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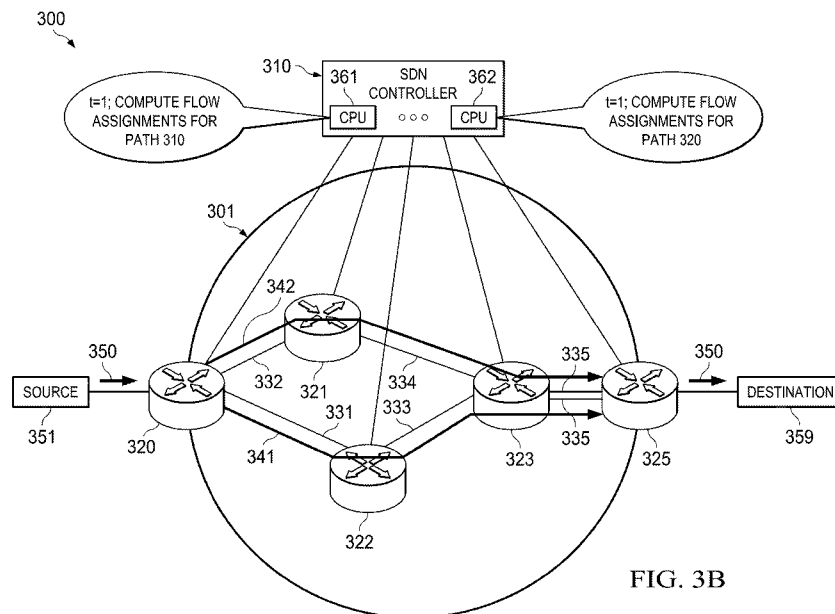
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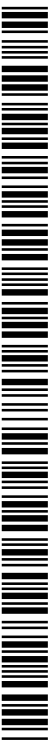
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[Continued on next page]

(54) Title: SYSTEMS AND METHODS FOR TRAFFIC ENGINEERING IN SOFTWARE DEFINED NETWORKS



(57) Abstract: Traffic engineering vector operations that are capable of being independently solved can provide near-linear scalability through the exploitation of massively parallel processing. Optimization can be performed simultaneously on different paths in a data plane, as well as on different links within the same path (or within the same set of paths). In some embodiments, the traffic engineering vector operations include an adjustable alpha-fairness variable that allows managers to achieve different levels of fairness/throughput. Hence, embodiment alpha fairness techniques provide flexible policy execution, while maintaining excellent scalability for large network implementations.





TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

— with information concerning request for restoration of the right of priority in respect of one or more priority claims (Rules 26bis.3 and 48.2(b)(vii))

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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - H04L 12/56 (2014.01)

CPC - H04L 45/124 (2014.09)

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)

IPC(8) - H04L 12/56, H04L 12/26, H04L 12/24, H04Q 3/66, H04Q 3/00 (2014.01)

USPC - 370/238, 709/241, 370/386, 370/236.2

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
 CPC - H04L 45/124, H04L 45/00, H04L 45/50, H04L 69/167, H04Q 2213/13056, H04Q 2213/13164, H04Q 3/0079, H04Q 3/66, H04Q 2213/13167, H04Q 2213/13103, H04Q 2213/13353, H04Q 2213/13106, H04Q 2213/13166 (2014.09) (keyword delimited)

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

Orbit, Google Patents, Google Scholar, Google.

traffic engineering, network, paths, communicate, connection, traffic flows, data plane, links, source destination pairs, iterative, compute

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y — A	US 2013/0121146 A1 (HASSIDIM et al) 16 May 2013 (16.05.2013), entire document	1-4, 7-9, 11, 15-21 — 5, 6, 10, 12-14, 22-24
Y — A	US 2013/0039187 A1 (STRULO et al) 14 February 2013 (14.02.2013), entire document	1-4, 7-9, 11, 15-21 — 5, 6, 10, 12-14, 22-24
Y — A	US 2004/0246905 A1 (DUNAGAN et al) 09 December 2004 (09.12.2004), entire document	1-4, 7-9, 11, 15-21 — 5, 6, 10, 12-14, 22-24
Y	US 2002/0186658 A1 (CHIU et al) 12 December 2002 (12.12.2002), entire document	7, 8, 16
Y	AZODOLMOLKY et al. "Integrated OpenFlow-GMPLS control plane: an overlay model for software defined packet over optical networks." In: Optics express. 22 December 2011 (22.12.2011). Retrieved from <http://www.opticsinfobase.org/view_article.cfm?gotourl=http%3A%2F%2Fwww%2Eopticsinfobase%2Eorg%2FDirectPDFAccess%2F5F8C40AB%2D99FF%2D76D3%2D6BA95911799CD30A%5F224728%2Foe%2D19%2D26%2DB421%2Epdf%3Fda%3D1%26id%3D224728%26seq%3D0%26mobile%3Dno&org=>, entire document	15
A	US 2002/0141345 A1 (SZVIATOVSKI et al) 03 October 2002 (03.10.2002), entire document	1-24
A	US 2008/0049621 A1 (MCGUIRE et al) 28 February 2008 (28.02.2008), entire document	1-24
A	US 2012/0314575 A1 (FRANK et al) 13 December 2012 (13.12.2012), entire document	1-24

 Further documents are listed in the continuation of Box C.

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

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"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

25 October 2014

Date of mailing of the international search report

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