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(71) Applicant (for all designated States except US): **BRITISH TELECOMMUNICATIONS PUBLIC LIMITED COMPANY** [GB/GB]; 81 Newgate Street, London Greater London EC1A 7AJ (GB).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **HEALEY, Peter** [GB/GB]; 31 Norbury Road, Ipswich Suffolk IP4 4RQ (GB). **SIKORA, Edmund, Sergio, Robert** [GB/GB]; Ashlyn, Ashbocking Road, Swilland, Ipswich Suffolk IP6 9LJ (GB).

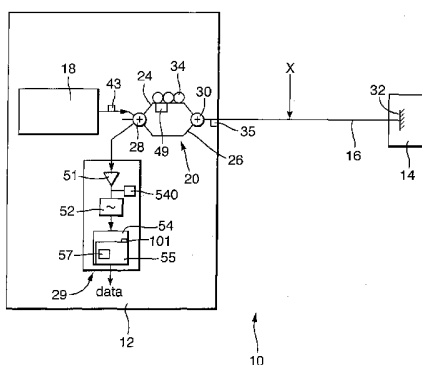
(74) Agent: **CHABASSEUR, Vincent, Robert**; BT Group Legal, Intellectual Property Department, PP: C5A, BT Centre, 81 Newgate Street, London Greater London EC1A 7AJ (GB).

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[Continued on next page]

(54) Title: EVALUATING THE POSITION OF A TIME-VARYING DISTURBANCE



(57) Abstract: The present invention relates to a method of and apparatus for evaluating the position of a disturbance on an optical link, in particular where the disturbance is a time-varying disturbance. An optical time domain reflectometry technique is used in which a series of low coherence test pulses is launched by means of an optical pulse source (18) into an the optical link (16), and the backscattered return signal is monitored. The test pulses pass through an unbalanced Mach Zhender interferometer (20) with the result that for each test pulse, a pair of time-displaced pulse copies is launched onto the link (16). The backscattered return signal is passed through the same interferometer (20), which causes the pulse copies of each pair to become realigned and to interfere with one another. A time-varying disturbance (x) is likely to affect each pulse copy of a pair differently. As a result, an abnormality such as a step is likely occur in the backscattered signal. From the time position of an abnormality, the distance of the disturbance responsible is evaluated.



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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

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

EP0-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2003/103211 A1 (LANGE CHARLES ET AL) 5 June 2003 (2003-06-05) paragraphs '0001! - '0003!, '0026! - '0056!; figures 2B,3,4 -----	1-4, 8-18, 22-29, 32
X	US 4 572 949 A (BOWERS ET AL) 25 February 1986 (1986-02-25) column 1, lines 9-14 column 2, line 36 - column 4, line 27 column 13, lines 21-62; figures 2,6 ----- -/--	1,2, 8-18, 22-25, 32

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Prasse, T

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>US 5 636 021 A (UDD ET AL) 3 June 1997 (1997-06-03)</p> <p>column 1, lines 4-8 column 5, line 26 - column 6, line 59; figure 2 column 12, lines 25-56; figure 8</p>	<p>1-3, 19-22, 26,30-32</p>
X	<p>US 6 459 486 B1 (UDD ERIC ET AL) 1 October 2002 (2002-10-01)</p> <p>column 1, lines 28-34 column 2, line 54 - column 4, line 19; figures 1,2</p>	<p>1-3,22, 26,32</p>

INTERNATIONAL SEARCH REPORT

Information on patent family members

Interr

Application No

PCT/GB2005/001269

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2003103211	A1	05-06-2003	EP 1451556 A1 01-09-2004
			JP 2005512047 T 28-04-2005
			WO 03048746 A1 12-06-2003
US 4572949	A	25-02-1986	US 4652744 A 24-03-1987
			AT 48033 T 15-12-1989
			AU 569251 B2 28-01-1988
			AU 1604783 A 04-11-1983
			BR 8306918 A 17-04-1984
			CA 1229674 A1 24-11-1987
			DE 3380854 D1 21-12-1989
			EP 0091826 A2 19-10-1983
			IL 68399 A 20-12-1987
			KR 9100604 B1 28-01-1991
			NO 834587 A 13-12-1983
			WO 8303684 A1 27-10-1983
US 5636021	A	03-06-1997	NONE
US 6459486	B1	01-10-2002	NONE