

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
1 November 2007 (01.11.2007)

PCT

(10) International Publication Number
WO 2007/124296 A3

(51) International Patent Classification:
H04J 1/16 (2006.01)

(21) International Application Number:

PCT/US2007/066743

(22) International Filing Date: 17 April 2007 (17.04.2007)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
11/408,293 20 April 2006 (20.04.2006) US

(71) Applicant (for all designated States except US): **CISCO TECHNOLOGY, INC., ET AL.** [US/US]; 170 West Tasman Drive, SJC/10/2/1, San Jose, CA 95134-1706 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **PAN, Rong** [US/US]; 558 Carlisle Way, Sunnyvale, CA 94087 (US). **BONOMI, Flavio** [IT/US]; 526 Lowell Avenue, Palo Alto, CA 94301 (US). **VARGHESE, George** [US/US]; 795 Prestwick Court, Sunnyvale, CA 94087 (US).

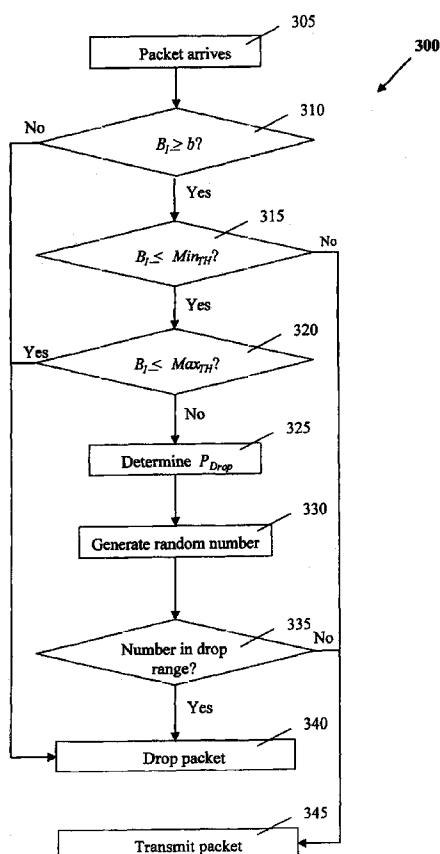
(74) Agents: **LAFFERTY, Wm., Brook et al.**; Scientific-Atlanta, Inc., Intellectual Property Dept., 5030 Sugarloaf Parkway, Lawrenceville, GA 30044 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, 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, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: A MODIFICATION OF POLICING METHODS TO MAKE THEM MORE TCP-FRIENDLY



(57) Abstract: Various improvements are provided for prior art policing methods, including token bucket (200) methods and virtual time policing methods. Some preferred methods of the invention involve assigning a non-zero drop probability even when the packet would otherwise have been transmitted according to a prior art policing method. For example, a non-zero drop probability may be assigned even when there are sufficient tokens in a token bucket to allow transmission of the packet. A non-zero drop probability may be assigned, for example, when a token bucket level is at or below a predetermined threshold (160) or according to a rate (205) at which a token bucket is being emptied. Some implementations involve treating a token bucket as a virtual queue wherein the number of free elements in the virtual queue is proportional to the number of remaining tokens in the token bucket. Such implementations may involve predicting a future virtual queue size according to a previous virtual queue size and using this predicted value to calculate a drop probability.



Published:

— *with international search report*

(88) Date of publication of the international search report:

26 June 2008

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US07/66743

A. CLASSIFICATION OF SUBJECT MATTER

IPC: H04J 1/16(2006.01)

USPC: 370/229,230,235,235.1

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)

U.S. : 370/229,230,235,235.1

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,570,360 (KLAUSMEIER et al.) 29 October 1996 (29.10.1996), Fig. 5b, Abstract	1-22
X	PUB. No 2005/0025057 A1 (HUO) 03 February 2005 (03.02.2005) Fig. 2 and Abstract.	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 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

28 March 2008 (28.03.2008)

Date of mailing of the international search report

09 APR 2008

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Facsimile No. (571) 273-3201

Authorized officer

CHI PHAM

Telephone No. (571) 272-2600