power management taught by Mukai 150 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Zhang ’034 and Mukai 150 because (a) Zhang ’034 and Mukai 150 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Mukai 150’s teachings with those of Zhang ’034. For similar reasons, a person of ordinary skill in the art would be motivated to combine Zhang ’034 with other references in E1 – E9 and E Secondary with similar teachings.

(5) Exemplary Ghazidaidi ’483 Solutions

A person of ordinary skill in the art would be motivated to combine Ghazidaidi ’483 with Röger for many reasons. For example, Ghazidaidi ’483 describes power management of ONUs in

a PON. *See, e.g.*, Ghazidaidi '483 at abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Ghazidaidi '483 to implement the details of ONU power management taught by Röger because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Ghazidaidi '483 with Röger because (a) Ghazidaidi '483 and Röger disclose similar methods and solutions; and (b) both patents/publications are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ghazidaidi '483's teachings with those of Röger. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ghazidaidi '483 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Ghazidaidi '483 with Mukai 631 for many reasons. For example, Ghazidaidi '483 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Ghazidaidi '483 to implement the details of ONU power management taught by Ghazidaidi '483 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Ghazidaidi '483 with Mukai 631 because (a) Ghazidaidi '483 and Mukai 631 disclose similar methods and solutions; and (b) both publications are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in

incorporating Ghazidaidi ’483’s teachings with those of Mukai 631. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ghazidaidi ’483 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Ghazidaidi ’483 with G.987.3 for many reasons. For example, Ghazidaidi ’483 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Ghazidaidi ’483 to implement the details of ONU power management taught by G.987.3 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Ghazidaidi ’483 with G.987.3 because (a) Ghazidaidi ’483 and G.987.3 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ghazidaidi ’483’s teachings with those of G.987.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ghazidaidi ’483 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Ghazidaidi ’483 with Zhang ’034 for many reasons. For example, Ghazidaidi ’483 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Ghazidaidi ’483 to implement the details of ONU power management taught by Zhang ’034 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power

management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Ghazidaidi '483 with Zhang '034 because (a) Ghazidaidi '483 and Zhang '034 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Ghazidaidi '483's teachings with those of Zhang '034. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ghazidaidi '483 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Ghazidaidi '483 with Zhang 958 for many reasons. For example, Ghazidaidi '483 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Ghazidaidi '483 to implement the details of ONU power management taught by Zhang 958 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Ghazidaidi '483 and Zhang 958 because (a) Ghazidaidi '483 and Zhang 958 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Zhang 958's teachings with those of Ghazidaidi '483. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ghazidaidi '483 with other references in E1 – E9 and E Secondary with similar teachings.

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A person of ordinary skill in the art would be motivated to combine Ghazidaidi '483 with Schmuck 989 for many reasons. For example, Ghazidaidi '483 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Ghazidaidi '483 to implement the details of ONU power management taught by Schmuck 989 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Ghazidaidi '483 and Schmuck 989 because (a) Ghazidaidi '483 and Schmuck 989 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Schmuck 989's teachings with those of Ghazidaidi '483. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ghazidaidi '483 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Ghazidaidi '483 with Skubic for many reasons. For example, Ghazidaidi '483 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Ghazidaidi '483 to implement the details of ONU power management taught by Skubic because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Ghazidaidi '483 and Skubic because (a) Ghazidaidi '483 and Skubic disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of

endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Skubic's teachings with those of Ghazidaidi '483. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ghazidaidi '483 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Ghazidaidi '483 with Mukai 150 for many reasons. For example, Ghazidaidi '483 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Ghazidaidi '483 to implement the details of ONU power management taught by Mukai 150 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Ghazidaidi '483 and Mukai 150 because (a) Ghazidaidi '483 and Mukai 150 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Mukai 150's teachings with those of Ghazidaidi '483. For similar reasons, a person of ordinary skill in the art would be motivated to combine Ghazidaidi '483 with other references in E1 – E9 and E Secondary with similar teachings.

(6) Exemplary Zhang 958 Solutions

A person of ordinary skill in the art would be motivated to combine Zhang 958 with Röger for many reasons. For example, Zhang 958 describes power management of ONUs in a PON. *See, e.g.*, Zhang 958 at abstract. A person having ordinary skill in the art would have been motivated

to modify the method and/or device of Zhang 958 to implement the details of ONU power management taught by Röger because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Zhang 958 with Röger because (a) Zhang 958 and Röger disclose similar methods and solutions; and (b) both patents/publications are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Zhang 958's teachings with those of Röger. For similar reasons, a person of ordinary skill in the art would be motivated to combine Zhang 958 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Zhang 958 with Mukai 631 for many reasons. For example, Zhang 958 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Zhang 958 to implement the details of ONU power management taught by Zhang 958 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Zhang 958 with Mukai 631 because (a) Zhang 958 and Mukai 631 disclose similar methods and solutions; and (b) both publications are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Zhang 958's teachings with

those of Mukai 631. For similar reasons, a person of ordinary skill in the art would be motivated to combine Zhang 958 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Zhang 958 with G.987.3 for many reasons. For example, Zhang 958 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Zhang 958 to implement the details of ONU power management taught by G.987.3 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Zhang 958 with G.987.3 because (a) Zhang 958 and G.987.3 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Zhang 958's teachings with those of G.987.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine Zhang 958 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Zhang 958 with Zhang '034 for many reasons. For example, Zhang 958 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Zhang 958 to implement the details of ONU power management taught by Zhang '034 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Zhang

958 with Zhang ’034 because (a) Zhang 958 and Zhang ’034 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Zhang 958’s teachings with those of Zhang ’034. For similar reasons, a person of ordinary skill in the art would be motivated to combine Zhang 958 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Zhang 958 with Ghazidaidi ’483 for many reasons. For example, Zhang 958 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Zhang 958 to implement the details of ONU power management taught by Ghazidaidi ’483 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Zhang 958 and Ghazidaidi ’483 because (a) Zhang 958 and Ghazidaidi ’483 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Zhang 958’s teachings with those of Ghazidaidi ’483. For similar reasons, a person of ordinary skill in the art would be motivated to combine Zhang 958 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Zhang 958 with Schmuck 989 for many reasons. For example, Zhang 958 describes power management of ONUs

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in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Zhang 958 to implement the details of ONU power management taught by Schmuck 989 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Zhang 958 and Schmuck 989 because (a) Zhang 958 and Schmuck 989 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Schmuck 989's teachings with those of Zhang 958. For similar reasons, a person of ordinary skill in the art would be motivated to combine Zhang 958 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Zhang 958 with Skubic for many reasons. For example, Zhang 958 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Zhang 958 to implement the details of ONU power management taught by Skubic because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Zhang 958 and Skubic because (a) Zhang 958 and Skubic disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Skubic's teachings with those

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of Zhang 958. For similar reasons, a person of ordinary skill in the art would be motivated to combine Zhang 958 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Zhang 958 with Mukai 150 for many reasons. For example, Zhang 958 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Zhang 958 to implement the details of ONU power management taught by Mukai 150 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Zhang 958 and Mukai 150 because (a) Zhang 958 and Mukai 150 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Mukai 150's teachings with those of Zhang 958. For similar reasons, a person of ordinary skill in the art would be motivated to combine Zhang 958 with other references in E1 – E9 and E Secondary with similar teachings.

(7) Exemplary Schmuck 989 Solutions

A person of ordinary skill in the art would be motivated to combine Schmuck 989 with Röger for many reasons. For example, Schmuck 989 describes power management of ONUs in a PON. *See, e.g.*, Schmuck 989 at abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Schmuck 989 to implement the details of ONU power management taught by Röger because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Schmuck 989 with Röger because (a) Schmuck 989 and Röger disclose

similar methods and solutions; and (b) both patents/publications are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Schmuck 989's teachings with those of Röger. For similar reasons, a person of ordinary skill in the art would be motivated to combine Schmuck 989 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Schmuck 989 with Mukai 631 for many reasons. For example, Schmuck 989 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Schmuck 989 to implement the details of ONU power management taught by Schmuck 989 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Schmuck 989 with Mukai 631 because (a) Schmuck 989 and Mukai 631 disclose similar methods and solutions; and (b) both publications are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Schmuck 989's teachings with those of Mukai 631. For similar reasons, a person of ordinary skill in the art would be motivated to combine Schmuck 989 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Schmuck 989 with G.987.3 for many reasons. For example, Schmuck 989 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method

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and/or device of Schmuck 989 to implement the details of ONU power management taught by G.987.3 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Schmuck 989 with G.987.3 because (a) Schmuck 989 and G.987.3 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Schmuck 989's teachings with those of G.987.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine Schmuck 989 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Schmuck 989 with Zhang '034 for many reasons. For example, Schmuck 989 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Schmuck 989 to implement the details of ONU power management taught by Zhang '034 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Schmuck 989 with Zhang '034 because (a) Schmuck 989 and Zhang '034 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Schmuck 989's teachings with those of Zhang '034. For similar reasons, a person of ordinary skill

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in the art would be motivated to combine Schmuck 989 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Schmuck 989 with Ghazidaidi ’483 for many reasons. For example, Schmuck 989 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Schmuck 989 to implement the details of ONU power management taught by Ghazidaidi ’483 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Schmuck 989 and Ghazidaidi ’483 because (a) Schmuck 989 and Ghazidaidi ’483 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Schmuck 989’s teachings with those of Ghazidaidi ’483. For similar reasons, a person of ordinary skill in the art would be motivated to combine Schmuck 989 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Schmuck 989 with Zhang 958 for many reasons. For example, Schmuck 989 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Schmuck 989 to implement the details of ONU power management taught by Zhang 958 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to

combine Schmuck 989 and Zhang 958 because (a) Schmuck 989 and Zhang 958 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Schmuck 989's teachings with those of Zhang 958. For similar reasons, a person of ordinary skill in the art would be motivated to combine Schmuck 989 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Schmuck 989 with Skubic for many reasons. For example, Schmuck 989 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Schmuck 989 to implement the details of ONU power management taught by Skubic because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Schmuck 989 and Skubic because (a) Schmuck 989 and Skubic disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Skubic's teachings with those of Schmuck 989. For similar reasons, a person of ordinary skill in the art would be motivated to combine Schmuck 989 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Schmuck 989 with Mukai 150 for many reasons. For example, Schmuck 989 describes power management of ONUs

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in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Schmuck 989 to implement the details of ONU power management taught by Mukai 150 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Schmuck 989 and Mukai 150 because (a) Schmuck 989 and Mukai 150 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Mukai 150's teachings with those of Schmuck 989. For similar reasons, a person of ordinary skill in the art would be motivated to combine Schmuck 989 with other references in E1 – E9 and E Secondary with similar teachings.

(8) Exemplary Skubic Solutions

A person of ordinary skill in the art would be motivated to combine Skubic with Röger for many reasons. For example, Skubic describes power management of ONUs in a PON. *See, e.g.*, Skubic at abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Skubic to implement the details of ONU power management taught by Röger because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Skubic with Röger because (a) Skubic and Röger disclose similar methods and solutions; and (b) both patents/publications are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Skubic's teachings with those

of Röger. For similar reasons, a person of ordinary skill in the art would be motivated to combine Skubic with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Skubic with Mukai 631 for many reasons. For example, Skubic describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Skubic to implement the details of ONU power management taught by Skubic because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Skubic with Mukai 631 because (a) Skubic and Mukai 631 disclose similar methods and solutions; and (b) both publications are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Skubic's teachings with those of Mukai 631. For similar reasons, a person of ordinary skill in the art would be motivated to combine Skubic with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Skubic with G.987.3 for many reasons. For example, Skubic describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Skubic to implement the details of ONU power management taught by G.987.3 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Skubic with G.987.3 because (a) Skubic and G.987.3 disclose similar methods and solutions; and (b) both publications/patents

are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Skubic's teachings with those of G.987.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine Skubic with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Skubic with Zhang '034 for many reasons. For example, Skubic describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Skubic to implement the details of ONU power management taught by Zhang '034 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Skubic with Zhang '034 because (a) Skubic and Zhang '034 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Skubic's teachings with those of Zhang '034. For similar reasons, a person of ordinary skill in the art would be motivated to combine Skubic with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Skubic with Ghazidaidi '483 for many reasons. For example, Skubic describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Skubic to implement the details of ONU power management taught by Ghazidaidi '483 because, it is also directed at ONU power management. A person of ordinary skill in the art would

be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Skubic and Ghazidaidi '483 because (a) Skubic and Ghazidaidi '483 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Skubic's teachings with those of Ghazidaidi '483. For similar reasons, a person of ordinary skill in the art would be motivated to combine Skubic with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Skubic with Zhang 958 for many reasons. For example, Skubic describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Skubic to implement the details of ONU power management taught by Zhang 958 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Skubic and Zhang 958 because (a) Skubic and Zhang 958 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Skubic's teachings with those of Zhang 958. For similar reasons, a person of ordinary skill in the art would be motivated to combine Skubic with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Skubic with Schmuck 989 for many reasons. For example, Skubic describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Skubic to implement the details of ONU power management taught by Schmuck 989 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Skubic and Schmuck 989 because (a) Skubic and Schmuck 989 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Skubic's teachings with those of Schmuck 989. For similar reasons, a person of ordinary skill in the art would be motivated to combine Skubic with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Skubic with Mukai 150 for many reasons. For example, Skubic describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Skubic to implement the details of ONU power management taught by Mukai 150 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Skubic and Mukai 150 because (a) Skubic and Mukai 150 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA

would have had a reasonable expectation of success in incorporating Skubic's teachings with those of Mukai 150. For similar reasons, a person of ordinary skill in the art would be motivated to combine Skubic with other references in E1 – E9 and E Secondary with similar teachings.

(9) Exemplary Mukai 150 Solutions

A person of ordinary skill in the art would be motivated to combine Mukai 150 with Röger for many reasons. For example, Mukai 150 describes power management of ONUs in a PON. *See, e.g.*, Mukai 150 at abstract. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Mukai 150 to implement the details of ONU power management taught by Röger because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Mukai 150 with Röger because (a) Mukai 150 and Röger disclose similar methods and solutions; and (b) both patents/publications are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Mukai 150's teachings with those of Röger. For similar reasons, a person of ordinary skill in the art would be motivated to combine Mukai 150 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Mukai 150 with Mukai 631 for many reasons. For example, Mukai 150 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Mukai 150 to implement the details of ONU power management taught by Mukai 150 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management

capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Mukai 150 with Mukai 631 because (a) Mukai 150 and Mukai 631 disclose similar methods and solutions; and (b) both publications are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Mukai 150's teachings with those of Mukai 631. For similar reasons, a person of ordinary skill in the art would be motivated to combine Mukai 150 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Mukai 150 with G.987.3 for many reasons. For example, Mukai 150 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Mukai 150 to implement the details of ONU power management taught by G.987.3 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Mukai 150 with G.987.3 because (a) Mukai 150 and G.987.3 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Mukai 150's teachings with those of G.987.3. For similar reasons, a person of ordinary skill in the art would be motivated to combine Mukai 150 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Mukai 150 with Zhang '034 for many reasons. For example, Mukai 150 describes power management of ONUs in a PON.

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A person having ordinary skill in the art would have been motivated to modify the method and/or device of Mukai 150 to implement the details of ONU power management taught by Zhang ’034 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Mukai 150 with Zhang ’034 because (a) Mukai 150 and Zhang ’034 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Mukai 150’s teachings with those of Zhang ’034. For similar reasons, a person of ordinary skill in the art would be motivated to combine Mukai 150 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Mukai 150 with Ghazidaidi ’483 for many reasons. For example, Mukai 150 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Mukai 150 to implement the details of ONU power management taught by Ghazidaidi ’483 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Mukai 150 and Ghazidaidi ’483 because (a) Mukai 150 and Ghazidaidi ’483 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in

incorporating Mukai 150's teachings with those of Ghazidaidi '483. For similar reasons, a person of ordinary skill in the art would be motivated to combine Mukai 150 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Mukai 150 with Zhang 958 for many reasons. For example, Mukai 150 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Mukai 150 to implement the details of ONU power management taught by Zhang 958 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Mukai 150 and Zhang 958 because (a) Mukai 150 and Zhang 958 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Mukai 150's teachings with those of Zhang 958. For similar reasons, a person of ordinary skill in the art would be motivated to combine Mukai 150 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Mukai 150 with Schmuck 989 for many reasons. For example, Mukai 150 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Mukai 150 to implement the details of ONU power management taught by Schmuck 989 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to

combine Mukai 150 and Schmuck 989 because (a) Mukai 150 and Schmuck 989 disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Mukai 150's teachings with those of Schmuck 989. For similar reasons, a person of ordinary skill in the art would be motivated to combine Mukai 150 with other references in E1 – E9 and E Secondary with similar teachings.

A person of ordinary skill in the art would be motivated to combine Mukai 150 with Skubic for many reasons. For example, Mukai 150 describes power management of ONUs in a PON. A person having ordinary skill in the art would have been motivated to modify the method and/or device of Mukai 150 to implement the details of ONU power management taught by Mukai 150 because, it is also directed at ONU power management. A person of ordinary skill in the art would be motivated by the advantages of such functionality, such as its ONU power management capabilities. In addition, a person of ordinary skill in the art would be motivated to combine Mukai 150 and Skubic because (a) Mukai 150 and Skubic disclose similar methods and solutions; and (b) both publications/patents are analogous art and in the same field of endeavor as each other, for example, both relate to the same concept and address the same problem. Moreover, a POSITA would have had a reasonable expectation of success in incorporating Mukai 150's teachings with those of Skubic. For similar reasons, a person of ordinary skill in the art would be motivated to combine Mukai 150 with other references in E1 – E9 and E Secondary with similar teachings.

d) The Claims Recite Well-Known Concepts That Would Have Been Obvious to Implement.

The Asserted Claims represent nothing more than an arrangement of well-known concepts and features and add nothing to the state of the art at the time of the alleged invention. For each of

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the concepts represented by the Asserted Claims, it would have been obvious to add to the teachings of any number of known products and references, including to the teachings of any of the primary references in Exhibits E1 – E9 and E1 Secondary to the extent that such reference is alleged to be missing such concept or feature. The following are examples of concepts that would have been obvious, which is not intended to be an exhaustive list of the claimed features that would have been obvious. Defendants reserve the right to supplement these examples as necessary.

(1) It would have been obvious to modify any primary reference for operating an ONU in a first state with a transmitter is turned off and receiver is turned on and in a second state where both the transmitter and receiver are turned off (Claim 1)

To the extent Iarnach contends that any reference charted in Exhibits E1 - E9 and E1 Secondary does not disclose "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 and operating the ONU in a second state in which both the transmitter and the receiver are turned off" it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits E1 - E9 and E1 Secondary. A person having ordinary skill in the art would have been motivated to employ or implement operating ONUs in the two states defined in claim 1. *See, e.g.*, Röger, Mukai 631, G.987.3, Zhang '034, Ghazidaidi '483, Zhang 958, Schmuck 989, Skubic, Mukai 150, G.988, Roger FTTx, Freude, Chang 668, Cornwall, Kim 210, Pfeiffer, Ma, and/or Cvijetic. This functionality existed in teachings for PONs and little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle.

(2) It would have been obvious to modify any primary reference to transition the ONU directly from the first state to the

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second state and from the second state to the first state based on a power management rule (Claim 1)

To the extent Iarnach contends that any reference charted in Exhibits E1 - E9 and E1 Secondary does not disclose "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" it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits E1 - E9 and E1 Secondary. A person having ordinary skill in the art would have been motivated to employ or implement transitioning the ONU directly from the first state to the second state and from the second state to the first state based on a power management rule. *See, e.g.,* Röger, Mukai 631, G.987.3, Zhang '034, Ghazidaidi '483, Zhang 958, Schmuck 989, Skubic, Mukai 150, G.988, Roger FTTx, Freude, Chang 668, Cornwall, Kim 210, Pfeiffer, Ma, and/or Cvijetic. This direct transition would have accomplished the expected result of the alleged power savings of claim 1. Little or no complexity would have been involved in including the feature, as adding the feature would have fit together with the other features and functionalities like pieces of a puzzle. These states already existed within the existing standard and directly transition between them would have been trivial for a POSITA and an obvious solution with predictable results.

(3) It would have been obvious to modify any primary reference for 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 (Claim 1)

To the extent Iarnach contends that any reference charted in Exhibits E1 - E9 and E1 Secondary does not disclose "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" it would have been obvious to combine such a well-known feature with any of

the references charted in Exhibits E1 - E9 and E1 Secondary. A person having ordinary skill in the art would have been motivated to employ or implement ensuring that 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. *See, e.g.*, Röger, Mukai 631, G.987.3, Zhang '034, Ghazidaidi '483, Zhang 958, Schmuck 989, Skubic, Mukai 150, G.988, Roger FTTx, Freude, Chang 668, Cornwall, Kim 210, Pfeiffer, Ma, and/or Cvijetic. This was a known feature in the existing XG-PON standard and would have been readily apparent and known to a POSITA to implement to achieve the inherent attributes of this limitation. Little or no complexity would have been involved in including the feature, as the feature already existed within the standard.

(4) It would have been obvious to modify any primary reference for receiving, by the receiver, a power management message from an optical line terminal (OLT) (Claim 1)

To the extent Iarnach contends that any reference charted in Exhibits E1 - E9 and E1 Secondary does not disclose "receiving, by the receiver, a power management message from an optical line terminal (OLT)" it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits E1 - E9 and E1 Secondary. A person having ordinary skill in the art would have been motivated to employ or implement the receiver receiving a power management message from the OLT. *See, e.g.*, Röger, Mukai 631, G.987.3, Zhang '034, Ghazidaidi '483, Zhang 958, Schmuck 989, Skubic, Mukai 150, G.988, Roger FTTx, Freude, Chang 668, Cornwall, Kim 210, Pfeiffer, Ma, and/or Cvijetic. Using the receiver to receive a power management message from the OLT was a known feature from the existing standard that was known by a POSITA to achieve predictable and reliable results. Little or no complexity would have been involved in including the feature, as the feature already existed.

(5) It would have been obvious to modify any primary reference for changing the power management rule based on the received power management message (Claim 1)

To the extent Iarnach contends that any reference charted in Exhibits E1 - E9 and E1 Secondary does not disclose "changing the power management rule based on the received power management message" it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits E1 - E9 and E1 Secondary. A person having ordinary skill in the art would have been motivated to employ or implement changing the power management rule based on the received power management message. *See, e.g.*, Röger, Mukai 631, G.987.3, Zhang '034, Ghazidaidi '483, Zhang 958, Schmuck 989, Skubic, Mukai 150, G.988, Roger FTTx, Freude, Chang 668, Cornwall, Kim 210, Pfeiffer, Ma, and/or Cvijetic. Using a power management message to change the power management rule was a known feature of the existing standard and was known to POSITA to work to achieve the stated goal. Little or no complexity would have been involved in including the feature.

(6) It would have been obvious to modify any primary reference for operating the ONU in a third state in which both the transmitter and the receiver are turned on (Claim 2)

To the extent Iarnach contends that any reference charted in Exhibits E1 - E9 and E1 Secondary does not disclose "operating the ONU in a third state in which both the transmitter and the receiver are turned on" it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits E1 - E9 and E1 Secondary. A person having ordinary skill in the art would have been motivated to employ or implement a third state in which both the transmitter and the receiver are turned on. *See, e.g.*, Röger, Mukai 631, G.987.3, Zhang '034, Ghazidaidi '483, Zhang 958, Schmuck 989, Skubic, Mukai 150, G.988, Roger FTTx, Freude, Chang 668, Cornwall, Kim 210, Pfeiffer, Ma, and/or Cvijetic. The claimed third state is nothing

more than a well-known active state that was known in the existing standards. Little or no complexity would have been involved in including the feature.

> (7) It would have been obvious to modify any primary reference for 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 (Claim 3)

To the extent Iarnach contends that any reference charted in Exhibits E1 - E9 and E1 Secondary does not disclose "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" it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits E1 - E9 and E1 Secondary. A person having ordinary skill in the art would have been motivated to employ or implement a power management rule that 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. *See, e.g.*, Röger, Mukai 631, G.987.3, Zhang '034, Ghazidaidi '483, Zhang 958, Schmuck 989, Skubic, Mukai 150, G.988, Roger FTTx, Freude, Chang 668, Cornwall, Kim 210, Pfeiffer, Ma, and/or Cvijetic. Using a time period for operation in the first and second states was a known technique for managing ONU power consumption. Little or no complexity would have been involved in including the feature.

> (8) It would have been obvious to modify any primary reference for performing the transitioning responsive to the received power management message and a local decision to change an operational state (Claim 5)

To the extent Iarnach contends that any reference charted in Exhibits E1 - E9 and E1 Secondary does not disclose "performing the transitioning responsive to the received power

management message and a local decision to change an operational state" it would have been obvious to combine such a well-known feature with any of the references charted in Exhibits E1 - E9 and E1 Secondary. A person having ordinary skill in the art would have been motivated to employ or implement performing the transitioning responsive to the received power management message and a local decision to change an operational state. *See, e.g.*, Röger, Mukai 631, G.987.3, Zhang '034, Ghazidaidi '483, Zhang 958, Schmuck 989, Skubic, Mukai 150, G.988, Roger FTTx, Freude, Chang 668, Cornwall, Kim 210, Pfeiffer, Ma, and/or Cvijetic. Performing the transitioning responsive to the received power management message and a local decision to change an operational state was a known technique for ONU power management in existing standards and was already known to work the intended goal of the asserted claim. Little or no complexity would have been involved in including the feature.

e) Additional Reasons to Combine.

In addition to the information contained elsewhere in these invalidity contentions, including in Exhibits E1 - E9 and E1 Secondary, Defendants have identified additional motivations and reasons to combine the various references. Defendants note that in *KSR Int'l Co. v. Teleflex Inc.*, the Supreme Court held that "[i]n determining whether the subject matter of a patent claim is obvious, neither the particular motivation nor the avowed purpose of the patentee controls. What matters is the objective reach of the claim. If the claim extends to what is obvious, it is invalid under § 103." 127 S. Ct. 1727, 1742 (2007).

KSR further illustrated several ways in which the subject matter of a patent claim may be shown to have been obvious. For instance, "[o]ne of the ways in which a patent's subject matter can be proved obvious is by noting that there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent's claims." *KSR*, 127 S. Ct. at 1742. The Supreme Court held that it was error to "look only to the problem the patentee was trying to

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solve." *Id*. As the Court explained, "[t]he question is not whether the combination was obvious to the patentee but whether the combination was obvious to a person with ordinary skill in the art. Under the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed." *Id*. Further, "[c]ommon sense teaches … that familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle." *Id.* Further, a showing that a combination of elements was "obvious to try" may demonstrate that it was obvious under § 103. *Id.* For instance, the Supreme Court held that "predictable solutions" using a combination of "known options" may render the subject matter of a patent claim obvious. *Id.*

When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product was not of innovation but of ordinary skill and common sense. *Id.* The ways in which the subject matter of a patent claim may be shown to be obvious, identified by *KSR*, are merely illustrative. A core thrust of *KSR* was that "[r]igid preventative rules that deny factfinders recourse to common sense are neither necessary under our case law nor consistent with it." *KSR*, 127 S. Ct. at 1742-43 (quoting *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1367 (Fed. Cir. 2006) ("Our suggestion test is in actuality quite flexible and not only permits, but requires, consideration of common knowledge and common sense"), and *Alza Corp. v. Mylan Labs., Inc.*, 464 F.3d 1286, 1291 (Fed. Cir. 2006) ("There is flexibility in our obviousness jurisprudence because a motivation may be found *implicitly* in the prior art. We do not have a rigid test that requires an actual teaching to combine ...").

Although Defendants note that there is no longer a rigid requirement regarding motivation to combine under *KSR*, Defendants provide the following statements regarding motivation to combine. Multiple teachings, suggestions, and/or reasons to modify any of the references and/or to combine any two or more of the references in Exhibits E1 - E9 and E1 Secondary come from many sources, including the prior art (specific and as a whole), common knowledge, common sense, predictability, expectations, industry trends, design incentives or need, market demands or pressure, market forces, obvious to try, the nature of the problem faced, and/or knowledge possessed by one of ordinary skill. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field of endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one.

The combination of prior art references identified in these contentions would have been obvious because the combination represents the known potential options with a reasonable expectation of success. Additionally, one of ordinary skill in the art would have been motivated to create combinations identified in these contentions using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or teaching, suggestion, or motivation in the prior art generally. Also, market forces in the industry, and the desire to improve features and performance, would motivate the addition of features to systems as they became available, became less expensive, became more commonly used, provided better performance, reduced costs, size or weight, or predictably achieved other desirable results.

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C. Other Grounds for Invalidity

Defendants identify the following additional grounds for invalidity of the Asserted Claims of the ’892 Patent. Defendants reserve the right to supplement these disclosures based on further investigation and discovery.

1. Invalidity of the ’892 Patent Based on 35 U.S.C. § 112, ¶ 1 (Enablement and Written Description)

Based on Defendants’ present understanding of Iarnach’s asserted scope of the claims of the ’892 Patent, to the extent such positions can be understood from Iarnach’s Preliminary Infringement Contentions, the Asserted Claims of the ’892 Patent are invalid for reciting at least the following claim terms, phrases, or limitations that lack enablement or sufficient written description:

- “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” (’892 Patent, claim 1)
- “operating the ONU in a second state in which both the transmitter and the receiver are turned off” (’892 Patent, claim 1)
- “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” (’892 Patent, claim 1)
- “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” (’892 Patent, claim 1)
- “receiving, by the receiver, a power management message from an optical line terminal (OLT)” (’892 Patent, claim 1)
- changing the power management rule based on the received power management message.” (’892 Patent, claim 1)
- “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.” (’892 Patent, claim 2)
- “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." ('892 Patent, claim 3)

- "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." ('892 Patent, claim 5)

These claim terms, phrases, and limitations, as apparently construed by Iarnach, fail to satisfy the enablement and/or written description requirements of 35 U.S.C. § 112. This is at least because the specifications of the '892 Patent demonstrate that the patentee neither conceived of nor demonstrated possession of all that Iarnach now contends the claims cover. In addition, based on Defendant's present understanding of Iarnach's Preliminary Infringement Contentions, each of the Asserted Claims of the '892 Patent in which these claim terms, phrases, and limitations appear is invalid because the specification fails to provide sufficient disclosure to enable a person of ordinary skill in the art to which the alleged invention pertains, or with which it is most nearly connected, to implement the alleged invention without undue experimentation.

2. Invalidity of the '892 Patent Based on 35 U.S.C. § 112, ¶ 2 (Indefiniteness)

Based on the Defendants' present understanding of Iarnach's asserted scope of the claims of the '892 Patent, to the extent such positions can be understood from Iarnach's Preliminary Infringement Contentions, the Defendants assert that the Asserted Claims of the '892 Patent are invalid for reciting at least the following indefinite claim terms, phrases, or limitations:

- "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" ('892 Patent, claim 1)
- "operating the ONU in a second state in which both the transmitter and the receiver are turned off" ('892 Patent, claim 1)
- "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" ('892 Patent, claim 1)

- "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" ('892 Patent, claim 1)

- "receiving, by the receiver, a power management message from an optical line terminal (OLT)" ('892 Patent, claim 1)

- changing the power management rule based on the received power management message." ('892 Patent, claim 1)

- "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." ('892 Patent, claim 2)

- "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." ('892 Patent, claim 3)

- "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." ('892 Patent, claim 5)

These claim terms, phrases, and limitations, as apparently construed by Iarnach, violate the definiteness requirements of 35 U.S.C. § 112.

Based on Defendants' present understanding of Iarnach's Preliminary Infringement Contentions, these claim terms, phrases, and limitations are indefinite because they are inconsistent with and broader than the alleged invention disclosed in the specification and during prosecution. And given Iarnach's apparent constructions of the claim terms, phrases, and limitations, POSITA at the time of the invention would not have understood what is claimed with reasonable certainty, even when the claims are read in light of the specification and prosecution history.

3. Additional Grounds for Invalidity of the '892 Patent

In addition to the preceding invalidity contentions, Defendants reserve the right to assert that the Asserted Claims are invalid under 35 U.S.C. § 102(f) and/or § 102(g) in the event that Defendants obtain evidence that the named inventors of the '892 Patent did not invent (either alone or in conjunction with other parties) the subject matter claimed in the '892 Patent. Should

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Defendants obtain such evidence, Defendants will provide the name of the person(s) from whom and the circumstances under which the invention or any part of it was derived, and/or the circumstances surrounding the making of the invention before the patent application.

4. Collateral Estoppel

In the event the PTAB or any other judicial body issues an applicable decision or ruling such as, but not limited to, a ruling in Inter Partes Review, Iarnach is estopped from asserting the claims of the ’892 Patent in view of such decisions or rulings.

Defendants reserve the right to supplement these disclosures based on further investigation and discovery.

5. Secondary Considerations

There are no objective indicia of non-obviousness evidencing the validity of any of the Asserted Claims. If Iarnach identifies any alleged objective indicia of non-obviousness or secondary considerations supporting the validity of any Asserted Claims, Defendants reserve the right to supplement these contentions to respond to any such evidence. Further, to the extent any products allegedly practicing the claims have been successful, there is no nexus between the claimed inventions and the products’ alleged success.

DOCUMENT PRODUCTION

Based on investigations to date and their understanding of Iarnach’s Infringement Contentions, AT&T and Nokia have produced documents labeled NOK231_0000001 - NOK231_0189840, ATT-IARNACH000001 - ATT-IARNACH048055, and PA231_0000001 - PA231_0012171. This production includes (1) prior art referenced in the invalidity contentions and (2) technical documents sufficient to show the operation of the accused product(s). Many of these documents are marked “RESTRICTED – ATTORNEYS’ EYES ONLY,” and should be

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treated accordingly. Defendants reserve the right to supplement and rely on additional documents produced during the course of this litigation.

Discovery and Defendants' investigation are ongoing in this case, and Defendants reserve the right to identify and produce additional documents pursuant to the Local Rules and applicable Orders of the Court.

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CERTIFICATE OF SERVICE

I hereby certify that the foregoing document was served electronically on December 7, 2023 on all counsel who have consented to electronic service.

/s/ *David S. Frist*
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