



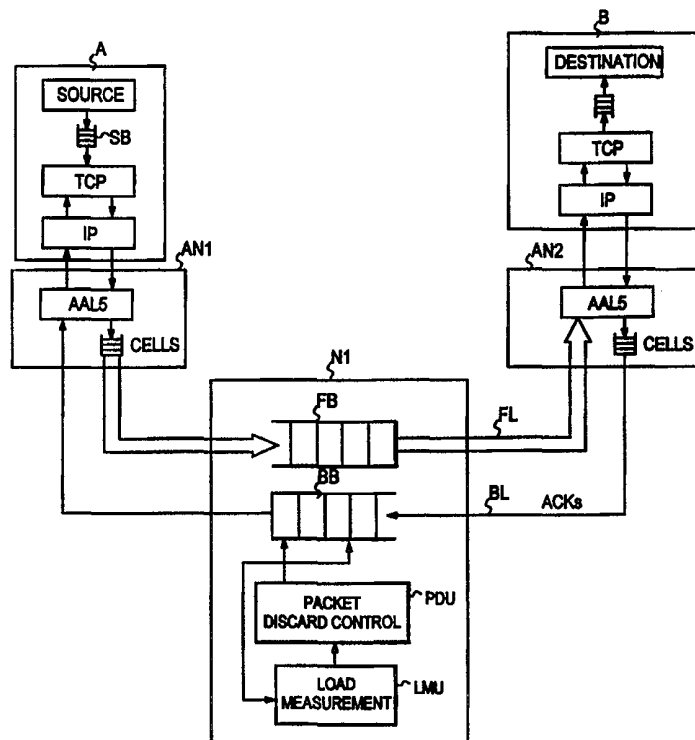
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification <sup>6</sup> : <b>H04L 12/56</b></p>	<p><b>A3</b></p>	<p>(11) International Publication Number: <b>WO 99/53655</b> (43) International Publication Date: 21 October 1999 (21.10.99)</p>
<p>(21) International Application Number: PCT/FI99/00303 (22) International Filing Date: 9 April 1999 (09.04.99) (30) Priority Data: 980826 9 April 1998 (09.04.98) FI (71) Applicant (for all designated States except US): NOKIA TELECOMMUNICATIONS OY [FI/FI]; Keilalahdentie 4, FIN-02150 Espoo (FI). (72) Inventor; and (75) Inventor/Applicant (for US only): MA, Jian [FI/CN]; 3361, Capital Paradise, Bai Zing Zhuang, Hou Sha Yu Xiang, Shuan Yi, Beijing 100130 (CN). (74) Agent: PATENT AGENCY COMPATENT LTD.; Teollisuuskatu 33, P.O. Box 156, FIN-00511 Helsinki (FI).</p>		<p>(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p><b>Published</b> <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p> <p>(88) Date of publication of the international search report: 2 December 1999 (02.12.99)</p>

(54) Title: CONGESTION CONTROL IN A TELECOMMUNICATIONS NETWORK

(57) Abstract

The invention relates to overload control in a packet switched network, especially in a network where Transmission Control Protocol (TCP) is used as the transport layer protocol. In order to increase the throughput of asymmetric connections, the level of traffic load is measured on the backward path of a connection and acknowledgement packets traveling along the backward path are discarded when the measured load level exceeds a predetermined level. If the asymmetry is dynamic, the current level of asymmetry can be estimated to determine whether a packet discard mechanism is used on the forward path or on the backward path.



**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

<b>AL</b>	Albania	<b>ES</b>	Spain	<b>LS</b>	Lesotho	<b>SI</b>	Slovenia
<b>AM</b>	Armenia	<b>FI</b>	Finland	<b>LT</b>	Lithuania	<b>SK</b>	Slovakia
<b>AT</b>	Austria	<b>FR</b>	France	<b>LU</b>	Luxembourg	<b>SN</b>	Senegal
<b>AU</b>	Australia	<b>GA</b>	Gabon	<b>LV</b>	Latvia	<b>SZ</b>	Swaziland
<b>AZ</b>	Azerbaijan	<b>GB</b>	United Kingdom	<b>MC</b>	Monaco	<b>TD</b>	Chad
<b>BA</b>	Bosnia and Herzegovina	<b>GE</b>	Georgia	<b>MD</b>	Republic of Moldova	<b>TG</b>	Togo
<b>BB</b>	Barbados	<b>GH</b>	Ghana	<b>MG</b>	Madagascar	<b>TJ</b>	Tajikistan
<b>BE</b>	Belgium	<b>GN</b>	Guinea	<b>MK</b>	The former Yugoslav Republic of Macedonia	<b>TM</b>	Turkmenistan
<b>BF</b>	Burkina Faso	<b>GR</b>	Greece	<b>ML</b>	Mali	<b>TR</b>	Turkey
<b>BG</b>	Bulgaria	<b>HU</b>	Hungary	<b>MN</b>	Mongolia	<b>TT</b>	Trinidad and Tobago
<b>BJ</b>	Benin	<b>IE</b>	Ireland	<b>MR</b>	Mauritania	<b>UA</b>	Ukraine
<b>BR</b>	Brazil	<b>IL</b>	Israel	<b>MX</b>	Mexico	<b>UG</b>	Uganda
<b>BY</b>	Belarus	<b>IS</b>	Iceland	<b>NE</b>	Niger	<b>US</b>	United States of America
<b>CA</b>	Canada	<b>IT</b>	Italy	<b>NL</b>	Netherlands	<b>UZ</b>	Uzbekistan
<b>CF</b>	Central African Republic	<b>JP</b>	Japan	<b>NO</b>	Norway	<b>VN</b>	Viet Nam
<b>CG</b>	Congo	<b>KE</b>	Kenya	<b>NZ</b>	New Zealand	<b>YU</b>	Yugoslavia
<b>CH</b>	Switzerland	<b>KG</b>	Kyrgyzstan	<b>PL</b>	Poland	<b>ZW</b>	Zimbabwe
<b>CI</b>	Côte d'Ivoire	<b>KP</b>	Democratic People's Republic of Korea	<b>PT</b>	Portugal		
<b>CM</b>	Cameroon	<b>KR</b>	Republic of Korea	<b>RO</b>	Romania		
<b>CN</b>	China	<b>KZ</b>	Kazakstan	<b>RU</b>	Russian Federation		
<b>CU</b>	Cuba	<b>LC</b>	Saint Lucia	<b>SD</b>	Sudan		
<b>CZ</b>	Czech Republic	<b>LI</b>	Liechtenstein	<b>SE</b>	Sweden		
<b>DE</b>	Germany	<b>LK</b>	Sri Lanka	<b>SG</b>	Singapore		
<b>DK</b>	Denmark	<b>LR</b>	Liberia				
<b>EE</b>	Estonia						

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 99/00303

A. CLASSIFICATION OF SUBJECT MATTER		
IPC6: H04L 12/56 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)		
IPC6: H04L, H04Q		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
SE,DK,FI,NO classes as above		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
WPI, EPODOC, PAJ		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0829986 A1 (LUCENT TECHNOLOGIES INC.), 18 March 1998 (18.03.98), column 3, line 27 - column 4, line 17; column 5, line 42 - line 49; column 6, line 47 - column 7, line 7, claims 3-11, abstract	1-3,8-13
Y	column 7, line 37 - line 48; column 8 - column 9, line 25 --	4-7
Y	WO 9745978 A2 (FUJITSU NETWORK COMMUNICATIONS INC.), 4 December 1997 (04.12.97), page 9, paragraph 3 - page 10, paragraph 1; page 11, paragraph 2; page 15, paragraph 3 - page 16, paragraph 3 --	4-7
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> 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 document 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		"F" 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		Date of mailing of the international search report
6 October 1999		13-10-1999
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86		Authorized officer  Erik Johannesson/mj Telephone No. +46 8 782 25 00

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 99/00303

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	Balakrishnan H. et al, "The Effects of Asymmetry on TCP Performance", 1997, Proc. 3rd ACM/IEEE Conference on Mobile Computing and ..., (Budapest, Hungary), see abstract, section 4.3, section 8  --	1-13
A	Goyal R. et al, "TCP Selective Acknowledgements and UBR Drop Polices to Improve ATM-UBR Performance over Terrestrial and Satellite Networks", 1997, Proceedings of ICCCN97, (Las Vegas), see sections 2,5,9  -- -----	1-13

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

28/09/99

International application No.

PCT/FI 99/00303

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0829986 A1	18/03/98	JP 10126446 A	15/05/98
WO 9745978 A2	04/12/97	AU 3006097 A	05/01/98