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- (21) **International Application Number:**
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62/142,093 2 April 2015 (02.04.2015) US
- (71) **Applicant:** COMMSCOPE TECHNOLOGIES LLC
[US/US]; 1100 CommScope Place SE, Hickory, North Carolina 28602 (US).
- (72) **Inventors:** ZIMMEL, Steven C.; 5344 Hampshire Drive, Minneapolis, Minnesota 55419 (US). GRONVALL, Erik J.; 4217 West 100th Street, Bloomington, Minnesota 55437 (US). LU, Yu; 12251 Princeton Avenue, Eden Prairie, Minnesota 55347 (US).
- (74) **Agent:** KOWALCHYK, Katherine M.; Merchant & Gould P.C., P.O. Box 2903, Minneapolis, Minnesota 55402-0903 (US).
- (81) **Designated States** (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM,

DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

- (84) **Designated States** (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— of inventorship (Rule 4.17(iv))

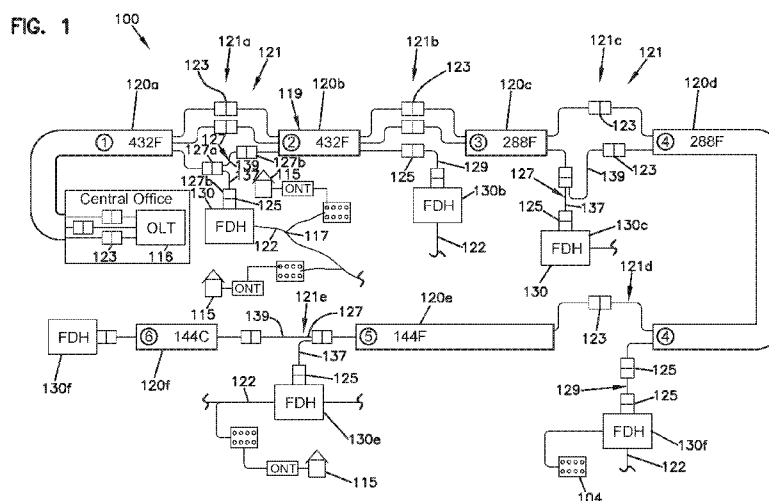
Published:

- with international search report (Art. 21(3))
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(88) Date of publication of the international search report:

10 November 2016

(54) **Title:** FIBER OPTIC NETWORK ARCHITECTURE USING HIGH FIBER-COUNT FIBER OPTIC CONNECTORS



(57) **Abstract:** A fiber optic network architecture for distributing service to local subscribers is disclosed. The architecture includes a plurality of high-fiber count cables connected end-to-end at connectorized coupling locations to form a main cable trunk. The connectorized coupling locations include high-fiber count pass-through connections for optically connecting optical fibers of adjacent ones of the high-fiber count cables end. The connectorized coupling locations also including high-fiber count branch connections for optically connecting optical fibers of the high-fiber count cables to branch locations.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2016/025664**A. CLASSIFICATION OF SUBJECT MATTER****G02B 6/28(2006.01)i, G02B 6/38(2006.01)i**

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G02B 6/28; G02B 644; G02B 6/40; H04J 14/00; G02B 6/46; G02B 6/02; G02B 600; G02B 6/00; G02B 6/44; G02B 6/38

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: fiber optic network, service, local subscriber, high-fiber count cables, coupling locations, high-fiber count pass-through connections, high-fiber count branch connections

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6819842 B1 (VOGEL et al.) 16 November 2004 See column 4, lines 15-17, column 5, lines 1-2, claim 4 and figures 1-3.	1-22
Y	US 2012-0027355 A1 (LEBLANC et al.) 02 February 2012 See paragraphs [0045]-[0046], [0055]-[0059], [0075]-[0076] and figures 2, 6-7, 33, 35.	1-22
A	US 2011-0311226 A1 (SMITH et al.) 22 December 2011 See paragraphs [0050]-[0067] and figures 1-8.	1-22
A	WO 2008-076450 A1 (CORNING CABLE SYSTEMS LLC et al.) 26 June 2008 See paragraphs [0025]-[0027] and figure 1.	1-22
A	US 8737837 B2 (CONNER et al.) 27 May 2014 See claims 1, 3 and figures 1-2.	1-22



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

20 September 2016 (20.09.2016)

Date of mailing of the international search report

20 September 2016 (20.09.2016)

Name and mailing address of the ISA/KR

International Application Division

Korean Intellectual Property Office

189 Cheongsa-ro, Seo-gu, Daejeon, 35208, Republic of Korea

Facsimile No. +82-42-481-8578

Authorized officer

KANG, Sung Chul

Telephone No. +82-42-481-8405



INTERNATIONAL SEARCH REPORTInternational application No.
PCT/US2016/025664**Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Group I (claims 1-22) directed to a fiber optic network architecture for distributing service to local subscribers.
Group II (claims 23-29) directed to a fiber optic connector.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of any additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.: 1-22

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2016/025664

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6819842 B1	16/11/2004	AR 052634 A1 CA 2551044 A1 EP 1820054 A1 TW I261133 B WO 2005-019895 A1	28/03/2007 03/03/2005 22/08/2007 01/09/2006 03/03/2005
US 2012-0027355 A1	02/02/2012	US 2015-0219864 A1 US 8961035 B2 US 9348097 B2	06/08/2015 24/02/2015 24/05/2016
US 2011-0311226 A1	22/12/2011	US 2015-0334476 A1 US 8837940 B2	19/11/2015 16/09/2014
WO 2008-076450 A1	26/06/2008	AU 2003-295460 A1 AU 2003-295460 A8 AU 2006-275551 A1 AU 2006-337663 A1 AU 2006-337663 A2 AU 2006-337663 B2 AU 2007-101252 A4 AU 2007-101252 B4 AU 2007-325773 A1 AU 2007-325773 A2 AU 2007-325773 B2 AU 2007-334346 A1 CA 2506435 A1 CA 2506435 C CA 2565932 A1 CA 2569748 A1 CA 2569748 C CA 2616851 A1 CA 2616851 C CA 2642016 A1 CA 2642016 C CN 100456071 C CN 100472262 C CN 101010610 A CN 101339280 A CN 101339280 B CN 101401018 A CN 101401018 B CN 101435902 A CN 101435902 B CN 101460877 A CN 101460877 B CN 101529297 A CN 101529297 B CN 101542346 A CN 101542346 B	29/07/2004 29/07/2004 08/02/2007 16/08/2007 30/10/2008 30/08/2012 01/12/2011 24/10/2013 05/06/2008 08/10/2009 09/05/2013 26/06/2008 22/07/2004 14/08/2012 15/12/2005 22/12/2005 28/08/2012 08/02/2007 09/07/2013 16/08/2007 13/10/2015 28/01/2009 25/03/2009 01/08/2007 07/01/2009 01/12/2010 01/04/2009 16/11/2011 20/05/2009 28/11/2012 17/06/2009 04/05/2011 09/09/2009 11/05/2011 23/09/2009 22/08/2012

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2016/025664

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		CN 102176347 A	07/09/2011
		CN 102176347 B	27/03/2013
		CN 1729418 A	01/02/2006
		CN 1954247 A	25/04/2007
		CN 1954247 B	22/12/2010
		EP 1573377 A2	14/09/2005
		EP 1573377 B1	20/01/2016
		EP 1697768 A2	06/09/2006
		EP 1818704 A2	15/08/2007
		EP 1818704 A3	05/09/2007
		EP 1910879 A2	16/04/2008
		EP 1910879 B1	20/04/2016
		EP 1982223 A1	22/10/2008
		EP 2095164 A1	02/09/2009
		JP 2007-538287 A	27/12/2007
		JP 2008-502025 A	24/01/2008
		JP 2009-503589 A	29/01/2009
		JP 2009-526266 A	16/07/2009
		JP 4948408 B2	06/06/2012
		JP 5172673 B2	27/03/2013
		JP 5410097 B2	05/02/2014
		KR 10-2005-0084384 A	26/08/2005
		US 2004-0120662 A1	24/06/2004
		US 2004-0120663 A1	24/06/2004
		US 2004-0208462 A1	21/10/2004
		US 2004-0223707 A1	11/11/2004
		US 2004-0240808 A1	02/12/2004
		US 2005-0259754 A1	24/11/2005
		US 2006-0002668 A1	05/01/2006
		US 2006-0165355 A1	27/07/2006
		US 2007-0025668 A1	01/02/2007
		US 2007-0098339 A1	03/05/2007
		US 2007-0269172 A1	22/11/2007
		US 2009-0067791 A1	12/03/2009
		US 2009-0074363 A1	19/03/2009
		US 2009-0074364 A1	19/03/2009
		US 2009-0190887 A1	30/07/2009
		US 2009-0190890 A1	30/07/2009
		US 2009-0324183 A1	31/12/2009
		US 2010-0290747 A1	18/11/2010
		US 2014-0212101 A1	31/07/2014
		US 2014-0241678 A1	28/08/2014
		US 6970629 B2	29/11/2005
		US 7177507 B2	13/02/2007
		US 7231119 B2	12/06/2007
		US 7236670 B2	26/06/2007
		US 7254302 B2	07/08/2007
		US 7277615 B2	02/10/2007
		US 7336873 B2	26/02/2008
		US 7415181 B2	19/08/2008

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2016/025664

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 8737837 B2	27/05/2014	US 7469087 B2	23/12/2008
		US 7471862 B2	30/12/2008
		US 7668243 B2	23/02/2010
		US 7693375 B2	06/04/2010
		US 7747117 B2	29/06/2010
		US 7751666 B2	06/07/2010
		US 7787727 B2	31/08/2010
		WO 2004-061866 A2	22/07/2004
		WO 2004-061866 A3	16/09/2004
		WO 2005-036213 A2	21/04/2005
		WO 2005-036213 A3	21/09/2006
		WO 2005-119321 A1	15/12/2005
		WO 2005-121857 A1	22/12/2005
		WO 2007-016479 A2	08/02/2007
		WO 2007-016479 A3	23/08/2007
		WO 2007-092046 A1	16/08/2007
		WO 2008-066782 A2	05/06/2008
		WO 2008-066782 A3	07/08/2008
		AU 2009-201534 A1	29/04/2010
		AU 2009-201534 B2	26/08/2010
		AU 2009-201623 A1	29/04/2010
		AU 2009-201624 A1	07/10/2010
		AU 2009-201624 B2	24/03/2011
		AU 2009-201625 A1	29/04/2010
		AU 2009-201625 B2	07/04/2011
		AU 2009-201626 A1	29/04/2010
		AU 2010-213701 A1	19/08/2010
		AU 2010-219424 A1	07/10/2010
		AU 2011-201172 A1	07/04/2011
		CA 2740152 A1	22/04/2010
		CA 2740154 A1	22/04/2010
		CA 2740157 A1	22/04/2010
		CA 2740161 A1	22/04/2010
		CA 2740164 A1	22/04/2010
		CA 2751027 A1	19/08/2010
		CN 102209925 A	05/10/2011
		CN 102210112 A	05/10/2011
		CN 102210112 B	25/11/2015
		CN 102210113 A	05/10/2011
		CN 102210113 B	18/05/2016
		CN 102210114 A	05/10/2011
		CN 102210114 B	02/03/2016
		CN 102210115 A	05/10/2011
		CN 102334057 A	25/01/2012
		CN 102334057 B	18/06/2014
		EP 2350724 A1	03/08/2011
		EP 2353232 A1	10/08/2011
		EP 2353233 A1	10/08/2011
		EP 2353233 B1	22/01/2014

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2016/025664Patent document
cited in search reportPublication
datePatent family
member(s)Publication
date

EP 2353234 A1	10/08/2011
EP 2353235 A1	10/08/2011
ES 2456355 T3	22/04/2014
US 2010-0092129 A1	15/04/2010
US 2010-0092133 A1	15/04/2010
US 2010-0092146 A1	15/04/2010
US 2010-0092169 A1	15/04/2010
US 2010-0092171 A1	15/04/2010
US 8249450 B2	21/08/2012
US 9188759 B2	17/11/2015
US 9207421 B2	08/12/2015
WO 2010-044967 A1	22/04/2010
WO 2010-044973 A1	22/04/2010
WO 2010-044975 A1	22/04/2010
WO 2010-044976 A1	22/04/2010
WO 2010-044979 A1	22/04/2010
WO 2010-093794 A1	19/08/2010