

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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NOKIA OF AMERICA CORP.,

Petitioners

v.

ADAPTIVE SPECTRUM AND SIGNAL ALIGNMENT, INC.

Patent Owner

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Case: IPR2025-00428

U.S. Patent No. 7,991,122

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**PETITION FOR *INTER PARTES* REVIEW**  
**UNDER 35 U.S.C. §312 AND 37 C.F.R. §42.104**

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Alexandria, Virginia 22313-1450

**TABLE OF CONTENTS**

|       |                                                                                                                                                      |    |
|-------|------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| I.    | STANDING UNDER 37 C.F.R. §42.104(a)                                                                                                                  | 1  |
| II.   | PAYMENT OF FEES                                                                                                                                      | 1  |
| III.  | OVERVIEW OF CHALLENGES AND RELIEF REQUESTED                                                                                                          | 1  |
| IV.   | BACKGROUND                                                                                                                                           | 2  |
|       | A. Technical Background                                                                                                                              | 2  |
|       | B. Prosecution History                                                                                                                               | 5  |
|       | C. Priority Date                                                                                                                                     | 5  |
|       | D. Claim Construction                                                                                                                                | 6  |
| V.    | PRIOR ART REFERENCES                                                                                                                                 | 11 |
|       | Tsatsanis (Ex. 1006)                                                                                                                                 | 11 |
|       | Savor (Ex. 1005)                                                                                                                                     | 13 |
|       | Rezvani (Ex. 1008)                                                                                                                                   | 14 |
| VI.   | LEVEL OF ORDINARY SKILL IN THE ART                                                                                                                   | 17 |
| VII.  | THE CHALLENGED CLAIMS ARE UNPATENTABLE                                                                                                               | 17 |
| VIII. | Ground 1A: Claims 1-6, 8, and 10-18 are rendered obvious over Tsatsanis. Ground 1B: Claims 1-20 are rendered obvious over Tsatsanis in view of Savor | 17 |
|       | 1. Motivation to Combine                                                                                                                             | 17 |
|       | 2. Overview of Ground 1                                                                                                                              | 21 |
|       | 3. Claim 1                                                                                                                                           | 25 |

4. Claim 2: The method of claim 1 wherein the controller is configured to evaluate whether crosstalk from the new DSL line set affects the already-operating DSL line set by measuring crosstalk levels resulting from transmitting data using the at least one DSL line in the new DSL line set and the already-operating DSL line set concurrently. ....42
5. Claim 3: The method of claim 1 wherein the already-operating DSL line set comprises at least one of the following: a vectored DSL line set; a single DSL line; or a plurality of DSL lines; and further wherein the new DSL line set comprises: a single DSL line; or a plurality of DSL lines. ....43
6. Claim 4: The method of claim 1 further comprising configuring operation of the already-operating DSL line set to prevent disruption of the already-operating DSL line set by the new DSL line set, wherein configuring operation of the already-operating DSL line set is performed either: before transmitting data using the at least one DSL line in the new DSL line set and the already-operating DSL line set concurrently; or after evaluating concurrent use of the new DSL line set and the already-operating DSL line set.....45
7. Claim 5: The method of claim 1 wherein determining the operational configuration for the at least one DSL line in the new DSL line set comprises using orthogonal training sequences on a plurality of DSL lines in the new DSL line set to permit independent identification of the plurality of DSL lines in the new DSL line set during simultaneous training. ....46
8. Claim 6: The method of claim 1 wherein determining the operational configuration for the at least one DSL line in the new DSL line set comprises setting at least one transmit power level of the at least one DSL line in the new DSL line set to prevent disruptive crosstalk in the already-operating DSL line set. ....47

9. Claim 7: The method of claim 6 wherein setting the at least one transmit power level of the at least one DSL line in new DSL line set to prevent disruptive crosstalk in the already-operating DSL line set comprises using at least one of the following to limit transmit power of the at least one DSL line in the new DSL line set: CARMASK; PSDMASK; MAXNOMATP; MAXNOMPSD; MAXRXPWR; RFIBANDS; MAXSNRM; BCAP[n]; Rmax; upstream Power “Back-Off”; a carrier mask operational parameter; a PSD operational parameter; a data rate operational parameter; a bit cap operational parameter; or a margin operational parameter.....49
- 10.Claim 8: The method of claim 1 wherein determining the operational configuration for the at least one DSL line in the new DSL line set comprises limiting data transmission by the at least one DSL line in the new DSL line set to the at least one tone set configured to prevent disruptive crosstalk in the already-operating DSL line set. ....50
- 11.Claim 9: The method of claim 1 wherein the control signals sent to the new DSL line set and the already-operating DSL line set comprise signals controlling at least one of the following: CARMASK; PSDMASK; RFIBANDS; BCAP[n]; a carrier mask operational parameter; a PSD operational parameter; a bit cap operational parameter; or a margin operational parameter.....51
- 12.Claim 10: The method of claim 1 wherein the already-operating DSL line set is a vectored DSL line set; further wherein the method further comprises adjusting operation of the vectored DSL line set to integrate the new DSL line set into vectored operation with the vectored DSL line set.....52
- 13.Claim 11 .....52

- 14.Claim 12: The method of claim 10 wherein adjusting operation of the vectored DSL line set to integrate the new DSL line set into vectored operation with the vectored DSL line set comprises configuring operation of the vectored DSL line set to integrate the new DSL line set into vectored operation with the vectored DSL line set after evaluating concurrent use of the new DSL line set and the already-operating DSL line set.....54
- 15.Claim 13: The method of claim 10 wherein adjusting operation of the vectored DSL line set to integrate the new DSL line set into vectored operation with the vectored DSL line set comprises configuring operation of the new DSL line set to integrate the ne DSL line set into vectored operation with the vectored DSL line set after evaluating concurrent use of the new DSL line set and the already-operating DSL line set. ....55
- 16.Claim 14 .....56
- 17.Claim 15: The controller of claim 15 wherein the operational configuration for the at least one DSL line in the new DSL line set comprises setting transmit power for the at least one DSL line in the new DSL line set. ....58
- 18.Claim 16: The controller of claim 14 wherein the controller is configured to obtain vector channel and noise information for the new DSL line set and the already-operating DSL line set. ....58
- 19.Claim 17: The controller of claim 14 wherein the already-operating DSL line set comprises at least one of the following: is a vectored DSL line set; a single DSL line; or a plurality of DSL lines.....58
- 20.Claim 18: The controller of claim 14 wherein the operational configuration for at least one DSL line in the new DSL line set comprises orthogonal training sequences on a plurality of DSL lines in the new DSL line set to permit independent identification f the plurality of DSL lines in the new DSL line set during simultaneous training. ....59

|                                                                                                                                                                                                                                                                                                                                                                                    |    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 21.Claim 19: The controller of claim 14 wherein the control signals sent to the new DSL line set and the already-operating DSL line set comprise signals controlling at least one of the following: CARMASK; PSDMASK; RFIBANDS; BCAP[n]; a carrier mask operationl parameter; a PSD operational parameter; a bit cap operational parameter; or a margin operational parameter..... | 59 |
| 22.Claim 20: .....                                                                                                                                                                                                                                                                                                                                                                 | 59 |
| IX. Ground 2: Claims 5 and 18 are rendered obvious over Tsatsanis in view of Rezvani.....                                                                                                                                                                                                                                                                                          | 62 |
| 1. Motivation to Combine .....                                                                                                                                                                                                                                                                                                                                                     | 62 |
| 2. Claim 5: The method of claim 1 wherein determining the operational configuration for the at least one DSL line in the new DSL line set comprises using orthogonal training sequences on a plurality of DSL lines in the new DSL line set to permit independent identification of the plurality of DSL lines in the new DSL line set during simultaneous training .....          | 64 |
| 3. Claim 18: The controller of claim 14 wherein the operational configuration for at least one DSL line in the new DSL line set comprises orthogonal training sequences on a plurality of DSL lines in the new DSL line set to permit independent identification f the plurality of DSL lines in the new DSL line set during simultaneous training. ....                           | 65 |
| X. DISCRETIONARY ISSUES.....                                                                                                                                                                                                                                                                                                                                                       | 65 |
| A. The Petition Does Not Present the Same References Addressed in Prosecution .....                                                                                                                                                                                                                                                                                                | 65 |
| B. The Board Should Not Deny Institution Under <i>Fintiv</i> .....                                                                                                                                                                                                                                                                                                                 | 68 |
| C. The Board Should Not Deny Institution Under <i>General Plastic</i> .....                                                                                                                                                                                                                                                                                                        | 72 |
| XI. CONCLUSION.....                                                                                                                                                                                                                                                                                                                                                                | 72 |
| XII. MANDATORY NOTICES UNDER 37 C.F.R. §42.8.....                                                                                                                                                                                                                                                                                                                                  | 73 |

|    |                                                          |    |
|----|----------------------------------------------------------|----|
| A. | Real Party in Interest Under 37 C.F.R. §42.8(b)(1) ..... | 73 |
| B. | Related Matters Under 37 C.F.R. §42.8(b)(2).....         | 73 |
| C. | Designation of Counsel Under 37 C.F.R. §42.8(b)(3) ..... | 74 |
|    | <b>Service Information</b> .....                         | 75 |

**TABLE OF AUTHORITIES**

|                                                                                                                                                                                                              | <b>Page(s)</b> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| <b>CASES</b>                                                                                                                                                                                                 |                |
| <i>ABS Global, Inc. et al v. Cytonome/ST, LLC,</i><br>IPR2017-02097, Paper 11 (PTAB 2018).....                                                                                                               | 67             |
| <i>Adaptive Spectrum and Signal Alignment, Inc. v. AT&amp;T Enterprises, LLC,</i><br><i>AT&amp;T Mobility LLC, AT&amp;T Mobility II LLC, and AT&amp;T Services, Inc.,</i><br>No. 2:24-cv-00029-JRG-RSP ..... | 73             |
| <i>Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH,</i><br>No. IPR2019-01469, Paper 6 (P.T.A.B. Feb. 13, 2020).....                                                                          | 65, 67, 68     |
| <i>Analytics For Life, Inc. et al v. 8825319 Canada Ltd.,</i><br>IPR2017-01742, Paper 9 (PTAB 2018).....                                                                                                     | 67             |
| <i>Apple v. Fintiv, Inc.,</i><br>IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020).....                                                                                                                           | 68, 70, 71     |
| <i>Becton, Dickinson &amp; Co. v. B. Braun Melsungen AG,</i><br>IPR2017-01586, Paper 8 (Dec. 15, 2017) .....                                                                                                 | 67             |
| <i>Code200, UAB v. Bright Data, Ltd.,</i><br>IPR2022-00861, Paper 18 (P.T.A.B. Aug. 23, 2022).....                                                                                                           | 72             |
| <i>Comcast Cable Commn's, LLC v. Rovi Guides, Inc.,</i><br>IPR2019-00231, Paper 14 (PTAB May 20, 2019) .....                                                                                                 | 71             |
| <i>Digital Check Corp. d/b/a ST Imaging v. E-ImageData Corp.,</i><br>IPR2017-00178, Paper 6 (PTAB 2017).....                                                                                                 | 66             |
| <i>Dish Network v. Broadband iTV,</i><br>IPR2020-01280, Paper 17 (PTAB Feb. 4, 2021).....                                                                                                                    | 69, 70         |
| <i>Fox Factory, Inc. v. SRAM, LLC,</i><br>IPR2016-01876, Paper 8 (PTAB 2017).....                                                                                                                            | 66             |
| <i>Godsbern-Smith Constr. Co. v. Guntert &amp; Zimmerman Const. Div., Inc.,</i><br>No. IPR2021-00050, Paper 24 (PTAB May 7, 2021) .....                                                                      | 65             |

|                                                                                                                             |    |
|-----------------------------------------------------------------------------------------------------------------------------|----|
| <i>NHK Spring Co. v. Intri-Plex Techs., Inc.</i> ,<br>IPR2018-00752, Paper 8 (PTAB Sept. 12, 2018).....                     | 68 |
| <i>Phillips v. AWH Corp.</i> ,<br>415 F.3d 1303 (Fed. Cir. 2005) .....                                                      | 6  |
| <i>Praxair Distribution, Inc. v. INO Therapeutics, LLC d/b/a Ikaria, Inc.</i> ,<br>IPR2015-00893, Paper 14 (PTAB 2015)..... | 66 |
| <i>Samsung Electronics v. Prisia Engineering</i> ,<br>948 F.3d 1342 (Fed. Cir. 2020) .....                                  | 10 |
| <i>Scientific Design Co. v. Shell Oil Co.</i> ,<br>IPR2021-01537, Paper 7 (PTAB 2022).....                                  | 66 |
| <i>VMWare, Inc. v. Intellectual Ventures I LLC</i> ,<br>IPR2020-00470, Paper 13 (PTAB Aug. 18, 2020).....                   | 68 |

#### **STATUTES**

|                           |               |
|---------------------------|---------------|
| 35 U.S.C. § 102(e) .....  | 5, 11, 13, 14 |
| 35 U.S.C. § 103.....      | 1, 2          |
| 35 U.S.C. § 112, ¶6.....  | 6             |
| 35 U.S.C. §§ 311–319..... | 1             |
| 35 U.S.C. § 315(e) .....  | 73            |
| 35 U.S.C. § 325(d) .....  | 65, 66, 67    |

#### **OTHER AUTHORITIES**

|                             |    |
|-----------------------------|----|
| 37 C.F.R. § 42 .....        | 1  |
| 37 C.F.R. § 42.8 .....      | 73 |
| 37 C.F.R. § 42.8(b)(1)..... | 73 |
| 37 C.F.R. § 42.8(b)(2)..... | 73 |
| 37 C.F.R. § 42.8(b)(3)..... | 74 |

|                                   |    |
|-----------------------------------|----|
| 37 C.F.R. § 42.8(b)(4).....       | 74 |
| 37 C.F.R § 42.10(b) .....         | 74 |
| 37 C.F.R. § 42.22(a)(1).....      | 1  |
| 37 C.F.R. § 42.104(a).....        | 1  |
| 37 C.F.R. § 42.104(b)(1)-(2)..... | 1  |
| 37 C.F.R. § 42.104(b)(3).....     | 6  |

**LIST OF EXHIBITS**

| <b>Exhibit</b>  | <b>Short Name</b>     | <b>Description</b>                                                                                                                                                                                                                                                                                                                |
|-----------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Ex. 1001</b> | '122 Patent           | U.S. Patent No. 7,991,122                                                                                                                                                                                                                                                                                                         |
| <b>Ex. 1002</b> | Declaration           | Declaration of Dr. Marc Moonen                                                                                                                                                                                                                                                                                                    |
| <b>Ex. 1003</b> | CV                    | <i>Curriculum Vitae</i> of Dr. Marc Moonen                                                                                                                                                                                                                                                                                        |
| <b>Ex. 1004</b> | '122 File History     | File History of U.S. Patent No. 7,991,122                                                                                                                                                                                                                                                                                         |
| <b>Ex. 1005</b> | Savoor                | U.S. Patent Number 7,400,720 to Savoor et al.                                                                                                                                                                                                                                                                                     |
| <b>Ex. 1006</b> | Tsatsanis             | U.S. Patent Application Publication Number 2006/0029148 to Tsatsanis                                                                                                                                                                                                                                                              |
| <b>Ex. 1007</b> | Marzetta              | “BLAST Training: Estimating Channel Characteristics for High Capacity Space-Time Wireless” by Marzetta                                                                                                                                                                                                                            |
| <b>Ex. 1008</b> | Rezvani               | U.S. Patent Number 7,356,049 to Rezvani                                                                                                                                                                                                                                                                                           |
| <b>Ex. 1009</b> | Docket Control Order  | Docket Control Order, <i>Adaptive Spectrum and Signal Alignment, Inc. v. AT&amp;T Inc., et al.</i> , Case No. 2:24-cv-00029-JRG-RSP (E.D. Tex. July 22, 2024) ECF No. 84.                                                                                                                                                         |
| <b>Ex. 1010</b> | Order Focusing Claims | Order Focusing Patent Claims and Prior Art to Reduce Costs, <i>Adaptive Spectrum and Signal Alignment, Inc. v. AT&amp;T Inc., et al.</i> , Case No. 2:24-cv-00029-JRG-RSP (E.D. Tex. July 22, 2024) ECF No. 104.                                                                                                                  |
| <b>Ex. 1011</b> | Motion to Transfer    | Defendants’ Motion to Transfer Venue Based on the Parties’ Contractual Forum-Selection Clause, and Alternatively, Motion to Stay Case Pending Arbitration, <i>Adaptive Spectrum and Signal Alignment, Inc. v. AT&amp;T Inc., et al.</i> , Case No. 2:24-cv-00029-JRG-RSP (E.D. Tex. July 22, 2024) ECF No. 92 ( <i>Redacted</i> ) |

Nokia of America Corp. (“Nokia” or “Petitioner”) petitions for IPR under 35 U.S.C. §§311–319 and 37 C.F.R. §42 of Claims 1-20 (“the Challenged Claims”) of U.S. Patent No. 7,991,122 (“the ’122 Patent”). Petitioner requests cancellation of the Challenged Claims.

#### **I. STANDING UNDER 37 C.F.R. §42.104(a)**

Petitioner certifies the ’122 Patent is available for IPR, and Petitioner is not barred or estopped from requesting IPR.

#### **II. PAYMENT OF FEES**

Petitioner authorizes Account No. 16-0605 to be charged.

#### **III. OVERVIEW OF CHALLENGES AND RELIEF REQUESTED**

Pursuant to 37 C.F.R. §42.22(a)(1) and 42.104(b)(1)–(2), Petitioner requests cancellation of the Challenged Claims pursuant to the grounds below. Additional support is provided in the Declaration of Dr. Marc Moonen (Ex. 1002).

- **Ground 1A:** Claims 1-6, 8, and 10-18 are unpatentable under 35 U.S.C. § 103 over U.S. Patent Application Publication Number 2006/0029148 to Tsatsanis (“Tsatsanis”).
- **Ground 1B:** Claims 1-20 are unpatentable under 35 U.S.C. § 103 over Tsatsanis in view of U.S. Patent Number 7,400,720 to Savoor et al. (“Savoor”).

- **Ground 2**: Claims 5 and 18 are unpatentable 35 U.S.C. § 103 over Tsatsanis in view of U.S. Patent Number 7,356,049 to Rezvani (“Rezvani”).

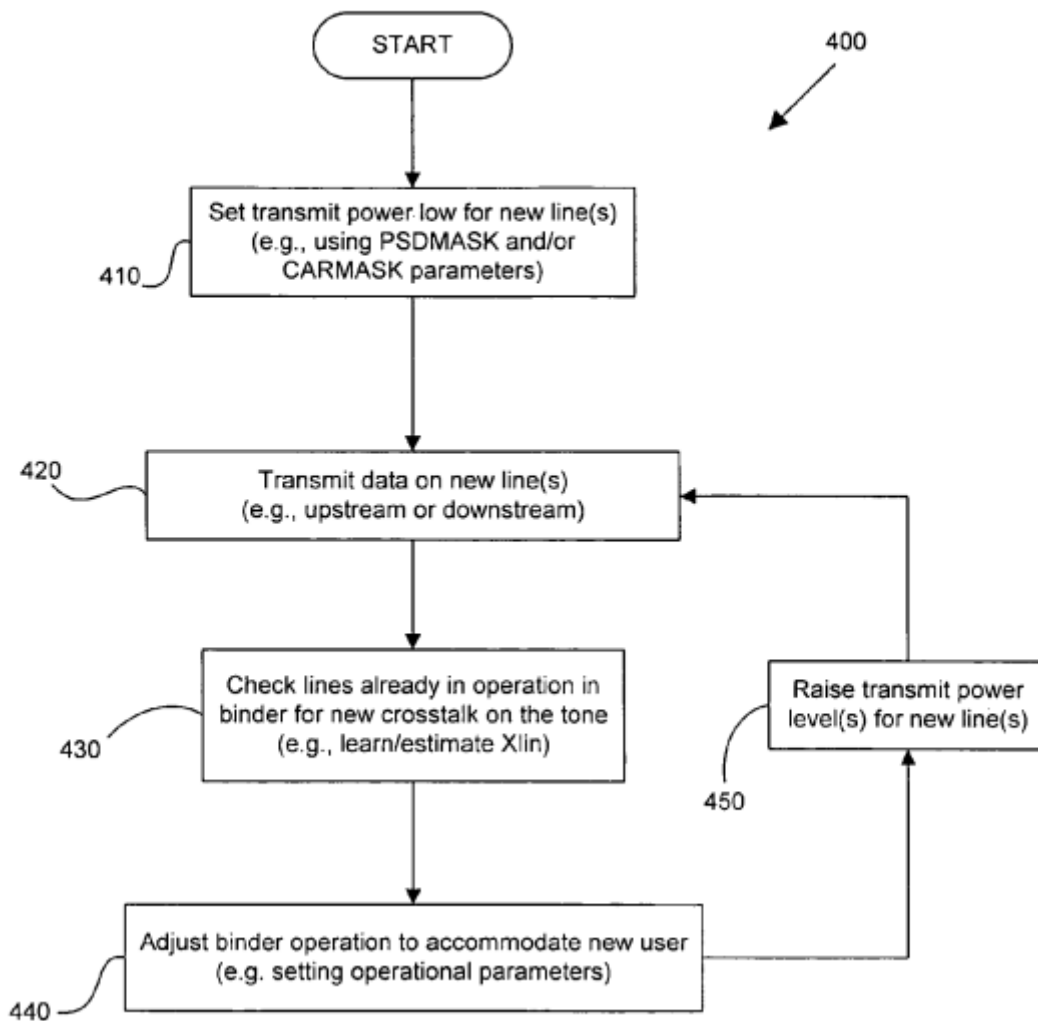
#### **IV. BACKGROUND**

##### **A. Technical Background**

The '122 Patent describes a conventional DSL deployment scenario with subscriber loops being connected to a central office. Ex. 1001, 7:25-38; Ex. 1002, ¶41. The alleged invention includes a controller that “can be used to collect and analyze the operational data and/or performance parameter values” of a DSL system. Ex. 1001 at 4:20-25. The '122 Patent teaches a method of setting the transmit power of a DSL line set low enough to operate in the same vicinity as an already operating DSL line set. Ex. 1001, 15:16-21. Data is transmitted on the new line set, and the DSL lines already in operation check for new crosstalk. Ex. 1001, 15:27-31. The operation is then adjusted to integrate the new line set. Ex. 1001, 15:32-35. This method is illustrated in FIG. 4 of the '122 Patent below.

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Ex. 1001, FIG. 4



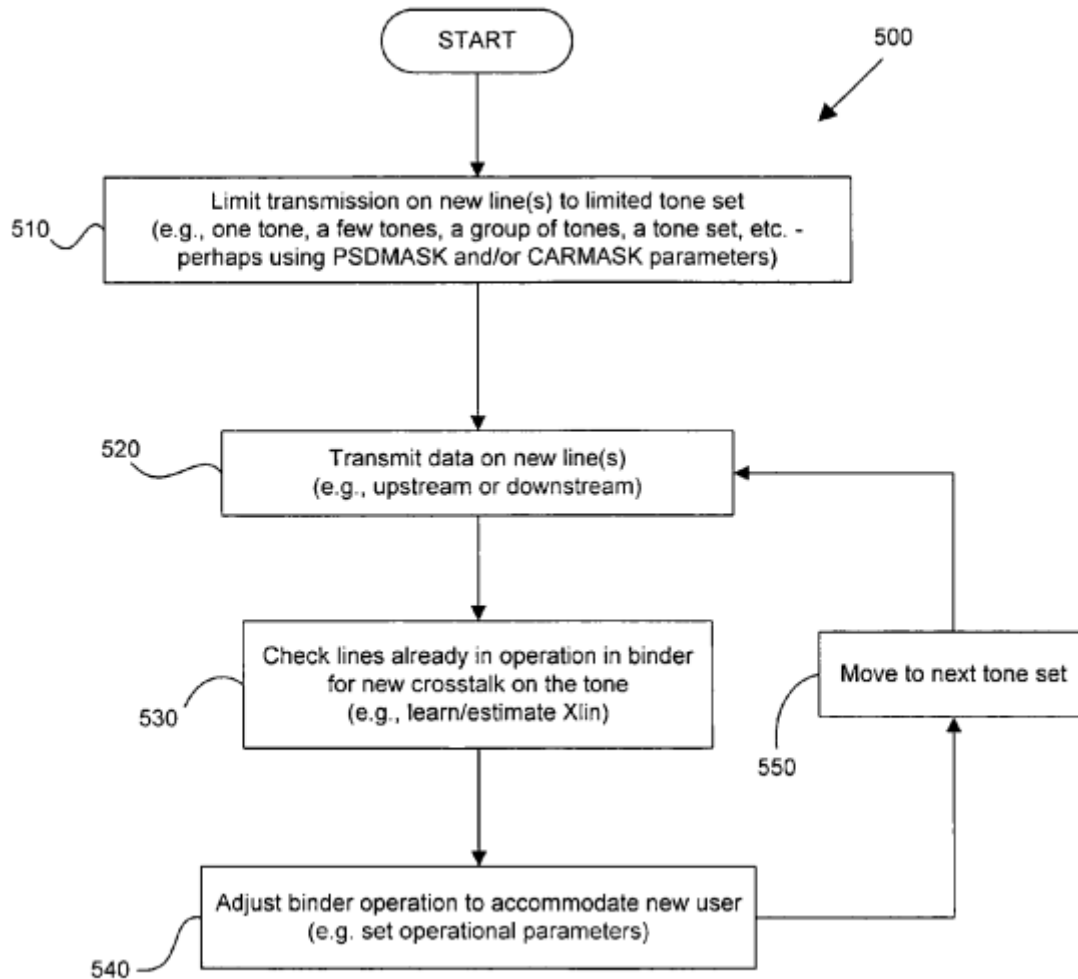
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The '122 Patent also teaches a method of limiting the transmission to a single tone or tone set at one time operating in the same vicinity as an already operating DSL line set. Ex. 1001, 15:46-50. Data is transmitted on a single tone or tone set, and the effects are checked on lines already in operation. Ex. 1001, 15:57-62. Operation is adjusted to integrate a new line set, and the new line set can then be

moved to another tone or tone set for evaluation. Ex. 1001, 15:63-66. This method is illustrated in FIG. 5 of the '122 Patent below.

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**Ex. 1001, FIG. 5**



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Thus, the '122 Patent proposed a DSL deployment method based on controlling transmit power on newly added lines and limiting the number of lines added at a time so as to reduce the disruption due to crosstalk of already-operating

lines. As is explained below, these concepts were well known prior to the '122 Patent. Ex. 1002, ¶42.

### **B. Prosecution History**

The '122 Patent was filed as U.S. Patent Application No. 11/345,215 (“the '215 Application”) on February 1, 2006. Ex. 1001, Cover; Ex. 1002, ¶39. In the only non-final rejection, Claims 1-13 and 20 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent Application Publication Number 2007/0019681 (“Wang”). Ex. 1004, p. 393. Claims 14-19 were indicated as allowable subject matter, and the Examiner stated that the prior art fails to “teach the combination of elements, i.e., data collection unit, analysis unit, etc. and their functions of a controller as recited in the independent claim 14.” Ex. 1004, p. 396. The Applicant amended the other independent claims to incorporate the limitations of Claim 14, and a Notice of Allowance then issued. Ex. 1004, pp. 498-505, 516.

### **C. Priority Date**

In this Petition, Petitioners assume that the earliest priority date for the '122 Patent is June 2, 2005. The '122 Patent has a filing date of February 1, 2006. Ex. 1001, 1; Ex. 1002, ¶40. The '122 Patent claims priority to two provisional applications: provisional application No. 60/686,544 (filed June 2, 2005) and provisional application No. 60/698,112 (filed July 10, 2005). Petitioners assume (without determining) that the priority claims are proper. If Patent owner disputes

the prior art status of any of Petitioners' cited references, Petitioners reserve the right to challenge the priority date.

#### **D. Claim Construction**

Generally, the terms should receive their respective plain and ordinary meaning as understood by a person of ordinary skill in the art under *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005); Ex. 1002, ¶43.

Independent claims 1, 14, and 20 recite several limitations subject to 35 U.S.C. § 112, ¶6. To comply with 3 C.F.R. § 42.104(b)(3), Petitioner identifies the following sections from Ex. 1001 that describe the structure performing the claimed function of each “means plus function” limitation. See Ex. 1002, ¶44.

| Claim Term                                                                                                                                                                                                                                                                                                                                     | Citations to Specification                                                                                                                                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| “sending control signals, via a control signal generator coupled to the analysis unit, to the new DSL line set and to the already-operating DSL line set, further wherein the control signals comprise signals controlling operation of at least one of the following: the new DSL line set; or the already-operating DSL line set;” (Claim 1) | “[A] DSLAM, modem and/or system operating signal generating means 350 (which can be a computer, processor, IC, computer module, etc. of the type generally known) inside or outside the controller 310.” Ex. 1001, 13:65-14:2. |

“a control signal generator coupled to the analysis unit, wherein the control signal generator is configured to send control signals to the new DSL line set and to the already-operating DSL line set, further wherein the control signals comprise signals controlling operation of at least one of the following: the new DSL line set; or the already-operating DSL line set;” (Claim 14)

“sending control signals, via a control signal generator coupled to the analysis unit, to the new DSL line set and to the already-operating DSL line set, further wherein the control signals comprise signals controlling operation of at least one of the following: the new DSL line

|                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| set; or the already-operating DSL line set;” (Claim 20)                                                                                                                                                                                                                                                                                                 |                                                                                                                |
| <p>“a data collection unit configured to collect operational data from a new DSL line set and an already-operating DSL line set;” (Claim 14)</p> <p>“collecting operational data, via a data collection unit, from the new DSL line set and the already-operating DSL line set;” (Claims 1, 20)</p>                                                     | <p>“[A] computer, processor, IC, computer module, etc. of the type generally known.” Ex. 1001, 13:35-39.</p>   |
| <p>“performing, via an analysis unit coupled to the collection unit, the following operations: analyzing the collected operational data; determining an operational configuration for at least one DSL line in the new DSL line set that will allow the new DSL line set to join the already-operating DSL line set without disrupting the already-</p> | <p>“[A] computer, processor, IC, computer module, etc. of the type generally known.” Ex. 1001, 13:65-14:2.</p> |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <p>operating DSL line set; evaluating data received by the new DSL line set; and evaluating data received by the already-operating DSL line set;” (Claim 1)</p> <p>“an analysis unit coupled to the collection unit, wherein the analysis unit is configured to: analyze the collected operational data; determine an operational configuration for at least one DSL line in the new DSL line set that will allow the new DSL line set to join the already-operating DSL line set without disrupting the already-operating DSL line set; evaluate data received by the new DSL line set; and evaluate data received by the already-operating DSL line set;” (Claim 14)</p> |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <p>“performing the following operations, via an analysis unit coupled to the collection unit: analyzing the collected operational data; determining an operational configuration for at least one DSL line in the new DSL line set that will allow the new DSL line set to join the already-operating DSL line set without disrupting the already-operating DSL line set; evaluating data received by the new DSL line set; and evaluating data received by the already-operating DSL line set;” (Claim 20)</p> |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

Without waiving any right to raise indefiniteness in the District Court due to the fact that the specification does not describe sufficiently-definite structure or an algorithm, review is still appropriate here because a determination of unpatentability is not impossible given that the prior art references disclose at least the same structure for performing the same functions as described in the specification and claims. *Samsung Electronics v. Prisia Engineering*, 948 F.3d 1342, 1355 (Fed. Cir. 2020); Ex. 1002, ¶44.

## **V. PRIOR ART REFERENCES**

### **Tsatsanis (Ex. 1006)**

Tsatsanis is a U.S. Patent Application Publication filed on August 6, 2004. Ex. 1006, 1. Tsatsanis was not cited and was not considered during prosecution. Ex. 1002, ¶45. Tsatsanis is prior art under 35 U.S.C. § 102(e).

Much like the '122 Patent, Tsatsanis is directed to “a method for canceling crosstalk type coupling in a multi-channel communication system.” Ex. 1006, [0009]. Tsatsanis discloses a training signal that is sent on a new channel at a first power level. Ex. 1006, [0009]. The first power level is a low power level that does not disrupt operation of other already operating channels. Ex. 1006, [0009]. Coupling components (i.e., crosstalk components) are then detected between the channels. Ex. 1006, [0009]. The coupling components are processed to generate filter coefficients, which configure filters to generate cancellation signals canceling the coupling components. The power level is then increased, and the filter coefficients are modified to continue canceling crosstalk. Ex. 1006, [0010]. Figure 9 of Tsatsanis (reproduced below) illustrates a method provided by Tsatsanis for activation and provisioning of a new channel for downstream transmission. The steps highlighted in blue in Figure 9 below involve activating a new channel and sending a training signal on the newly activated channels to generate crosstalk related information. The crosstalk related information is transmitted to a MIMO

transceiver in order to reduce crosstalk. Tsatsanis is not limited to the downstream direction and also includes a method for activation and provisioning of a new channel for upstream transmission.

Ex. 1006, FIG. 9 (annotated)

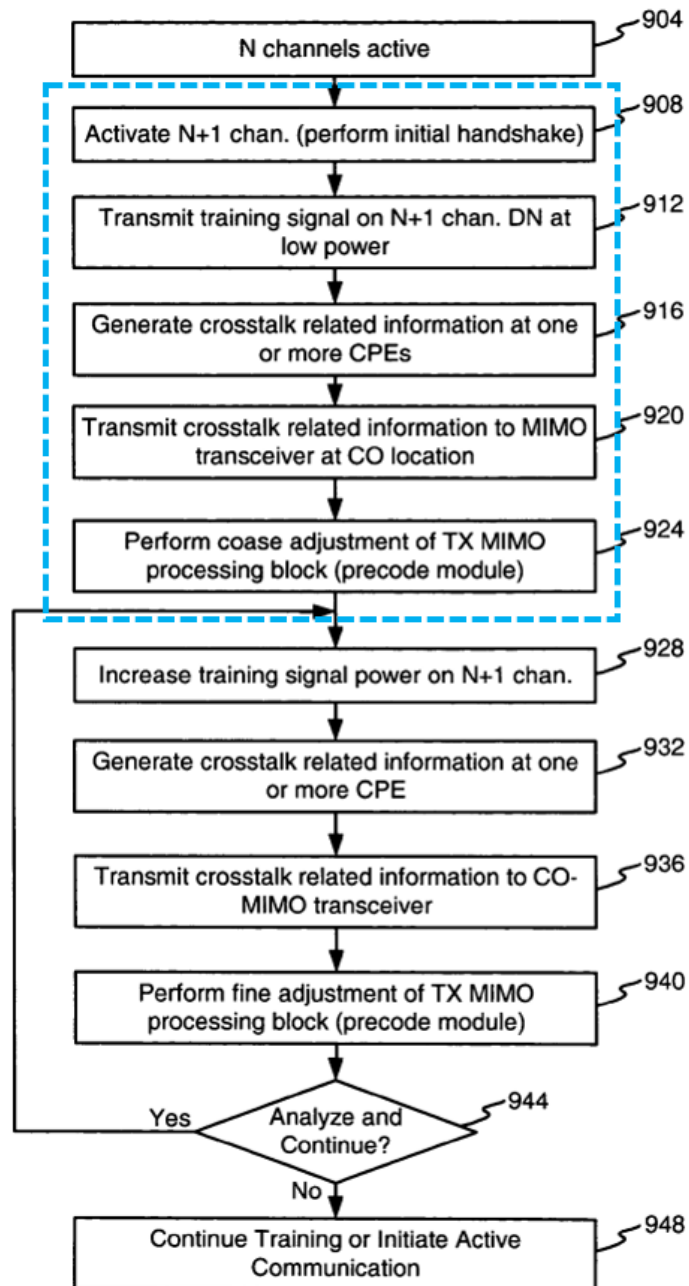


Fig. 9

### **Savor (Ex. 1005)**

Savor is a U.S. Patent filed on October 5, 2004. Ex. 1005, 1. Savor was not cited and was not considered during prosecution. Ex. 1002, ¶47. Savor is prior art under 35 U.S.C. § 102(e).

Savor is directed to a method “that can be used for modifying a control parameter associated with a digital subscriber line (DSL) service.” Ex. 1005, Abstract. The method of Savor involves receiving a real-time performance parameter measured after a new DSL circuit is placed in-service and modifying a value of a control parameter based on the performance parameters. Ex. 1005, Abstract. This method is highlighted in blue in FIG. 2 (reproduced below).

Ex. 1005, FIG. 2 (annotated)

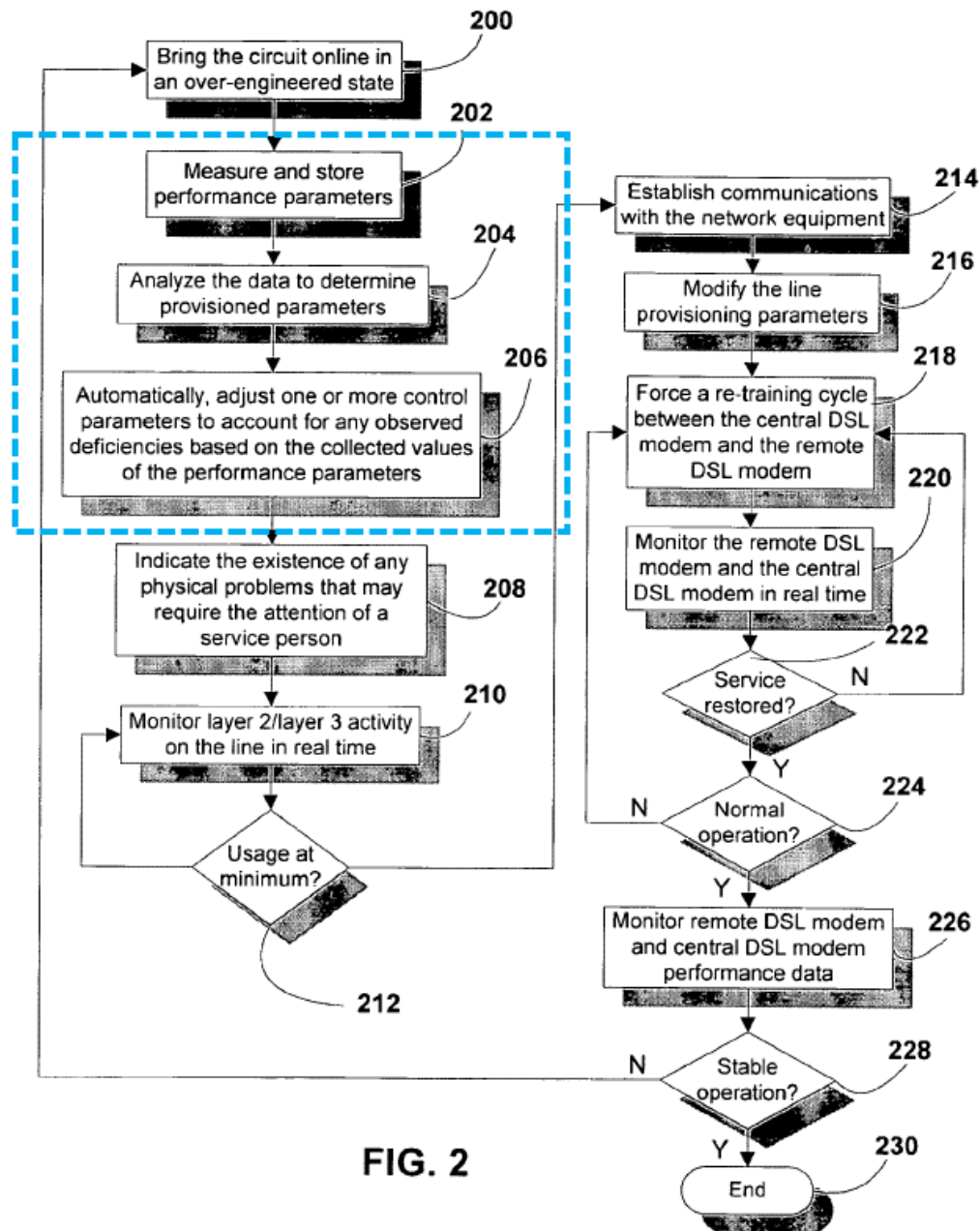


FIG. 2

Rezvani (Ex. 1008)

U.S. Patent No. 7,356,049 to Rezvani was filed on December 30, 2002, and issued on April 8, 2008. Ex. 1005, 1. Rezvani was not cited and was not considered during prosecution. Ex. 1002, ¶49. Rezvani is prior art under 35 U.S.C. § 102(e).

Rezvani is directed to “a method and apparatus for optimizing channel capacity of multi-line multi-tone communications such as X-DSL among subscriber lines which are bundled together.” Ex. 1005, 2:36-40, Abstract.

FIG. 12 (below) of Rezvani illustrates “the processes associated with an embodiment of the invention in which the spectrum manager manages profiling, interference determination, demand determination and spectral allocation for each of the subscriber lines in the bundle.” Ex. 1005, 4:14-18, 17:47-51, FIG. 12. The process includes an interference determination phase, where “[a] training sequence is sent by the interference module 934 on selected sub-channels of successively selected subscriber lines while interference on the same sub-channels is monitored on the receive path of all of the other lines in the bundle.” Ex. 1005, 14:41-45. “This is continued until all subscriber lines have performed as both interferer and interfere and the corresponding data is accumulated.” Ex. 1005, 14:45-47. After injecting the training sequence, “[b]ased on this data an interference matrix is calculated . . . that shows for each sub-channel on each subscriber line the relative interference in terms of noise injected from all other subscriber lines.” Ex. 1005, 14:47-51. These steps are highlighted in blue in FIG. 12 below. The training sequence may be combined with subscriber line specific orthogonal key codes code division multiplexing techniques (CDMA), allowing the training to be conducted in parallel on all lines,

and monitoring is done with a decoder using the orthogonal key codes. Ex. 1005, 8:33-40, 18:46-53.

Ex. 1008, FIG. 12 (annotated)

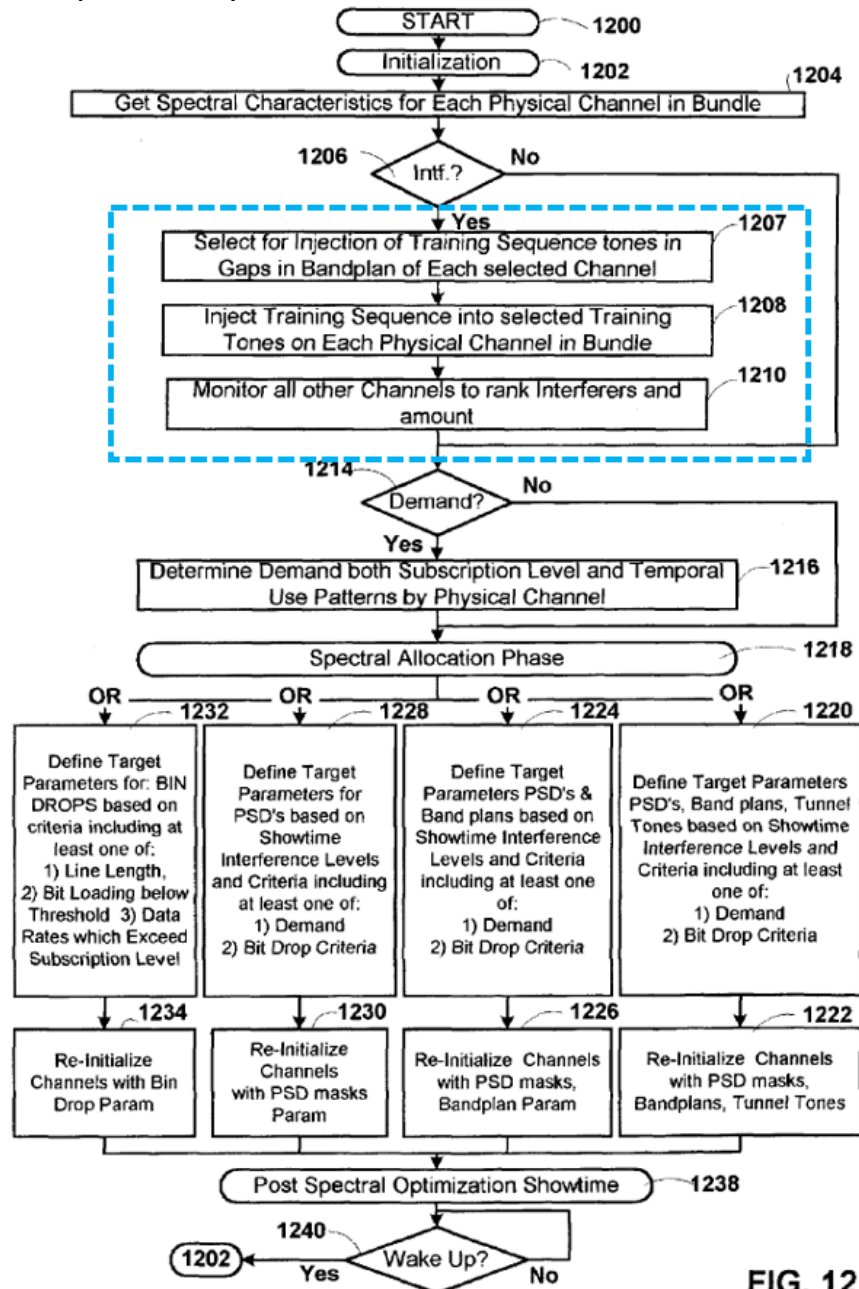


FIG. 12

## **VI. LEVEL OF ORDINARY SKILL IN THE ART**

A person of ordinary skill in the art (“POSITA”) pertinent to the ’122 Patent would have been a person with at least a Bachelor’s Degree in electrical engineering, computer engineering, or similar discipline and had approximately two years of experience with electronic communication systems and familiarity with standards governing DSL systems. Ex. 1002, ¶35. A person with a different degree but with additional relevant experience could still qualify if the additional experience compensates for the different educational background. Ex. 1002, ¶35.

## **VII. THE CHALLENGED CLAIMS ARE UNPATENTABLE**

The ’122 Patent contains 20 claims, of which claims 1, 14, 20 are independent and recite analogous limitations. Claim 1 is directed to a method and Claim 14 is directed to an apparatus. Claim 20 is directed to a computer program product. The Challenged Claims are disclosed and/or taught by the prior art. Ex. 1002, ¶52.

## **VIII. Ground 1A: Claims 1-6, 8, and 10-18 are rendered obvious over Tsatsanis.**

**Ground 1B: Claims 1-20 are rendered obvious over Tsatsanis in view of Savor.**

### ***1. Motivation to Combine***

Although Tsatsanis discloses each limitation of almost all of the challenged claims, a POSITA would have been motivated to either modify Tsatsanis or combine it with the knowledge of a POSITA, or with Savor. Ex. 1002, ¶53. Specifically, a

POSITA would have been motivated to modify Tsatsanis with the teachings of Savor to benefit from the additional performance measurements taught by Savor.

Tsatsanis and Savor are analogous art. For example, Tsatsanis teaches a method for activating and provisioning a new channel alongside active and provisioned channels. Ex. 1006, Abstract; Ex. 1002, ¶54. Tsatsanis describes transmitting a training signal at a low power level on the new channel, detecting coupling components between the channels, and adjusting filter coefficients to generate cancellation signals and pre-cancel the coupling components. Ex. 1006, [0081]-[0088]; Ex. 1002, ¶54. The power of the training signal is incrementally adjusted and the filter coefficients are adjusted to continue cancelling crosstalk until the new channel is fully active. Ex. 1006, [0081]-[0088]; Ex. 1002, ¶54.

Savor teaches a method with a similar framework to that of Tsatsanis. Ex. 1002, ¶55. Specifically, Savor teaches a method for measuring performance parameters of DSL lines and modifying control parameters based on the measured performance parameters. Ex. 1005, Abstract; Ex. 1002, ¶55. The performance parameters measured in Savor include quiet noise line measurements, which allow the determination of a level of cross talk. Ex. 1005, 6:62-7:16. Savor teaches that the source of the noise may be determined based on the “fingerprints” of the noise. Ex. 1005, 6:62-7:16.

A POSITA would have been motivated to modify the method for activating and provisioning a new channel taught by Tsatsanis by adding the teachings of Savoor related to measuring performance characteristics. Ex. 1002, ¶56. Upon activation of a new channel (as disclosed by Tsatsanis), the POSITA would have been motivated to additionally measure the performance parameters tracked by Savoor to ensure acceptable performance by the new channel and integration with the already-active channels. Ex. 1002, ¶56; Ex. 1005, Table 1. Indeed, applying well-known measurement techniques for measuring characteristics of DSL lines to the activation of those same DSL lines is a natural step. Ex. 1002, ¶56.

Furthermore, a POSITA would have been motivated to modify the channel parameters disclosed by Tsatsanis as an additional way to integrate the newly active channel into operation with the already active channels. Ex. 1002, ¶57; Ex. 1005, Table 2. A POSITA would have understood that performance parameters in addition to coupling components would be useful for tracking a newly activated line and that modifying control parameters would improve these performance parameters for the newly activated line. Ex. 1002, ¶57.

A POSITA would have had a reasonable expectation of success in combining Tsatsanis and Savoor because Tsatsanis and Savoor both have the same general structure. Tsatsanis and Savoor each involve measuring performance of DSL lines and making adjustments to parameters to improve performance of the channels. Ex.

1002, ¶58; Ex. 1006, [0004], [0081]-[0088]; Ex. 1005, 5:1-8:12; Ex. 1002, ¶58. Upon activation of a new channel (as disclosed by Tsatsanis), the POSITA would have been motivated to additionally measure the performance parameters tracked by Savor to ensure acceptable performance by the new channel and integration with the already-active channels. Ex. 1002, ¶56; Ex. 1005, Table 1. In particular, Savor provides additional detail on 24 specific performance parameters which are measured during optimization of the DSL network. Ex. 1005, 5:6-10. Savor discloses exemplary, non-limiting DSL performance parameters including, for example, several parameters representing noise, several parameters representing information about each tone, a parameter representing code violations for each line, and a parameter representing forward error correction information. Because measurements of these parameters would be useful to know when initializing a new line, a POSITA would have been motivated to measure them to define crosstalk cancellation upon activation of a new line as disclosed by Tsatsanis. Ex. 1002, ¶56. Indeed, applying well-known measurement techniques for measuring characteristics of DSL lines to the activation of those same DSL lines is a natural step. Ex. 1002, ¶56.

## **2. Overview of Ground 1**

The overlap between the supposed issues and the alleged invention to solve those issues claimed by the '122 patent and what was already taught by Tsatsanis is significant.

Tsatsanis ***addresses the same issue*** as the '122 Patent. Ex. 1002, ¶60. Specifically, each of Tsatsanis and the '122 Patent addresses the issue of how to add new DSL lines to already-active DSL lines while preventing disruptive crosstalk. *Compare* Ex. 1001, 1:44-49 (“[s]ignificant problems arise [in] already-operating DSL lines when one or more previously unused twisted pairs first activate for DSL operation (or for DSL service upgrade). Such activation can disrupt the already-operating DSL systems when they receive crosstalk caused by the new service(s)”), *with* Ex. 1006, [0007] (“[w]hen a channel is activated, it generates crosstalk that couples into the other lines that are already in service. This crosstalk disrupts the signal on the other lines ... [a]s a result, the activation of a new line can bring down, i.e. crash, communication service on the other previously provisioned and currently in operation communication lines. This occurs because crosstalk from the signal on the newly activated channel couples into the other channels and the MIMO processing unit is not configured to mitigate or cancel the crosstalk from the signal on the newly active channel”); Ex. 1002, ¶60. Each of Tsatsanis and the '122 Patent disclose that crosstalk may disrupt already-active channels when adding a new

channel and propose solutions for avoiding this. Ex. 1001, 1:44-49; Ex. 1006, [0007]; Ex. 1002, ¶60.

Moreover, Tsatsanis *solves the alleged problem in the same manner* as the '122 Patent. Ex. 1002, ¶61. Each of Tsatsanis and the '122 Patent teach measuring crosstalk levels during training of the new DSL line set and adjusting to cancel crosstalk. Ex. 1002, ¶61; *compare* Ex. 1001 ('122 Patent), 15:27-35 (“the line(s) already in operation (for example, vectored lines) check at 430 for new crosstalk that can be traced to and/or identified with the new line set ... [o]peration can be adjusted at 440 to accommodate, integrate, etc. the new line set (for example, by setting various operational parameters for the vectored line set and/or the new line set)”), 15:57-64 (“[T]he effects are checked at 530 in the lines already in operation (for example, a vectored line set). Again, the crosstalk that is learned can include, for example, learning and/or estimating  $X_{lin}$  ... the operation of the vectored set, new line set, etc. can be adjusted to accommodate, integrate, etc. the new line set”), *with* Ex. 1006 (Tsatsanis), [0009] (“a method for canceling crosstalk type coupling ... detects one or more coupling components on the one or more other channels and processing the one or mor coupling components to generate one or more filter coefficients. The filter coefficients are used to configure one or more filters ... the one or more filters are configured to generate cancellation signals to cancel the one or more coupling components”). Thus, both Tsatsanis and the '122 Patent address

the alleged issue by transmitting a training signal on a new line, measuring crosstalk caused by the training signal, and making adjustments before bringing the new line into full operation. Ex. 1002, ¶61.

Each of the '122 Patent and Tsatsanis teaches ***training the new DSL line set may be done by limiting the transmission power on the new DSL line set*** to avoid disruptive crosstalk. Ex. 1002, ¶62. For example, the '122 Patent teaches that, in one method, “the transmit power of a DSL line set (which may be one or more DSL lines) is set low enough to be non-disruptive to a vectored line set already operating in the same vicinity (for example, the same binder). The transmit power of the new line set can be controlled using various operational parameters (for example, the PSDMASK and/or CARMASK parameters).” Ex. 1001, 15:16-23. Likewise, Tsatsanis teaches that a transmission power of a training signal may be set to a low level so that the crosstalk generated by a new line is not disruptive to already-operating lines. Ex. 1006, [0081] (“[i]n contrast to prior art methods which would transmit a training or other type signal at full power, the method of FIG. 9 transmits a low power training signal on channel N+1. This occurs at step 912. ***Use of a low power signal for purposes of training or at other times, provides the benefit of not disrupting operation on the other active channels though unwanted crosstalk coupling. Use of a low power signal inhibits crosstalk coupling***”). In both the '122 Patent and Tsatsanis, transmit power is increased after adjustments are made to

cancel crosstalk. Ex. 1001 15:40-45 (“[at] 450 the transmit power of one or more lines of the “new” line set can be raised (for example, to another testing level or to full operational level). Data again can be transmitted by the new line set at 420 to either re-evaluate crosstalk effects or to begin normal operation”); Ex. 1006, [0085] (“the operation increases the training signal power level on channel N+1. The power level of the training signal may now be at full or normal power or at intermediate power level”).

The '122 Patent teaches and Tsatsanis ***at least renders obvious that training the new DSL line set may be done by limiting transmission to certain tones on the new DSL line set*** to avoid disruptive crosstalk. Ex. 1002, ¶63. For example, the '122 Patent teaches that in another method, “data transmission by a new line set (for example, non-vectored lines and/or lines not yet in operation) is limited to a single tone or other tone set. Power does not necessarily have to be limited in this embodiment because FEC measures on the vectored line set typically can address the relatively minor noise effects caused by one or several new crosstalkers on a single tone or frequency.” Ex. 1001, 15:46-54. The tones are limited by using CARMASK or PSDMASK. Ex. 1001, 2:37-45 (“CARMASK or PSDMASK (or any other transmit power and/or spectrum control) can be used to introduce a new line on a tone-by-tone basis into a vectored or non-vectored binder or other line set. That is, only one different tone at a time (on successive restarts) could be turned on by

CARMASK, PSDMASK, etc. so that affected, already-operating lines in the same binder can make proper adjustments before the next tone is turned on by the new line”); Ex. 1002, ¶63. Tsatsanis renders obvious this feature by teaching that tones (i.e., frequencies) may be processed individually. Ex. 1006, [0061] (“the output of the FFT module 620 comprises a total of 256 tones on each of fourteen channels or lines for each block, symbol, or register transfer. It is contemplated that the MIMO block 624 may jointly process all of the fourteen channels *for each of the 256 tones*. Thus, processing may occur *on one frequency at a time* (fourteen channels) as the system *cycles through the 256 frequencies*, which represent the data”); Ex. 1002, ¶63.

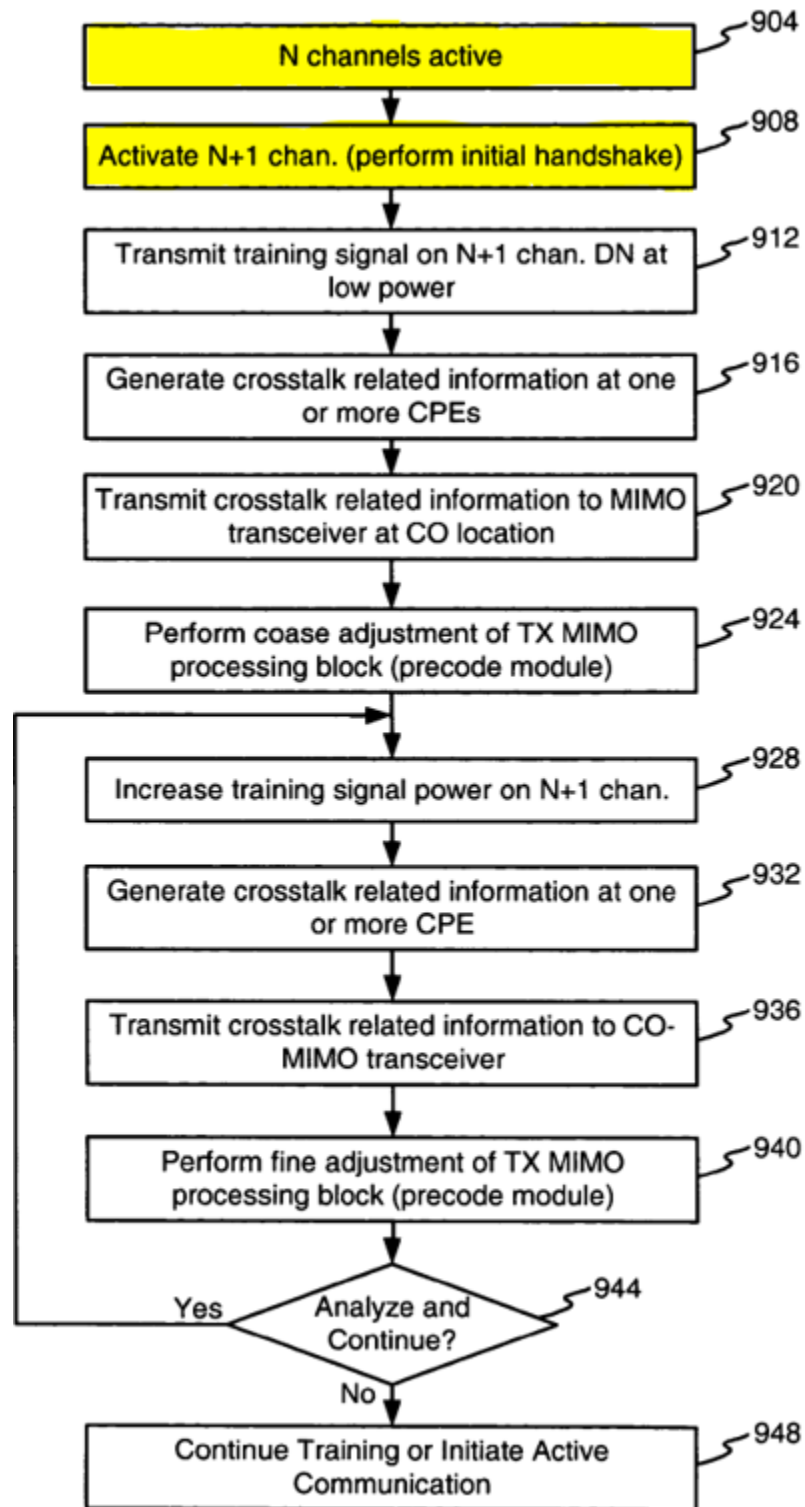
### 3. *Claim 1*

#### ***1[pre]: A method of adding a new DSL line set to an already-operating DSL line set, the method comprising:***

To the extent the preamble is limiting, Tsatsanis discloses 1[pre]. Ex. 1002, ¶64. For example, Tsatsanis teaches that “the operation initiates provisioning and activation, such as with a training process, of a new channel N+1.” Ex. 1006, [0081]. The operation is initiated when “one or more other channels associated with a communication device are provisioned and active, or are capable of being engaged in active communication.” Ex. 1006, [0081]. Thus, Tsatsanis discloses adding (“provisioning and activation”) of a new DSL line set (“new channel N+1”) to an already-operating DSL line set (“one or more other channels ... are provisioned and

active”). Ex. 1002, ¶64. Further, Tsatsanis explains that channels are DSL lines. Ex. 1006, [0006] (“In general, *new lines, i.e. channels*, are activated....”). Tsatsanis further teaches that there may be multiple “channels N+1, N+2, ... (not shown), which may not be provisioned and/or active.” Ex. 1006, [0045]. A POSITA would have understood that after provisioning and activation of channel N+1, channel N+2 and other channels may be activated in turn by repeating the procedure. Ex. 1002, ¶64. Blocks 904 and 908 (yellow) of annotated FIG. 1 below illustrate this activation of a new channel with N other already-active channels.

Ex. 1006, FIG. 9 (annotated)



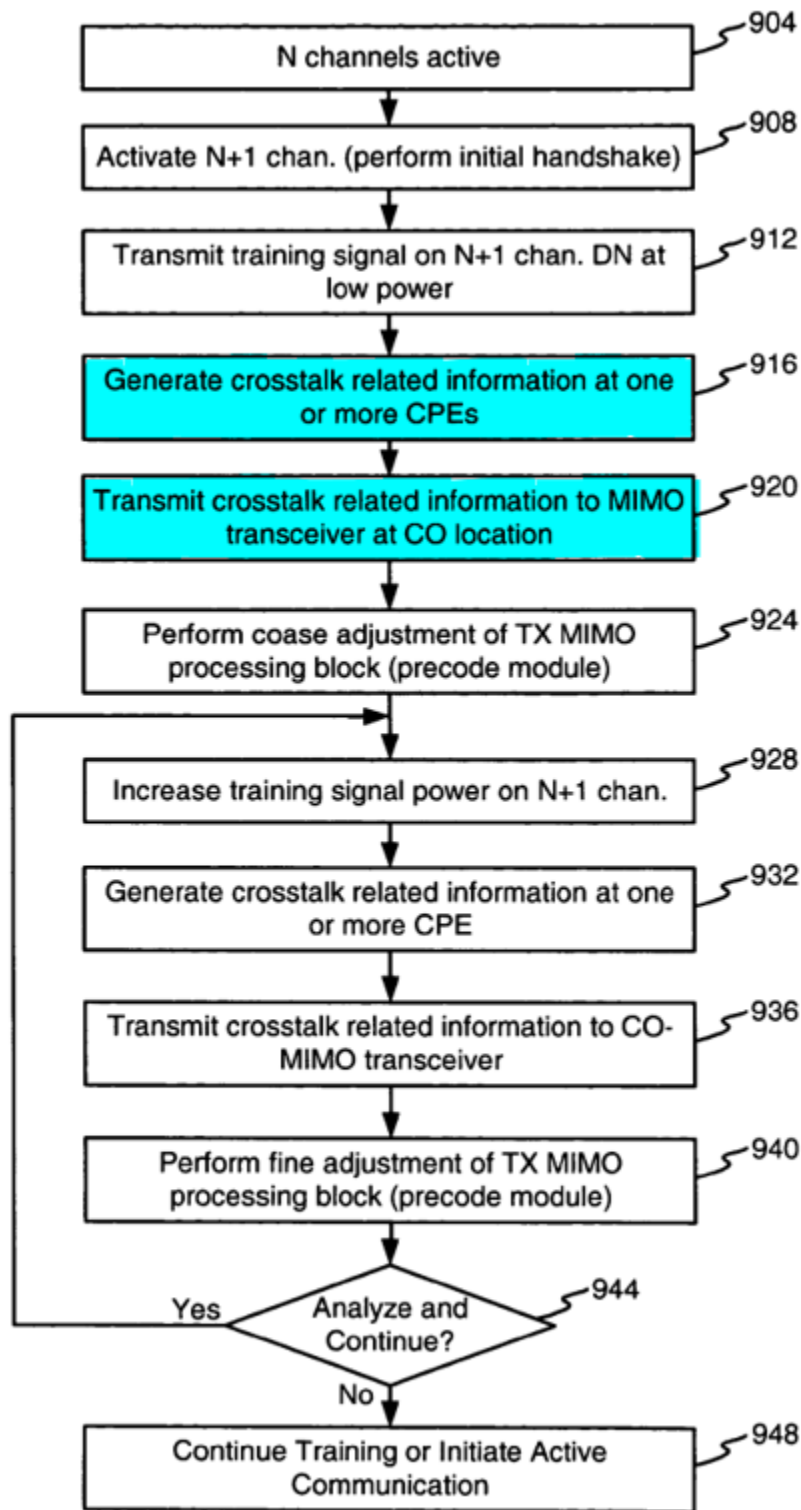
***1[a]: collecting operational data, via a data collection unit,  
from the new DSL line set and the already-operating DSL  
line set;***

Tsatsanis or in view of Savoor discloses or renders obvious 1[a]. Ex. 1002, ¶65. First, a POSITA would have understood that “operational data” would at least include data collected from operation of the new DSL line set and the already-operating DSL line set. Ex. 1006, [0081]; Ex. 1002, ¶65. Tsatsanis teaches transmitting a low power training signal from a central office (CO) to a customer premises equipment (CPE) on the new DSL line set to avoid disruption of the already-operating DSL line set. Ex. 1006, [0081]. The CPE calculates “appropriate channel parameters from the received signals” and communicates the channel parameters to a transceiver at the CO. Ex. 1006, [0081]-[0083]. The channel parameters constitute the claimed “operational data” because they are calculated based on operation of the new DSL line set and the already operating line set. Ex. 1006, [0081]-[0083]. The channel parameters are calculated from the plural “received ***signals***” which a POSITA would have understood includes all received signals in the already-operating DSL line set as well as in the new DSL line set. Ex. 1002, ¶65. Ex. 1006, [0081]-[0083]; Ex. 1002, ¶65.

The channel parameters include “crosstalk related information at one or more of the CPEs.” Ex. 1006, [0081]. Tsatsanis further states that the crosstalk related information for CPE  $i$ ,  $i=1, \dots, N$ , comprises the response of the crosstalk channel

coupling from the new source  $N+1$  to the victim CIP  $i$ .” Ex. 1006, [0083]. Blocks 916 and 920 (blue) of annotated FIG. 9 below illustrate the collection of the operational data.

Ex. 1006, FIG. 9 (annotated)



The receiver located at the CO discloses the claimed “data collection unit” because it collects the channel parameters from the CPEs. Ex. 1006, [0081]-[0083], [0066]-[0071]; Ex. 1002, ¶66. The receiver is shown in FIG. 7 below at block 728 (yellow). Furthermore, the ’122 Patent admits that the data collection unit may be “a computer, processor, IC, computer module, etc. *of the type generally known.*” Ex. 1001, 13:35-39.

Ex. 1006, FIG. 7 (annotated)

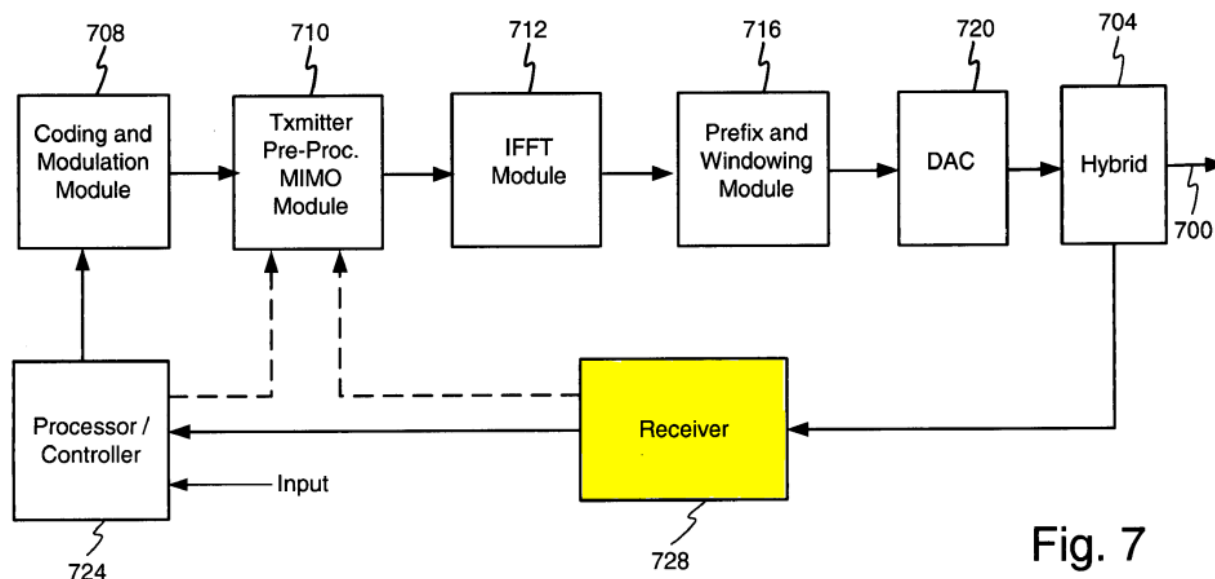


Fig. 7

To the extent it is argued that Tsatsanis does not disclose or render obvious 1[a], Tsatsanis in view of Savor does. Ex. 1002, ¶67. Savor teaches that “several measurements are taken, recorded, and analyzed for the DSL network 100 to promote statistical confidence.” Ex. 1005, 5:1-11 Specifically, measurements are taken of the “performance parameters” (or “operational data”) and are measured

during “optimization of the DSL network.” Ex. 1005, 5:1-11. The measurements are taken by a “termination unit” of the DSL circuit, which teaches the claimed “data collection unit.” Ex. 1005, Abstract. The termination unit may be a “DSL modem.” Ex. 1005, 2:38-48.

Alternatively, Savoor also discloses the “central office computer 126” that anticipates the data collection unit. Ex. 1005, 8:35-43. “The central office computer 126 can interface with the ATU-Cs and the ATU-Rs, or their respective agents, in order to obtain performance data, extract provisioning data, implant provisioning data, and control the circuit provisioning in order to provide optimum performance of each DSL circuit.” Ex. 1005, 8:35-43.

***1[b]: performing, via an analysis unit coupled to the collection unit, the following operations: analyzing the collected operational data; determining an operational configuration for at least one DSL line in the new DSL line set that will allow the new DSL line set to join the already-operating DSL line set without disrupting the already-operating DSL line set***

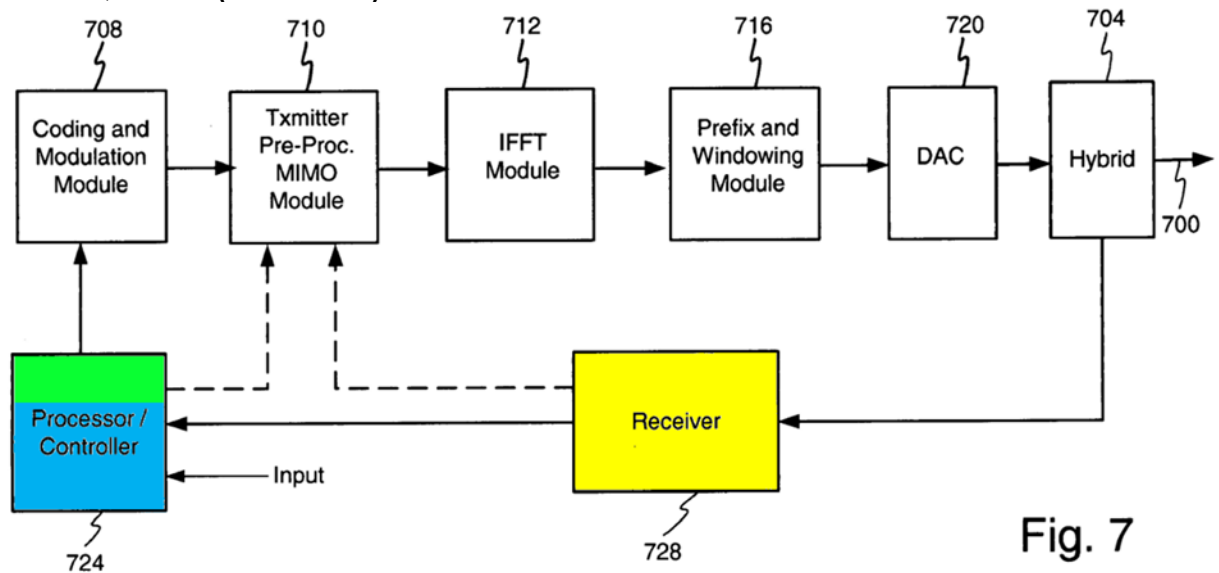
Tsatsanis alone or in view of Savoor discloses or renders obvious 1[b]. Ex. 1002, ¶69. First, it should be noted that the term “operational configuration” is not defined in the ’122 Patent and is only used in the claims. Regardless, a POSITA would have understood that the plain and ordinary meaning of “operational configuration” would include characteristics of an operating DSL line set in the new

DSL line set that allow the new DSL line set to operate without disrupting the already-operating DSL line set. Ex. 1002, ¶69.

In that regard, Tsatsanis teaches that operational data received by the CO from the CPE is “further processed and appropriate channel information extracted.” Ex. 1006, [0083]. Specifically, the operational data may be delivered from the receiver to the processor, which provides output to the transmitter MIMO pre-processing module (also referred to as a MIMO precoder). Ex. 1006, [0066]. Tsatsanis further states that “[b]ecause access to all the signals is available at the CO location, MIMO pre-coding may occur at that location. Thus, at step 924, coarse adjustments are made to the precoding MIMO processing unit or module.” Ex. 1006, [0084]. Adjustments are made to pre-cancel unwanted crosstalk, i.e. adjustments are made so that the new DSL line set (together with the already-operating DSL line set) has an “operational configuration” that allows the “new DSL line set to join the already-operating DSL line set without disrupting the already-operating DSL line set.” Ex. 1001, Claim 1. A POSITA would have understood that in order to provide output to cause the MIMO pre-processing module to adjust the operational configuration in this manner, the processor would first necessarily determine the operational configuration to adjust to, or it would at least be obvious to determine the operational configuration prior to adjustment. Ex. 1002, ¶70.

The processor (blue in annotated FIG. 7 below) teaches the claimed “analysis unit” because it would first necessarily determine the operational configuration to adjust to, or it would at least be obvious to determine the operational configuration prior to adjustment. Ex. 1002, ¶71. Furthermore, the ’122 Patent admits that the analysis unit may be “a computer, processor, IC, computer module, etc. *of the type generally known.*” Ex. 1001, 13:35-56.

Ex. 1006, FIG. 7 (annotated)



To the extent it is argued that Tsatsanis does not render obvious 1[b], Tsatsanis in view of Savor does. Ex. 1002, ¶72. Savor specifically teaches that “performance parameters measured in step 202 ... are analyzed in order to make a number of determinations” including “any cross talk, any white noise, and any non-linear echos.” Ex. 1005, 6:62-7:16.

Furthermore, control parameters are then “automatically adjusted to account for any observed deficiencies based on the collected values of the performance parameters.” Ex. 1005, 7:26-43. A POSITA would have understood that in order to adjust for observed deficiencies such as crosstalk, there must be a determination made of an operational configuration for removing the deficiencies, i.e. an “operational configuration for at least one DSL line in the new DSL line set that will allow the new DSL line set to join the already-operating DSL line set without disrupting the already-operating DSL line set.” Ex. 1002, ¶73. Control parameters of the DSL line sets determine the “operational configuration” of the DSL lines since the adjusting them changes the operational characteristics (i.e., performance parameters) of the DSL lines. Ex. 1002, ¶73.

Regarding the analysis unit, Savor teaches that “[i]n a particular embodiment, the entire process can be encapsulated in a software program that can be executed by a computer connected to the DSL network, e.g., the central office computer 126. The central office computer 126 can interface with the ATU-Cs and the ATU-Rs, or their respective agents, in order to obtain performance data, extract provisioning data, implant provisioning data, and control the circuit provisioning in order to provide optimum performance of each DSL circuit.” A POSITA would have understood that the central office computer is analyzing the performance parameters

collected from the termination unit and thus teaches the “analysis unit.” Ex. 1005, 8:35-43; Ex. 1002, ¶74.

***1[c]: evaluating data received by the new DSL line set; and  
evaluating data received by the already-operating DSL line  
set; and***

Tsatsanis alone discloses or renders obvious 1[c]. Ex. 1002, ¶75. For example, as described above with respect to 1[b], Tsatsanis teaches that operational data received by the CO from the CPE is “further processed and appropriate channel information extracted” prior to adjustment. Ex. 1006, [0083]. The operational data would include “data received by the new DSL line set” and “data received by the already-operating DSL line set” because it includes crosstalk information from the new DSL line set in response to signals transmitted in the already-operating DSL line set, as well as crosstalk information from the already-operating DSL line set in response to the training signal sent on the new DSL line set, as described with respect to 1[b]. Ex. 1002, ¶75; *see supra*, § VIII.3.1[b].

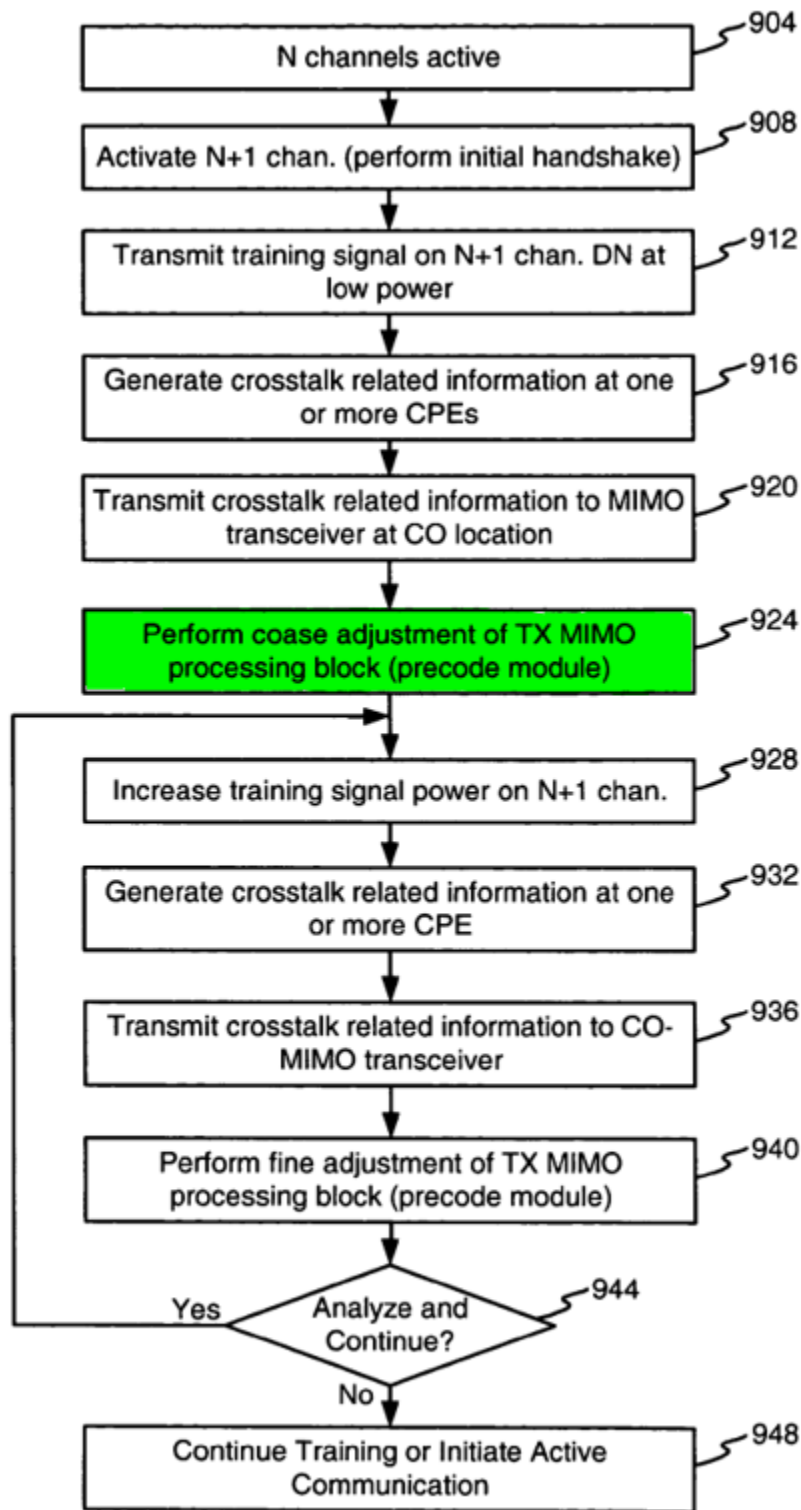
Furthermore, after adjustment of the transmitter MIMO processing module, the “operation increases the training signal power level on channel N+1.” Ex. 1006, [0085]. Crosstalk related information is then generated again and transmitted to the CO for adjustment of the precoder MIMO system. Ex. 1006, [0085]-[0086]. A POSITA would have understood that data is again evaluated to perform another adjustment after the training signal power level is increased. Ex. 1002, ¶76.

Furthermore, “a **determination** is made regarding whether additional iterations are required.” Ex. 1006, [0086].

***1[d]: sending control signals, via a control signal generator coupled to the analysis unit, to the new DSL line set and to the already-operating DSL line set, further wherein the control signals comprise signals controlling operation of at least one of the following: the new DSL line set; or the already operating DSL line set; and***

Tsatsanis alone or in view of Savoor discloses or renders obvious 1[d]. Ex. 1002, ¶77. For example, as described above in 1[b]-1[c], the MIMO pre-processing module is adjusted to pre-cancel unwanted crosstalk occurring across channels. Ex. 1002, ¶77; *see supra*, § VIII.3.1[b]-1[c]; Ex. 1006, [0084]-[0086]. The adjustments are made based on filter coefficient values of a MIMO filter, which are calculated by a processor. Ex. 1006, [0089], [0094]. The filter coefficients adjust one or more filters which generate “cancellation signals” to cancel crosstalk coupling. Ex. 1006, [0005], [0009], [0016], [0043], [0050], [0053]. A POSITA would have understood that the filter coefficients teach the claimed “control signals” of the ’122 patent because they control operation of the new DSL line set and the already-operating DSL line set. Ex. 1006, [0009]; Ex. 1002, ¶77. Thus, the filter coefficients “control[s] operation of at least one of the following: the new DSL line set; or the already operating DSL line set” by modifying the signal sent on at least the new DSL line set. Ex. 1002, ¶77. Block 924 (green) of annotated FIG. 9 below illustrate the control signal sending step of Tsatsanis.

Ex. 1006, FIG. 9 (annotated)



In addition, the POSITA would have understood that portions of the disclosed Processor/Controller (yellow below) teach the “control signal generator” because it calculates the filter coefficients sent to the MIMO module (orange below) to cancel crosstalk and thus control operation of the new and existing lines. Ex. 1006, [0017], [0066]-[0071], [0086], [0089] (“precode MIMO filter is also depicted in the detailed transmitter block diagram of FIG. 7 as block 710”), [0092]-[0096] (“the two or more signals provided to the MIMO filter 1104 are ***processed or modified based on the coefficient values*** of the MIMO filter to thereby pre-cancel the unwanted coupling that will occur across channels”); Ex. 1002, ¶78. Although the disclosed Processor/Controller is the analysis unit, a POSITA would have understood that a transmitter, separate from the actual processor/controller, would have been necessary or at least would have been obvious to send the control signals of the processor/controller. Ex. 1002, ¶78. As such, this separate transmitter (shown in green below), which actually sends the claimed “control signals,” would be coupled to the processor/controller (i.e., the analysis unit). Ex. 1002, ¶78. Furthermore, the ’122 Patent admits that the control signal generator (described in the specification as “signal generating means”) may be “a computer, processor, IC, computer module, etc. ***of the type generally known.***” Ex. 1001, 13:65-14:2.

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**Ex. 1006, FIG. 7 (annotated)**

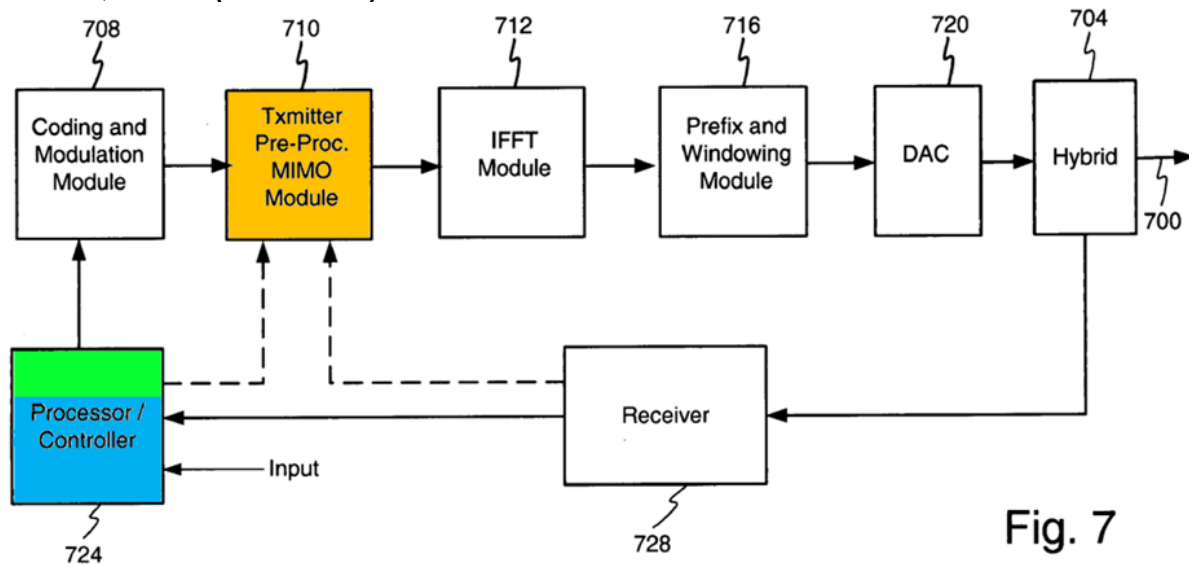


**Fig. 7**

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To the extent it is argued that Tsatsanis doesn't render obvious 1[d], Tsatsanis in view of Savor does. Ex. 1002, ¶79. For example, Savor teaches that “[a]t block 206, one or more of the *control parameters* ... are automatically *adjusted* to account for any observed deficiencies based on the collected values of the performance parameters.” Ex. 1005, 7:26-43.

Regarding the control signal generator, Savor teaches that “[i]n a particular embodiment, the entire process can be encapsulated in a software program that can be executed by a computer connected to the DSL network, e.g., the central office computer 126. The central office computer 126 can interface with the ATU-Cs and the ATU-Rs, or their respective agents, in order to obtain performance data, extract provisioning data, implant provisioning data, and control the circuit provisioning in order to provide optimum performance of each DSL circuit.” Ex. 1005, 8:35-43.

Since the central office computer controls the circuit provisioning, a POSITA would have understood that it teaches the “control signal generator” and is necessarily coupled to the “analysis unit” because it also teaches the analysis unit. Ex. 1002, ¶80.

***1[e]: wherein the controller is configured to evaluate whether crosstalk from the new DSL line set affects the already-operating DSL line set.***

Tsatsanis alone discloses or renders obvious 1[e]. Ex. 1002, ¶81. First, there is no antecedent basis for “the controller” in claim 1, and thus no relationship is described between the controller, the data collection unit, the analysis unit, and the control signal generator. For the purposes of this petition, Petitioner assumes that “the controller” encompasses all these units, as claimed in claim 14. The CO of Tsatsanis teaches the claimed “controller” because the transceiver, MIMO processing module, and processor are all comprised in the CO. Ex. 1006, FIGS. 10-11, [0092]-[0097]; Ex. 1002, ¶81. Tsatsanis discloses the claimed “controller” in FIG. 7 which also depicts each of the transceiver, MIMO processing module, and processor. Ex. 1006, FIG. 7.

Tsatsanis teaches that “an analysis of the ***level of crosstalk coupling*** may occur” to determine if “a sufficient number of iterations have occurred.” Ex. 1006, [0087]. The analysis may include “comparison of the crosstalk to a threshold.” Ex. 1006, [0087]. Tsatsanis states that the purpose of a training signal sent from the CO

to the CPE “is to probe the crosstalk coupling channels, identify their coupling strengths and design appropriate cancellation filters all while not disturbing **operation of the other active provisioned channels.**” Ex. 1006, [0082]. Crosstalk information is sent back to the CO for evaluation and adjustment. Ex. 1006, [0083]-[0084]. In doing so, a POSITA would have understood that, inherently, the controller is configured to evaluate whether crosstalk from the new DSL line set affects the already-operating DSL line. Ex. 1002, ¶82.

4. ***Claim 2: The method of claim 1 wherein the controller is configured to evaluate whether crosstalk from the new DSL line set affects the already-operating DSL line set by measuring crosstalk levels resulting from transmitting data using the at least one DSL line in the new DSL line set and the already-operating DSL line set concurrently.***

Tsatsanis alone discloses or renders obvious Claim 2. Ex. 1002, ¶83. For example, Tsatsanis teaches “transmit[ting] a low power training signal on channel N+1,” that “provides the benefit of not disrupting operation of the other **active channels** through unwanted crosstalk coupling.” Ex. 1006, [0081]. A POSITA would have understood this to mean that the training signal is sent on the new DSL line set concurrently with data transmission on the already-operating DSL line set. Ex. 1002, ¶83. As described with respect to Claim 1, evaluation of the crosstalk levels occurs after this concurrent transmission. Ex. 1002, ¶83; *see supra*, § VIII.3.1[c]. That is, channel parameters, including crosstalk related information, are calculated from the plural “received **signals**” which a POSITA would have

understood includes all received signals in the already-operating DSL line set as well as in the new DSL line set. Ex. 1002, ¶83. Ex. 1006, [0081]-[0083].

5. ***Claim 3: The method of claim 1 wherein the already-operating DSL line set comprises at least one of the following: a vectored DSL line set; a single DSL line; or a plurality of DSL lines; and further wherein the new DSL line set comprises: a single DSL line; or a plurality of DSL lines.***

Tsatsanis alone or in view of Savoor discloses or renders obvious Claim 3. Ex. 1002, ¶84. For example, Tsatsanis states that “it is contemplated that the one or more other channels associated with a communication device are provisioned and active.” Ex. 1006, [0081]. Tsatsanis explains that channels are DSL lines. Ex. 1006, [0006] (“In general, ***new lines, i.e. channels***, are activated....”). Thus, Tsatsanis at least teaches that the already-operating DSL line set comprises a single DSL line or a plurality of DSL lines. Ex. 1002, ¶84. Tsatsanis further states that “the operation initiates provisioning and activation, such as with a training process, of a new channel N+1.” Ex. 1006, [0081]. Thus, Tsatsanis at least teaches that the new DSL line set comprises a single DSL line. Ex. 1002, ¶84. Additionally, provisioning “a new channel N+1” indicates the existence of “N” active lines which a POSITA would have understood comprise a single DSL line or a plurality of DSL lines. Ex. 1002, ¶84.

Additionally, Tsatsanis teaches that there may be multiple “channels N+1, N+2, ... (not shown), which may not be provisioned and/or active.” Ex. 1006,

[0045]. A POSITA would have understood that after provisioning and activation of channel N+1, channel N+2 and other channels may be activated in turn by repeating the procedure. Ex. 1002, ¶85. Thus, a POSITA would have understood that the new DSL line set comprises a plurality of DSL lines. Ex. 1002, ¶85.

Furthermore, a POSITA would have understood that the inclusion of a MIMO processing module in FIG. 6 of Tsatsanis indicates the possibility of vectoring operations across the already-operating DSL line set. Ex. 1006, FIG. 6, [0057]-[0059]; Ex. 1002, ¶86. Thus, Tsatsanis also teaches that the already-operating DSL line set comprises a vectored DSL line set.

To the extent it is argued that Tsatsanis doesn't render obvious Claim 3, Tsatsanis in view of Savoor does. Ex. 1002, ¶87. Savoor teaches that "the DSL network 100 includes a central office (CO) 102 in which a DSL access multiplexer (DSLAM) 104 can be located. A first central DSL modem 106 and a second central DSL modem 108 are located in the CO 102 ... In a particular embodiment, the first DSL modem 106 and the second DSL modem 108 are installed in the DSLAM 104," showing that a new or already-operating DSL line set may be a plurality of lines. Ex. 1005, 3:1-14.

6. ***Claim 4: The method of claim 1 further comprising configuring operation of the already-operating DSL line set to prevent disruption of the already-operating DSL line set by the new DSL line set, wherein configuring operation of the already-operating DSL line set is performed either: before transmitting data using the at least one DSL line in the new DSL line set and the already-operating DSL line set concurrently; or after evaluating concurrent use of the new DSL line set and the already-operating DSL line set.***

Tsatsanis alone discloses or renders obvious Claim 4. Ex. 1002, ¶88. For example, as described above with respect to 1[d], Tsatsanis teaches adjusting a MIMO preprocessing module to generate cancellation signals and pre-cancel crosstalk between the new line set and the already-operating line set. Ex. 1002, ¶88; *see supra*, § VIII.3.1[d]. This adjustment happens after a training signal is sent concurrently on the new DSL line set with data transmission on the already-operating DSL line set, as explained with respect to Claim 2. Ex. 1002, ¶88; *see supra*, § VIII.4; Ex. 1006, [0081]-[0087]. Thus, Tsatsanis teaches pre-canceling crosstalk (“configuring operation”) between the already-operating DSL line set and the new DSL line set to prevent disruption of the already-operating DSL line set by the new DSL line set after evaluating concurrent use of the new DSL line set and the already-operating DSL line set. Ex. 1002, ¶88. A POSITA would have understood that this configures the “operation of the already operating DSL line set” because “[b]ased on the received signal on each line, the MIMO processing is capable of generating cancellation signals ***tailored to each of the other lines*** to thereby remove

unwanted noise and crosstalk from each incoming signal.” Ex. 1006, [0005]; Ex. 1002, ¶88.

Furthermore, a POSITA also would have understood that any concurrent operation or transmission may be replaced by non-concurrent (i.e., successive) operation or transmission. Ex. 1002, ¶89. A POSITA would have understood that operational data could also be extracted with successive operation or transmission to prevent crosstalk for future concurrent operation or transmission, and thus Tsatsanis at least renders obvious configuring operation of the already-operating DSL line set before transmitting data using a new DSL line and the already-operating DSL line set concurrently. Ex. 1002, ¶89.

7. ***Claim 5: The method of claim 1 wherein determining the operational configuration for the at least one DSL line in the new DSL line set comprises using orthogonal training sequences on a plurality of DSL lines in the new DSL line set to permit independent identification of the plurality of DSL lines in the new DSL line set during simultaneous training.***

Tsatsanis alone or in view of Savor discloses or renders obvious Claim 5. Ex. 1002, ¶90. For example, Tsatsanis teaches a “training process” of provisioning a new channel. Ex. 1006, [0009]. A POSITA would have been motivated to use orthogonal training sequences to simultaneously train a plurality of new channels so that new lines could be brought on in a faster manner. Ex. 1002, ¶90. A POSITA would have understood that such orthogonal training sequences would have allowed simultaneous training without the training sequences interfering with one another.

Ex. 1002, ¶90. A POSITA would have known that these orthogonal training sequences were commonly known. See Ex. 1007, 5-6. Ex. 1002, ¶90. Furthermore, the '122 Patent admits that “[s]uch orthogonal [training] sequences ***may be known to those skilled in the art.***” Ex. 1001, 11:38-60. Thus, the '122 Patent admits that a POSITA would have known to use such orthogonal training sequences with Tsatsanis. Ex. 1002, ¶90.

**8. Claim 6: The method of claim 1 wherein determining the operational configuration for the at least one DSL line in the new DSL line set comprises setting at least one transmit power level of the at least one DSL line in the new DSL line set to prevent disruptive crosstalk in the already-operating DSL line set.**

Tsatsanis alone or in view of Savor discloses or renders obvious Claim 6. Ex. 1002, ¶91. As discussed with respect to 1[pre], the '122 Patent and Tsatsanis teach the same method of setting a transmission power of a training signal to a low level so that the crosstalk generated by a new line is not disruptive to already-operating lines and increasing transmit power after adjustments are made to cancel crosstalk. See *supra*, § VIII.3.1[pre]. For example, Tsatsanis teaches transmitting a training signal at a low transmit power level and determining crosstalk information. Ex. 1006, [0072]-[0073] (“[i]n contrast to prior art methods which would utilize a full power transmit signal, the method ... transmits a low power signal on channel N+1 ... [u]se of a low power signal for purposes of training or at other times, provides the benefit of not disrupting operation of the other active channels through

unwanted crosstalk coupling”). The low transmit power is used because it “reduces crosstalk interference because the low power levels generate lower electrical fields, which in turn radiate less interference into other channels.” Ex. 1006, [0072]. As described with respect to 1[b], the operational configuration is determined based on a training signal sent at the low power level. Ex. 1002, ¶91; *see supra*, § VIII.3.1[b]. Tsatsanis further teaches that the training signal power may be adjusted incrementally to prevent crosstalk. Ex. 1006, [0079] (“the process may adjust the training signal power at fixed and predetermined time instants and at fixed and predetermined step increments”), [0085], [0087].

To the extent it is argued that Tsatsanis doesn’t render obvious Claim 6, Tsatsanis in view of Savor does. Ex. 1002, ¶92. Savor teaches that control parameters including “**power** and noise margin **settings can be adjusted**.” Ex. 1005, 7:26-43. Table 2 of Savor lists control parameters which may be adjusted including “[t]he transmission power of the data signal.” A POSITA would have understood it to be obvious to adjust a transmit power level of the DSL lines (as taught in Savor) to prevent crosstalk (as detected in Tsatsanis). Ex. 1002, ¶92.

9. ***Claim 7: The method of claim 6 wherein setting the at least one transmit power level of the at least one DSL line in new DSL line set to prevent disruptive crosstalk in the already-operating DSL line set comprises using at least one of the following to limit transmit power of the at least one DSL line in the new DSL line set: CARMASK; PSDMASK; MAXNOMATP; MAXNOMPSD; MAXRXPWR; RFIBANDS; MAXSNRM; BCAP[n]; Rmax; upstream Power “Back-Off”; a carrier mask operational parameter; a PSD operational parameter; a data rate operational parameter; a bit cap operational parameter; or a margin operational parameter.***

Tsatsanis in view of Savoor renders obvious Claim 7. Ex. 1002, ¶93. Specifically, Table 2 of Savoor lists control parameters to control or modify operation of the lines, including “PSD” which is described as “the power spectral density of the data signal.” Ex. 1005, Table 2. In addition, Savoor states that “PSD masks are adjusted to limit cross talk on the DSL channel.” Ex. 1005, 7:32-33. A POSITA would have understood that modifying the PSD operational parameter or PSD mask would “limit transmit power of the at least one DSL line in the new DSL line set.” Ex. 1002, ¶93. Furthermore, Table 2 of Savoor lists “MAXSNRM” and “data rate” as control parameters which may be modified, and a POSITA would have understood that modifying these would also “limit transmit power of the at least one DSL line in the new DSL line set.” Ex. 1005, Table 2; Ex. 1002, ¶93.

10. ***Claim 8: The method of claim 1 wherein determining the operational configuration for the at least one DSL line in the new DSL line set comprises limiting data transmission by the at least one DSL line in the new DSL line set to the at least one tone set configured to prevent disruptive crosstalk in the already-operating DSL line set.***

Tsatsanis alone or in view of Savoor discloses or renders obvious Claim 8. Ex. 1002, ¶94. Tsatsanis teaches that the MIMO processing module processes “256 tones on each of fourteen channels or lines.” Ex. 1006, [0061]. Tsatsanis states that “processing may occur on ***one frequency at a time*** (fourteen channels) as the system ***cycles through the 256 frequencies*** [(i.e., tones)], which represent the data.” Ex. 1006, [0061]. In addition, Tsatsanis highlights “the benefit of not disrupting operation on the other active channels through unwanted crosstalk coupling.” Ex. 1006, [0081]. Since tones can be processed one at a time, it would have been obvious to a POSITA that transmission can be limited to a set of tones, providing benefits of not disrupting operation on the other active channels through unwanted crosstalk coupling. Ex. 1002, ¶94. As discussed with respect to Claim 1, the POSITA would have understood that, similar to transmitting on all tones at low power, transmitting on a single tone at full power would allow detection of crosstalk on the single tone, without producing a high enough (full-band) crosstalk to disrupt operation of already-operating lines. *See supra*, § VIII.2; Ex. 1002, ¶94. The POSITA would have been motivated to train a new line on a tone-by-tone basis since it would be more convenient than incrementally increasing power. Ex. 1002, ¶94. Specifically, the

POSITA would have understood that processing one tone at a time would be a more convenient way to increment training of the new line, as opposed to incrementally increasing power of the line where the power may be incrementally increased by too much (so that crosstalk levels disrupt already active lines) or too little (where bringing the new line to full power is delayed). Ex. 1002, ¶.

11. ***Claim 9: The method of claim 1 wherein the control signals sent to the new DSL line set and the already-operating DSL line set comprise signals controlling at least one of the following: CARMASK; PSDMASK; RFIBANDS; BCAP[n]; a carrier mask operational parameter; a PSD operational parameter; a bit cap operational parameter; or a margin operational parameter.***

Tsatsanis in view of Savoor renders obvious Claim 9. Ex. 1002, ¶95. Specifically, Table 2 of Savoor lists control parameters which may be modified including “PSD” which is described as “the power spectral density of the data signal.” Ex. 1005, Table 2. In addition, Savoor states that “PSD masks are adjusted to limit cross talk on the DSL channel.” Ex. 1005, 7:32-33. A POSITA would have understood that modifying the PSD operational parameter or PSD mask amounts to sending a control signal to the new DSL line set and the already operating DSL line set, or that it would at least be obvious to modify this parameter by sending a control signal to the new DSL line set and the already-operating DSL line set. Ex. 1002, ¶95. A POSITA would have understood that modifying these parameters would also be used to configure the operation of the new and active subscriber lines of Tsatsanis.

12. ***Claim 10: The method of claim 1 wherein the already-operating DSL line set is a vectored DSL line set; further wherein the method further comprises adjusting operation of the vectored DSL line set to integrate the new DSL line set into vectored operation with the vectored DSL line set.***

Tsatsanis alone or in view of Savoor renders obvious Claim 10. Ex. 1002, ¶96. As discussed with respect to Claim 1, Tsatsanis renders obvious adjusting operation of an already-operating DSL line set to integrate a new DSL line set by generating cancellation signals between lines. Ex. 1002, ¶96; *see supra*, § VIII.3. Tsatsanis further states that “[a]lthough it is contemplated that the principles described herein may be utilized with any transmission standard, modulation scheme, or encoding scheme, in this example embodiment, a ***vectored DMT transmission system*** is adopted for use.” Ex. 1006, [0064]. With the vectored DMT transmission system, “a collection of all the signals to be transmitted from all the available channels are processed in sync, with synchronous clocks and frame aligned, through the DMT transmitter blocks as shown.” Ex. 1006, [0064].

13. ***Claim 11***

***11[pre]: The method of claim 10 wherein adjusting operation of the vectored DSL line set to integrate the new DSL line set into vectored operation with the vectored DSL line set comprises:***

Tsatsanis alone or in view of Savoor discloses or renders obvious 11[pre] for at least the reasons discussed with respect to Claim 10. *See supra*, § VIII.12; Ex. 1002, ¶97.

***11[a]: obtaining vector channel and noise information for the new DSL line set and for the already-operating DSL line set; and***

Tsatsanis alone or in view of Savoor discloses or renders obvious 11[a]. Ex. 1002, ¶98. Tsatsanis teaches a method that “monitors, with one or more CPE receivers associated with active channels, for **noise**, coupling or both generated by transmission of the training signal and isolates **noise**, coupling, or both generated by the training signal and received at the CPE receivers associated with active channels.” Ex. 1006, [0017]. This information is transmitted to the CO and “processed to establish MIMO precoder filter coefficients configured to pre-cancel **noise**, coupling, or both resulting from signals on the channel being activated.” Ex. 1006, [0017]. Furthermore, the ’122 patent uses “vector channel information” only once in the specification as “FEXT crosstalk descriptions.” Ex. 1001, 9:52-57. Because Tsatsanis discloses a “vectored DMT transmission system,” and discusses obtaining crosstalk information as described above, a POSITA would have understood that Tsatsanis teaches obtaining “vector channel” information in addition to the noise information. Ex. 1002, ¶98.

To the extent it is argued that Tsatsanis doesn’t render obvious 11[a], Tsatsanis in view of Savoor does. Ex. 1002, ¶99. For example, Savoor teaches that “any cross talk, any white noise ... can be detected based on patterns observed in the empirical data collected per tone.” Ex. 1005, 6:62-7:16. Table 1 of Savoor lists

performance parameters that are measured including “Noise Margin Ratio,” “Quiet Line Noise,” “noise over the channel when the DSL modem is operating,” and “signal to noise ratio for each tone.” Ex. 1005, Table 1. A POSITA would have understood that this qualifies as “noise information” in addition to the vector channel and noise information taught by Tsatsanis. Ex. 1002, ¶99.

***11[b]: performing vectoring based on the obtained vector channel and noise information.***

Tsatsanis alone or in view of Savor discloses or renders obvious 11[b]. Ex. 1002, ¶100. For example, Tsatsanis teaches that the MIMO processing module “is trained to cancel crosstalk” generated by channels. Ex. 1006, [0072]. Specifically, filter coefficient values are corrected based on the collected crosstalk and noise information to “generate a more accurate crosstalk cancellation signal.” Ex. 1006, [0075]. A POSITA would have understood that cancellation of crosstalk between lines describes vectoring, and thus Tsatsanis performs vectoring based on the vector channel and noise information. Ex. 1002, ¶100.

- 14. Claim 12: The method of claim 10 wherein adjusting operation of the vectored DSL line set to integrate the new DSL line set into vectored operation with the vectored DSL line set comprises configuring operation of the vectored DSL line set to integrate the new DSL line set into vectored operation with the vectored DSL line set after evaluating concurrent use of the new DSL line set and the already-operating DSL line set.***

Tsatsanis alone or in view of Savor discloses or renders obvious Claim 12. Ex. 1002, ¶101. First, as described above with respect to Claim 2, Tsatsanis teaches

“transmit[ting] a low power training signal on channel N+1,” which “provides the benefit of not disrupting operation of the other **active channels** through unwanted crosstalk coupling.” Ex. 1006, [0081]; *see supra*, § VIII.4. A POSITA would have understood this to mean that the training signal is sent on the new DSL line set concurrently with data transmission on the already-operating DSL line set. The training signal power is increased iteratively and adjustments are made to cancel crosstalk between signals by generating cancellation signals. Ex. 1002, ¶101; Ex. 1006, [0081]-[0088]. A POSITA would have understood that this indicates that the new channel is integrated into vectored operation with the other active channels since the crosstalk is canceled between the new channel and the other active channels. Ex. 1002, ¶101.

15. ***Claim 13: The method of claim 10 wherein adjusting operation of the vectored DSL line set to integrate the new DSL line set into vectored operation with the vectored DSL line set comprises configuring operation of the new DSL line set to integrate the new DSL line set into vectored operation with the vectored DSL line set after evaluating concurrent use of the new DSL line set and the already-operating DSL line set.***

Tsatsanis alone or in view of Savoor discloses or renders obvious Claim 13 for at least the reasons discussed above with respect to Claim 12. *See supra*, § VIII.14; Ex. 1002, ¶102. This claim is identical to claim 12 discussed above, except that it requires “configuring operation of **the new DSL line set**” whereas claim 12 requires “configuring operation of **the vectored DSL line set**.” Tsatsanis teaches that

“prior to transmission, the outgoing signals on the new channel and other channels undergoes appropriate precoding.” Ex. 1006, [0086]. A POSITA would have understood that this indicates that the new channel is integrated into vectored operation with the other active channels since the crosstalk is canceled between the new channel and the other active channels. Ex. 1002, ¶102.

**16. Claim 14**

***14[pre]: A controller comprising:***

Tsatsanis alone or in view of Savor discloses or renders obvious 14[pre] for at least the reasons discussed with respect to 1[pre] and 1[e]. *See supra*, § VIII.3.1[pre], 1[e]; Ex. 1002, ¶103. Although claim 1 is a method claim and claim 14 is an apparatus claim (that claims a controller), the scope of the claims are identical. While the preamble of claim 1 does not claim a controller, limitation 1[e] does, and Tsatsanis discloses the claimed controller for the reasons explained in 1[e].

***14[a]: a data collection unit configured to collect operational data from a new DSL line set and an already-operating DSL line set;***

Tsatsanis alone or in view of Savor discloses or renders obvious 14[a] for at least the reasons discussed with respect to 1[a]. *See supra*, § VIII.3.1[a]; Ex. 1002, ¶104.

***14[b]: an analysis unit coupled to the collection unit, wherein the analysis unit is configured to: analyze the collected operational data; determine an operational configuration for the at least one DSL line in the new DSL line set that will allow the new DSL line set to join the already-operating DSL line set without disrupting the already-operating DSL line set;***

Tsatsanis alone or in view of Savor discloses 14[b] for at least the reasons discussed with respect to 1[b]. *See supra*, § VIII.3.1[b]; Ex. 1002, ¶105.

***14[c]: evaluate data received by the new DSL line set; and evaluate data received by the already-operating DSL line set; and***

Tsatsanis alone or in view of Savor discloses or renders obvious 14[c] for at least the reasons discussed with respect to 1[c]. *See supra*, § VIII.3.1[c]; Ex. 1002, ¶106.

***14[d]: a control signal generator coupled to the analysis unit, wherein the control signal generator is configured to send control signals to the new DSL line set and to the already-operating DSL line set, further wherein the control signals comprise signals controlling operation of at least one of the following: the new DSL line set; or the already-operating DSL line set; and***

Tsatsanis alone or in view of Savor discloses or renders obvious 14[d] for at least the reasons discussed with respect to 1[d]. *See supra*, § VIII.3.1[d]; Ex. 1002, ¶107.

**14[e]: wherein the controller is configured to evaluate whether crosstalk from the new DSL line set affects the already-operating DSL line set.**

Tsatsanis alone or in view of Savoor discloses or renders obvious 14[e] for at least the reasons discussed with respect to 1[e]. *See supra*, § VIII.3.1[e]; Ex. 1002, ¶108.

**17. Claim 15: The controller of claim 15 wherein the operational configuration for the at least one DSL line in the new DSL line set comprises setting transmit power for the at least one DSL line in the new DSL line set.**

Tsatsanis alone or in view of Savoor discloses or renders obvious Claim 15 for at least the reasons discussed with respect to Claim 6. *See supra*, § VIII.8; Ex. 1002, ¶109.

**18. Claim 16: The controller of claim 14 wherein the controller is configured to obtain vector channel and noise information for the new DSL line set and the already-operating DSL line set.**

Tsatsanis alone or in view of Savoor discloses or renders obvious Claim 16 for at least the reasons discussed with respect to 11[a]. *See supra*, § VIII.13.11[a]; Ex. 1002, ¶110.

**19. Claim 17: The controller of claim 14 wherein the already-operating DSL line set comprises at least one of the following: is a vectored DSL line set; a single DSL line; or a plurality of DSL lines.**

Tsatsanis alone or in view of Savoor discloses or renders obvious Claim 17 for at least the reasons discussed with respect to Claim 3. *See supra*, § VIII.5; Ex. 1002, ¶111.

20. ***Claim 18: The controller of claim 14 wherein the operational configuration for at least one DSL line in the new DSL line set comprises orthogonal training sequences on a plurality of DSL lines in the new DSL line set to permit independent identification of the plurality of DSL lines in the new DSL line set during simultaneous training.***

Tsatsanis alone or in view of Savor discloses or renders obvious Claim 18 for at least the reasons discussed with respect to Claim 5. *See supra*, § VIII.7; Ex. 1002, ¶112.

21. ***Claim 19: The controller of claim 14 wherein the control signals sent to the new DSL line set and the already-operating DSL line set comprise signals controlling at least one of the following: CARMASK; PSDMASK; RFIBANDS; BCAP[n]; a carrier mask operational parameter; a PSD operational parameter; a bit cap operational parameter; or a margin operational parameter.***

Tsatsanis in view of Savor renders obvious Claim 19 for at least the reasons discussed with respect to Claim 9. *See supra*, § VIII.11; Ex. 1002, ¶113.

22. ***Claim 20:***

***20[pre]: A computer program product comprising:***

Tsatsanis in view of Savor renders obvious 20[pre]. Ex. 1002, ¶114. For example, Savor teaches that the “computer includes a ***program*** for modifying a provisionable service parameter associated with the DSL channel based on measured in-service performance parameters received from the first modem or the second modem.” Ex. 1005, 2:49-58. Savor further teaches that its “entire process can be encapsulated in a ***software program*** that can be executed by a computer connected to the DSL network, e.g., the central office computer 126. The central office

computer 126 can interface with the ATU-Cs and the ATU-Rs, or their respective agents, in order to obtain performance data, extract provisioning data, implant provisioning data, and control the circuit provisioning in order to provide optimum performance of each DSL circuit.” Ex. 1005, 7:35-43. A POSITA would have understood that the program would be stored on a computer program product for execution on the computer. Ex. 1002, ¶114.

***20[a]: a machine readable medium; and program instructions contained in the machine readable medium, the program instructions specifying a method of training a new DSL line set to join an already-operating DSL line set, the method comprising:***

Tsatsanis in view of Savor renders obvious 20[a] for at least the reasons discussed with respect to 20[pre] and 1[pre]. Ex. 1002, ¶115. A POSITA would have understood that the program instructions of Savor would necessarily be contained in a machine readable medium for execution by the computer, or at least that it would be obvious to store the program instructions on the machine readable medium. Ex. 1002, ¶115. In addition, the ’122 Patent admits that the “media and program instructions may be ... ***of the kind well known and available to those having skill in the computer arts.***” Ex. 1001, 16:64-17:13.

***20[b]: collecting operational data, via a data collection unit, from the new DSL line set and the already-operating DSL line set;***

Tsatsanis in view of Savoor renders obvious 20[b] for at least the reasons discussed with respect to 1[a]. *See supra*, § VIII.3.1[a]; Ex. 1002, ¶116.

***20[c]: performing the following operations, via an analysis unit coupled to the collection unit: analyzing the collected operational data determining an operational configuration for at least one DSL line in the new DSL line set that will allow the new DSL line set to join the already-operating DSL line set without disrupting the already-operating DSL line set;***

Tsatsanis in view of Savoor renders obvious 20[c] for at least the reasons discussed with respect to 1[b]. *See supra*, § VIII.3.1[b]; Ex. 1002, ¶117.

***20[d]: evaluating data received by the new DSL line set; and evaluating data received by the already-operating DSL line set; and***

Tsatsanis in view of Savoor renders obvious 20[d] for at least the reasons discussed with respect to 1[c]. *See supra*, § VIII.3.1[c]; Ex. 1002, ¶118.

***20[e]: sending control signals, via a control signal generator coupled to the analysis unit, to the new DSL line set and to the already-operating DSL line set, further wherein the control signals comprise signals controlling operation of at least one of the following: the new DSL line set; or the already-operating DSL line set; and***

Tsatsanis in view of Savoor renders obvious 20[e] for at least the reasons discussed with respect to 1[d]. *See supra*, § VIII.3.1[d]; Ex. 1002, ¶119.

***20[f]: wherein the controller is configured to evaluate whether crosstalk from the new DSL line set affects the already-operating DSL line set.***

Tsatsanis in view of Savoor renders obvious 20[f] for at least the reasons discussed with respect to 1[e]. *See supra*, § VIII.3.1[e]; Ex. 1002, ¶120.

**IX. Ground 2: Claims 5 and 18 are rendered obvious over Tsatsanis in view of Rezvani.**

Tsatsanis in view of Rezvani renders obvious all of the limitations of Claims 1-20. Ex. 1002, ¶121.

***1. Motivation to Combine***

A POSITA would have been motivated to combine Tsatsanis and Rezvani. Ex. 1002, ¶122. Specifically, a POSITA would have been motivated to modify Tsatsanis with the teachings of Rezvani in order to train a plurality of new lines simultaneously. Ex. 1002, ¶122. Tsatsanis teaches a method for activating and provisioning a new channel alongside active and provisioned channels. Ex. 1006, Abstract. Rezvani also teaches training subscriber lines. Ex. 1008, 18:28-59. Rezvani teaches training all lines at once in parallel by using subscriber line specific orthogonal key codes. Ex. 1008, 18:46-53. A POSITA would have been motivated to incorporate the subscriber line specific orthogonal key codes with the teachings of Tsatsanis so that multiple lines not previously activated or provisioned could be trained at the same time. *See* Ex. 1006, [0045]; Ex. 1002, ¶122. A POSITA would have understood that training multiple subscriber lines simultaneously would be

beneficial by allowing quicker activation of numerous subscriber lines. Ex. 1002, ¶122.

Furthermore, a POSITA would have had a reasonable expectation of success in combining Tsatsanis and Rezvani because Tsatsanis and Rezvani are both related to digital subscriber line systems. Ex. 1006, [0004]; Ex. 1008, Abstract; Ex. 1002, ¶123. A POSITA would have understood that orthogonal training sequences such as those disclosed by Rezvani would be applicable to the subscriber lines of Tsatsanis, since the subscriber lines in each reference are of the same technology. Ex. 1002, ¶123. The POSITA further would have understood that the orthogonal training sequences such as those disclosed by Rezvani were well known in the art and applicable to DSL systems outside of Rezvani, including Tsatsanis. *See* Ex. 1007, 5-6; Ex. 1002, ¶123.

2. ***Claim 5: The method of claim 1 wherein determining the operational configuration for the at least one DSL line in the new DSL line set comprises using orthogonal training sequences on a plurality of DSL lines in the new DSL line set to permit independent identification of the plurality of DSL lines in the new DSL line set during simultaneous training***

Tsatsanis renders obvious Claim 5 for at least the reasons discussed with respect to Ground 1A. *See supra*, § VIII.7; Ex. 1002, ¶124.

In addition, Tsatsanis in view of Rezvani renders obvious Claim 5. For example, Rezvani teaches that “training ... is conducted in parallel ***on all lines at once*** by injecting the same training sequence combined with a subscriber line specific ***orthogonal key codes*** using code division multiplexing techniques (CDMA) into ... each subscriber line. The monitoring ... is done with a decoder using ***orthogonal key codes.***” Ex. 1008, 18:46-53; *see also id.*, 8:33-40 (“In an alternate embodiment of the invention the interference determination is conducted in parallel on all lines at once by injecting the same training sequence combined with a subscriber line specific orthogonal key codes using code division multiplexing techniques (CDMA) into ... each subscriber line and monitoring the same ... tones with a decoder using the key codes”). A POSITA would have understood that the orthogonal key codes specific to each subscriber line combine with the training sequence to teach an orthogonal training sequence, where multiple lines are trained simultaneously. Ex. 1002, ¶125. The POSITA would further have understood that each line may be independently identified during simultaneous training given that

an orthogonal key code is specific to each individual line. Ex. 1002, ¶125. Furthermore, the '122 Patent admits that “such orthogonal [training] sequences *may be known to those skilled in the art.*” Ex. 1001, 11:38-60. Thus, the '122 Patent admits that a POSITA would have known to use such orthogonal training sequences with Tsatsanis and Rezvani. Ex. 1002, ¶125.

3. ***Claim 18: The controller of claim 14 wherein the operational configuration for at least one DSL line in the new DSL line set comprises orthogonal training sequences on a plurality of DSL lines in the new DSL line set to permit independent identification of the plurality of DSL lines in the new DSL line set during simultaneous training.***

Tsatsanis in view of Rezvani renders obvious Claim 18 for at least the reasons discussed with respect to Claim 5. *See supra*, § VIII.7; Ex. 1002, ¶126.

## **X. DISCRETIONARY ISSUES**

### **A. The Petition Does Not Present the Same References Addressed in Prosecution**

Under *Advanced Bionics*, the Board should not deny institution under §325(d). *Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH*, No. IPR2019-01469, Paper 6 at 7-8 (P.T.A.B. Feb. 13, 2020) (precedential).

The Board has held that the first prong of *Advanced Bionics* is not met where “neither [the combination references] nor similar prior art was before the examiner ... the prosecution history does not include any overlapping arguments directed to this prior art.” *Godsbern-Smith Constr. Co. v. Guntert & Zimmerman Const. Div.*,

*Inc.*, No. IPR2021-00050, Paper 24 at 19-21 (PTAB May 7, 2021). All but one of the prior art references here was not cited during original prosecution and is not cumulative of any of the art considered by the Examiner during prosecution. *See supra* § V. Only Tsatsanis (one of the two references at issue in Ground 1) appears on the face of the '122 Patent.

Indeed, Tsatsanis was never applied in any rejection or substantively considered by the Examiner. Tsatsanis was merely cited as one reference among numerous other prior art references. Ex. 1004, 377-79, 509, 523-24, 620. However, when an asserted reference (e.g., Tsatsanis) is merely listed in a signed IDS, the Board has refused to exercise discretionary denial under § 325(d). *Scientific Design Co. v. Shell Oil Co.*, IPR2021-01537, Paper 7 at 24-26 (PTAB 2022) and IPR2022-00158, Paper 7 at 24-26 (PTAB 2022) (granting institution and finding that the Examiner initialing the asserted art on an IDS does not indicate substantive evaluation); *Digital Check Corp. d/b/a ST Imaging v. E-ImageData Corp.*, IPR2017-00178, Paper 6 at 12-13 (PTAB 2017) (acknowledging that a reference was cited in an IDS, but granting institution because there was no indication that the Examiner substantively discussed it during prosecution); *Fox Factory, Inc. v. SRAM, LLC*, IPR2016-01876, Paper 8 at 7-9 (PTAB 2017) (refusing to deny institution based on a prior art reference that was simply cited in an IDS and not considered at any length); *Praxair Distribution, Inc. v. INO Therapeutics, LLC d/b/a Ikaria, Inc.*,

IPR2015-00893, Paper 14 at 8 (PTAB 2015); *Analytics For Life, Inc. et al v. 8825319 Canada Ltd.*, IPR2017-01742, Paper 9 at 5-6 (PTAB 2018); *ABS Global, Inc. et al v. Cytonome/ST, LLC*, IPR2017-02097, Paper 11 at 37-38 (PTAB 2018).

Consistent with Board precedent, because no evaluation or rejection during prosecution involved Tsatsanis, none of the *Beckton Dickinson* factors (a)-(f) and *Advanced Bionics* prongs (1) and (2) favor discretionary denial. *Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 (Dec. 15, 2017) (precedential).

Further, while there is no need to reach Part Two of the *Advanced Bionics* framework and *Beckton Dickinson* factors (e)-(f), the record shows that the Challenged Claims were allowed based on a material error by the Examiner. For example, as explained in this Petition, Tsatsanis, by itself or in combination with Savoor, discloses or renders obvious all the features of the independent claims.

Notwithstanding the above, the Petition does not rely solely on the disclosure in Tsatsanis. Ground 1B is based on the combination of Tsatsanis and Savoor. Indeed, Savoor, by itself or in combination with Tsatsanis, was never considered by the Examiner with respect to any of the issued claims. The Examiner erred by never considering this combination. Thus, none of the *Beckton Dickinson* factors and *Advanced Bionics* prongs support a finding of discretionary denial under 35 U.S.C.

§ 325(d). *Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6 (PTAB Feb. 13, 2020) (precedential).

**B. The Board Should Not Deny Institution Under *Fintiv***

The claims of the '122 patent have never been tested in view of the most relevant prior art. In view of these strong and compelling challenges, the on-going district court litigation against AT&T, and the ongoing cloud over all of Nokia's customers, institution should not be discretionarily denied under §314(a). See *NHK Spring Co. v. Intrix-Plex Techs., Inc.*, IPR2018-00752, Paper 8 at 19-20 (PTAB Sept. 12, 2018) (precedential); *Apple v. Fintiv, Inc.*, IPR2020-00019, Paper 11 at 13-14 (PTAB Mar. 20, 2020) (precedential).

As an initial matter, because Nokia is not currently a party to the underlying litigation and is the only petitioner here, the Board should not discretionarily deny Nokia's petition. For purposes of this petition, the litigation between ASSIA and AT&T is considered below.

Factor 1—a potential stay of the district court litigation—is at least neutral because no party has requested a stay in the action against AT&T. *VMWare, Inc. v. Intellectual Ventures I LLC*, IPR2020-00470, Paper 13 at 17 (PTAB Aug. 18, 2020) (finding in the absence of a stay motion that this factor “does not weigh for or against discretionary denial”).

Factor 2—the district court trial date and the Board’s statutory deadline—weighs against discretionary denial because of the high likelihood of transfer to another forum or a stay pending arbitration, either of which will significantly push back any potential trial date. This is a complex case with a complicated relationship between the Plaintiff and Defendant AT&T. Specifically, Defendant AT&T has a license to patents owned by the Plaintiff (including a claim that it jointly owns the ’122 patent) where the licenses include a choice of forum clause requiring litigation to be brought in the Northern District of California rather than the Eastern District of Texas (any disagreement about this clause must be decided through arbitration). AT&T thus filed a motion to transfer the case to the Northern District of California or, in the alternative, arbitrate where the case should be brought. Given the strength of AT&T’s motion, it is highly likely that trial will be pushed back (either because it is transferred or because arbitration is ordered) until well after the deadline for a final written decision. Ex. 1011. Moreover, even if the motion is denied, because jury selection is far in the future and is not set to begin until at least September 22, 2025, with trial set to begin thereafter, discretionary denial is still not warranted. *See Dish Network v. Broadband iTV*, IPR2020-01280, Paper 17 at 16 (PTAB Feb. 4, 2021) (“We cannot ignore the fact that the currently scheduled trial date is more than nine months away and much can change during this time”).

Altogether, this factor weighs against discretionary denial.

Factor 3—investment in the district court proceedings—weighs against discretionary denial. The district court case is in its early stages and the district court has not issued any substantive rulings in with respect to the '122 patent. Specifically, invalidity contentions were served on October 7, 2024, the claim construction hearing is not scheduled until March 19, 2025, and opening expert reports are not due until April 29, 2025 with expert discovery extending into June. Ex. 1009.

Altogether, there is much work to be done in the district court and most of the work will be well in the future. Accordingly, the district court will not invest significant resources related to the challenged patent prior to the issuance of an institution decision. See *Fintiv*, IPR2020-00019, Paper 11 at 9-12; *DISH Network*, IPR2020-01280, Paper 17 at 18-21.

Factor 4—overlap between this proceeding and the district court proceedings—favors institution. Indeed, there will not be complete overlap between this IPR and the district court cases because there are sixteen claims challenged in this case, whereas there are only six claims at issue in the district court case, and that number may be further reduced before trial. Ex. 1010. This factor thus weighs against discretionary denial.

Factor 5—overlapping parties—strongly favors institution. Here, the Petitioners include only Nokia, who is not currently a party in the underlying litigation. *Fintiv*, IPR2020-00019, Paper 11 at 13-14. As an initial matter, that means

that if institution is denied and only the subset of claims raised at trial are rendered invalid at the district court, ASSIA may resort to gamesmanship and assert infringement of those claims not raised at trial (but challenged in this petition) against Nokia in a separate litigation. Additionally, in that underlying litigation, ASSIA has only accused AT&T of infringement (largely accusing Nokia products), but AT&T is just one of Nokia's many U.S. customers using Nokia's DSL products. Given ASSIA's history of suing Nokia's customers (including KPM in the Netherlands, Orange in France, and Fastweb in Italy), Nokia believes that ASSIA is likely to sue additional U.S.-based customers in the future, none of which are named in the underlying litigation.

The final *Fintiv* factor—other considerations—weighs strongly against discretionary denial. As detailed herein, the merits of the Petition are strong. More specifically, Tsatsanis teaches the same concept of the '122 patent (training and initialization of a new line to minimize impact of crosstalk from that new line). To the extent the '122 patent relies on any well-known crosstalk cancellation methodologies within this training sequence, Savor teaches those as well. Moreover, none of the grounds asserted herein were previously considered by either the Office or the district courts. *Cf. Comcast Cable Commn's, LLC v. Rovi Guides, Inc.*, IPR2019-00231, Paper 14 at 11 (PTAB May 20, 2019).

### **C. The Board Should Not Deny Institution Under *General Plastic***

The *General Plastic* factors do not apply for several reasons. First, this is the first and only *inter partes* review (“IPR”) petition filed by Petitioner with respect to the ’122 patent. As noted in Section IV.E, there are no other proceedings involving the ’122 patent, and therefore, there is no concern of serial petitions. Given the merits raised in this Petition have not been addressed to date, denial of institution under *General Plastic* is unwarranted. *Code200, UAB v. Bright Data, Ltd.*, IPR2022-00861, Paper 18 at 5-6 (P.T.A.B. Aug. 23, 2022) (precedential).

### **XI. CONCLUSION**

Petitioners respectfully request cancellation of the Challenged Claims.

## **XII. MANDATORY NOTICES UNDER 37 C.F.R. §42.8**

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

The real parties in interest are AT&T Services Inc., AT&T Enterprises, LLC, AT&T Mobility LLC, AT&T Mobility II LLC, and Nokia of America Corp.

Out of an abundance of caution, Petitioners have identified all current defendants in the below cases, as well as additional involved parties, as potential real parties in interest only for the purpose of this proceeding and only to the extent that Patent Owner contends that these separate legal entities should be named real parties in interest in this IPR. Petitioners do so to avoid the potential expenditure of resources to resolve such a challenge. Petitioners also acknowledge that each petitioner has a number of affiliates. No unnamed entity is funding, controlling, or otherwise has an opportunity to control or direct this Petition or Petitioners' participation in any resulting IPR. Petitioners are also not aware of any affiliate that would be barred from filing this Petition under 35 U.S.C. § 315(e).

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

The '122 patent is the subject of the following litigation:

- *Adaptive Spectrum and Signal Alignment, Inc. v. AT&T Enterprises, LLC, AT&T Mobility LLC, AT&T Mobility II LLC, and AT&T Services, Inc.*, No. 2:24-cv-00029-JRG-RSP

Petitioners are not aware of any other judicial or administrative matter that would affect or be affected by a decision in this IPR.

**C. Designation of Counsel Under 37 C.F.R. §42.8(b)(3)**

Petitioners provide the following designation of counsel.

| Lead Counsel                                                                                                                                                                                                                      | Backup Counsel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| M. Scott Stevens<br>Reg. No. 54,762<br><b>ALSTON &amp; BIRD LLP</b><br>Vantage South End<br>1120 S. Tryon Street, Suite 300<br>Charlotte, NC 28203<br>Phone: 704.444.1000<br>Fax: 704.444.1111<br>Email: scott.stevens@alston.com | Christopher TL Douglas<br>Reg. No. 56,950<br>Nicholas C. Marais<br>Reg. No. 77,181<br><b>ALSTON &amp; BIRD LLP</b><br>Vantage South End<br>1120 S. Tryon Street, Suite 300<br>Charlotte, NC 28203<br>Phone: 704.444.1000<br>Fax: 704.444.1111<br>Email: christopher.douglas@alston.com<br>Email: nic.marais@alston.com<br><br>Jason E. Spotts ( <i>pro hac vice</i> )<br><b>ALSTON &amp; BIRD LLP</b><br>Dallas Arts Tower<br>2200 Ross Avenue, Suite 2300<br>Dallas, TX 75201<br>Phone: 214.922.3400<br>Fax: 214.922.3899<br>Email: jason.spotts@alston.com |

Pursuant to 37 C.F.R. § 42.8(b)(4), counsel agrees to service by mail as detailed above, and to electronic service by email as detailed above. Pursuant to 37 C.F.R §42.10(b), a Power of Attorney executed by Petitioners accompanies this Petition.

## **Service Information**

Please address all correspondence and service to the addresses listed above.

Petitioners consent to electronic service at the addresses above.

Date: January 22, 2025

By: /M. Scott Stevens/

M. Scott Stevens  
Reg. No. 54.762  
**ALSTON & BIRD LLP**  
Vantage South End  
1120 S. Tryon Street, Suite 300  
Charlotte, NC 28203  
Phone: 704.444.1000  
Fax: 704.444.1111  
Email: scott.stevens@alston.com

## **CLAIMS APPENDIX**

| <b>Claim</b>  | <b>Recitation</b>                                                                                                                                                                                                                                                                                                                                                      |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1[pre]</b> | A method of adding a new DSL line set to an already-operating DSL line set, the method comprising:                                                                                                                                                                                                                                                                     |
| <b>1[a]</b>   | collecting operational data, via a data collection unit, from the new DSL line set and the already-operating DSL line set;                                                                                                                                                                                                                                             |
| <b>1[b]</b>   | performing, via an analysis unit coupled to the collection unit, the following operations: analyzing the collected operational data; determining an operational configuration for at least one DSL line in the new DSL line set that will allow the new DSL line set to join the already-operating DSL line set without disrupting the already-operating DSL line set; |
| <b>1[c]</b>   | evaluating data received by the new DSL line set; and evaluating data received by the already-operating DSL line set; and                                                                                                                                                                                                                                              |
| <b>1[d]</b>   | sending control signals, via a control signal generator coupled to the analysis unit, to the new DSL line set and to the already-operating DSL line set, further wherein the control signals comprise signals controlling operation of at least one of the following: the new DSL line set; or the already-operating DSL line set; and                                 |
| <b>1[e]</b>   | wherein the controller is configured to evaluate whether crosstalk from the new DSL line set affects the already-operating DSL line set.                                                                                                                                                                                                                               |
| <b>2</b>      | The method of claim 1 wherein the controller is configured to evaluate whether crosstalk from the new DSL line set affects the already-operating DSL line set by measuring crosstalk levels resulting from transmitting data using the at least one DSL line in the new DSL line set and the already-operating DSL line set concurrently.                              |
| <b>3</b>      | The method of claim 1 wherein the already-operating DSL line set comprises at least one of the following: a vectored DSL line set; a single DSL line; or a plurality of DSL lines; and further wherein the new DSL line set comprises: a single DSL line; or a plurality of DSL lines.                                                                                 |
| <b>4</b>      | The method of claim 1 further comprising configuring operation of the already-operating DSL line set to prevent disruption of the already-operating DSL line set by the new DSL                                                                                                                                                                                        |

|          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|          | line set, wherein configuring operation of the already-operating DSL line set is performed either: before transmitting data using the at least one DSL line in the new DSL line set and the already-operating DSL line set concurrently; or after evaluating concurrent use of the new DSL line set and the already-operating DSL line set.                                                                                                                                                                                                                                                                             |
| <b>5</b> | The method of claim 1 wherein determining the operational configuration for the at least one DSL line in the new DSL line set comprises using orthogonal training sequences on a plurality of DSL lines in the new DSL line set to permit independent identification of the plurality of DSL lines in the new DSL line set during simultaneous training.                                                                                                                                                                                                                                                                |
| <b>6</b> | The method of claim 1 wherein determining the operational configuration for the at least one DSL line in the new DSL line set comprises setting at least one transmit power level of the at least one DSL line in the new DSL line set to prevent disruptive crosstalk in the already-operating DSL line set.                                                                                                                                                                                                                                                                                                           |
| <b>7</b> | The method of claim 6 wherein setting the at least one transmit power level of the at least one DSL line in new DSL line set to prevent disruptive crosstalk in the already-operating DSL line set comprises using at least one of the following to limit transmit power of the at least one DSL line in the new DSL line set: CARMASK; PSDMASK; MAXNOMATP; MAXNOMPSD; MAXRXPWR; RFIBANDS; MAXSNRM; BCAP[n]; Rmax; upstream Power “Back-Off”; a carrier mask operational parameter; a PSD operational parameter; a data rate operational parameter; a bit cap operational parameter; or a margin operational parameter. |
| <b>8</b> | The method of claim 1 wherein determining the operational configuration for the at least one DSL line in the new DSL line set comprises limiting data transmission by the at least one DSL line in the new DSL line set to at least one tone set configured to prevent disruptive crosstalk in the already-operating DSL line set.                                                                                                                                                                                                                                                                                      |
| <b>9</b> | The method of claim 1 wherein the control signals sent to the new DSL line set and the already-operating DSL line set comprise signals controlling at least one of the following: CARMASK; PSDMASK; RFIBANDS; BCAP[n]; a carrier mask operational parameter; a PSD operational parameter; a bit cap operational parameter; or a margin operational parameter.                                                                                                                                                                                                                                                           |

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>10</b>      | The method of claim 1 wherein the already-operating DSL line set is a vectored DSL line set; further wherein the method further comprises adjusting operation of the vectored DSL line set to integrate the new DSL line set into vectored operation with the vectored DSL line set.                                                                                                                                           |
| <b>11[pre]</b> | The method of claim 10 wherein adjusting operation of the vectored DSL line set to integrate the new DSL line set into vectored operation with the vectored DSL line set comprises:                                                                                                                                                                                                                                            |
| <b>11[a]</b>   | obtaining vector channel and noise information for the new DSL line set and for the already-operating DSL line set; and                                                                                                                                                                                                                                                                                                        |
| <b>11[b]</b>   | performing vectoring based on the obtained vector channel and noise information.                                                                                                                                                                                                                                                                                                                                               |
| <b>12</b>      | The method of claim 10 wherein adjusting operation of the vectored DSL line set to integrate the new DSL line set into vectored operation with the vectored DSL line set comprises configuring operation of the vectored DSL line set to integrate the new DSL line set into vectored operation with the vectored DSL line set after evaluating concurrent use of the new DSL line set and the already-operating DSL line set. |
| <b>13</b>      | The method of claim 10 wherein adjusting operation of the vectored DSL line set to integrate the new DSL line set into vectored operation with the vectored DSL line set comprises configuring operation of the new DSL line set to integrate the new DSL line set into vectored operation with the vectored DSL line set after evaluating concurrent use of the new DSL line set and the already-operating DSL line set.      |
| <b>14[pre]</b> | a controller comprising:                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>14[a]</b>   | a data collection unit configured to collect operational data from a new DSL line set and an already-operating DSL line set;                                                                                                                                                                                                                                                                                                   |
| <b>14[b]</b>   | an analysis unit coupled to the collection unit, wherein the analysis unit is configured to: analyze the collected operational data; determine an operational configuration for at least one DSL line in the new DSL line set that will allow the new DSL line set to join the already-operating DSL line set without disrupting the already-operating DSL line set;                                                           |
| <b>14[c]</b>   | evaluate data received by the new DSL line set; and evaluate data received by the already-operating DSL line set; and                                                                                                                                                                                                                                                                                                          |
| <b>14[d]</b>   | a control signal generator coupled to the analysis unit, wherein the control signal generator is configured to send control                                                                                                                                                                                                                                                                                                    |

|                |                                                                                                                                                                                                                                                                                                                                                                    |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                | signals to the new DSL line set and to the already-operating DSL line set, further wherein the control signals comprise signals controlling operation of at least one of the following: the new DSL line set; or the already-operating DSL line set; and                                                                                                           |
| <b>14[e]</b>   | wherein the controller is configured to evaluate whether crosstalk from the new DSL line set affects the already-operating DSL line set.                                                                                                                                                                                                                           |
| <b>15</b>      | The controller of claim 14 wherein the operational configuration for the at least one DSL line in the new DSL line set comprises setting transmit power for the at least one DSL line in the new DSL line set.                                                                                                                                                     |
| <b>16</b>      | The controller of claim 14 wherein the controller is configured to obtain vector channel and noise information for the new DSL line set and the already-operating DSL line set.                                                                                                                                                                                    |
| <b>17</b>      | The controller of claim 14 wherein the already-operating DSL line set comprises at least one of the following: is a vectored DSL line set; a single DSL line; or a plurality of DSL lines.                                                                                                                                                                         |
| <b>18</b>      | The controller of claim 14 wherein the operational configuration for at least one DSL line in the new DSL line set comprises orthogonal training sequences on a plurality of DSL lines in the new DSL line set to permit independent identification of the plurality of DSL lines in the new DSL line set during simultaneous training.                            |
| <b>19</b>      | The controller of claim 14 wherein the control signals sent to the new DSL line set and the already-operating DSL line set comprise signals controlling at least one of the following: CARMASK; PSDMASK; RFIBANDS; BCAP[n]; a carrier mask operational parameter; a PSD operational parameter; a bit cap operational parameter; or a margin operational parameter. |
| <b>20[pre]</b> | A computer program product comprising:                                                                                                                                                                                                                                                                                                                             |
| <b>20[a]</b>   | a machine readable medium; and program instructions contained in the machine readable medium, the program instructions specifying a method of training a new DSL line set to join an already-operating DSL line set, the method comprising:                                                                                                                        |
| <b>20[b]</b>   | collecting operational data, via a data collection unit, from the new DSL line set and the already-operating DSL line set;                                                                                                                                                                                                                                         |
| <b>20[c]</b>   | performing the following operations, via an analysis unit coupled to the collection unit: analyzing the collected operational data determining an operational configuration for at least one DSL                                                                                                                                                                   |

|              |                                                                                                                                                                                                                                                                                                                                        |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              | line in the new DSL line set that will allow the new DSL line set to join the already-operating DSL line set without disrupting the already-operating DSL line set;                                                                                                                                                                    |
| <b>20[d]</b> | evaluating data received by the new DSL line set; and<br>evaluating data received by the already-operating DSL line set;<br>and                                                                                                                                                                                                        |
| <b>20[e]</b> | sending control signals, via a control signal generator coupled to the analysis unit, to the new DSL line set and to the already-operating DSL line set, further wherein the control signals comprise signals controlling operation of at least one of the following: the new DSL line set; or the already-operating DSL line set; and |
| <b>20[f]</b> | wherein the controller is configured to evaluate whether crosstalk from the new DSL line set affects the already-operating DSL line set.                                                                                                                                                                                               |

**CERTIFICATION UNDER 37 C.F.R. §42.24**

Petitioner certifies that the word count in this Petition is 13,999 words, as counted by the word-processing program (Microsoft Word for Office 365) used to generate this Petition, where such word count excludes the table of contents, table of authorities, mandatory notices, certificate of service, appendix of exhibits, and this certificate of word count. This Petition is in compliance with the 14,000-word limit set in 37 C.F.R. §42.24(a)(1)(i).

Date: January 22, 2025

By: /M. Scott Stevens/

M. Scott Stevens  
Reg. No. 54,762  
**ALSTON & BIRD LLP**  
Vantage South End  
1120 S. Tryon Street, Suite 300  
Charlotte, NC 28203  
Phone: 704.444.1000  
Fax: 704.444.1111  
Email: [scott.stevens@alston.com](mailto:scott.stevens@alston.com)

## **CERTIFICATE OF SERVICE**

Pursuant to 37 C.F.R. §§42.6(e), 42.105 and in view of the agreement between the Parties under 37 C.F.R. § 42.105(b), the undersigned hereby certifies that true and correct copies of the above-captioned PETITION FOR INTER PARTES REVIEW OF U.S. PATENT NO. 7,991,122, all associated exhibits, and Petitioner's Power of Attorney were served in their entireties on January 22, 2025, upon the Patent Owner at the following email addresses of Patent Owner's litigation counsel:

[ASSIA-ATT@caldwellcc.com](mailto:ASSIA-ATT@caldwellcc.com)

[bcaldwell@caldwellcc.com](mailto:bcaldwell@caldwellcc.com)

[jnemunaitis@caldwellcc.com](mailto:jnemunaitis@caldwellcc.com)

Date: January 22, 2025

By: /M. Scott Stevens/

M. Scott Stevens  
Reg. No. 54.762  
**ALSTON & BIRD LLP**  
Vantage South End  
1120 S. Tryon Street, Suite 300  
Charlotte, NC 28203  
Phone: 704.444.1000  
Fax: 704.444.1111  
Email: scott.stevens@alston.com