

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
10 October 2002 (10.10.2002)

PCT

(10) International Publication Number  
**WO 02/080518 A3**

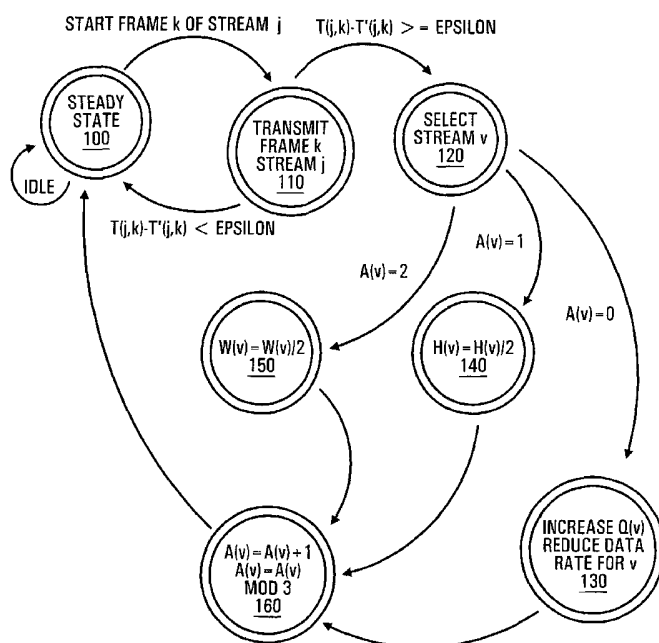
- (51) International Patent Classification<sup>7</sup>: H04N 7/24, 5/00
- (74) Agent: SMART & BIGGAR; Attn: ZISCHKA, Matthew, 438 University Avenue, Suite 1500, Box 111, Toronto, Ontario M5G 2K8 (CA).
- (21) International Application Number: PCT/CA02/00436
- (22) International Filing Date: 28 March 2002 (28.03.2002)
- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, 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, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data: 09/823,646 30 March 2001 (30.03.2001) US
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, 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, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- (71) Applicant (for all designated States except US): VIXS SYSTEMS INC. [CA/CA]; 2235 Sheppard Avenue East, Suite 1705, Toronto, Ontario M2J 5B5 (CA).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): LAKSONO, Indra [CA/CA]; 138 Old Hill Street, Richmond Hill, Ontario L4C 9Z7 (CA).

Published:  
— with international search report

[Continued on next page]

(54) Title: ADAPTIVE BANDWIDTH SYSTEM AND METHOD FOR VIDEO TRANSMISSION

ABFM State Machine 3 step escalation



(57) Abstract: A system and a method for simultaneous transmission of multiple media streams in a fixed bandwidth network are disclosed herein. The system is comprised of a central gateway media server and a plurality of client receiver units. The input media streams arrive from an external source and are then transmitted to the client receiver units in a compressed format. A state machine on the gateway media server detects if the network bandwidth is close to saturation. In one embodiment, the potential bandwidth saturation is measured by matching the time when the start of unit of media for each stream against the estimated transmission time for that unit. When any one actual transmission time exceeds its estimated transmission time by a predetermined threshold value, the network is deemed to be close to saturation, or already saturated, and the state machine executes a process of selecting at least one stream as a target for lowering total bandwidth usage. Once the target stream associated with a client receiver unit is chosen, the amount of data transmitted by the target stream is reduced, which could result in a lower data transmission rate. In one embodiment, the amount of data is reduced by a gradual degradation of the precision of the data, resulting in a greater potential for data compression, and/or by gradually reducing the resolution of the data of the target stream.



WO 02/080518 A3



— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

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

12 December 2002

## INTERNATIONAL SEARCH REPORT

|          |                |
|----------|----------------|
| Internat | Application No |
| PCT/CA   | 02/00436       |

A. CLASSIFICATION OF SUBJECT MATTER  
 IPC 7 H04N7/24 H04N5/00

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 7 H04N

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 practical, search terms used)

EPO-Internal, PAJ, WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category ° | Citation of document, with indication, where appropriate, of the relevant passages                                                                                                                                                                                                                            | Relevant to claim No. |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| X          | RAMANUJAN R S ET AL: "Adaptive streaming of MPEG video over IP networks" LOCAL COMPUTER NETWORKS, 1997. PROCEEDINGS.; 22ND ANNUAL CONFERENCE ON MINNEAPOLIS, MN, USA 2-5 NOV. 1997, LOS ALAMITOS, CA, USA, IEEE COMPUT. SOC, US, 2 November 1997 (1997-11-02), pages 398-409, XP010252445 ISBN: 0-8186-8141-1 | 1-25, 33-37, 39-43    |
| A          | the whole document<br>-----<br>-/--                                                                                                                                                                                                                                                                           | 26-32, 38             |

Further documents are listed in the continuation of box C.

Patent family members are listed in 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

\*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.

\*Z\* document member of the same patent family.

Date of the actual completion of the international search

30 September 2002

Date of mailing of the international search report

09/10/2002

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

Fantini, F

## INTERNATIONAL SEARCH REPORT

|          |                |
|----------|----------------|
| Internat | Application No |
| PCT/CA   | 02/00436       |

| C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT |                                                                                                                                                                                                                                                                                |                          |
|------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| Category °                                           | Citation of document, with indication, where appropriate, of the relevant passages                                                                                                                                                                                             | Relevant to claim No.    |
| X                                                    | US 6 014 694 A (AHARONI AMIR ET AL)<br>11 January 2000 (2000-01-11)<br><br>abstract<br>column 1, line 45 - line 62<br>column 2, line 10 - line 53<br>column 3, line 8 - line 28<br>column 7, line 44 - column 8, line 17<br>column 10, line 21 - line 49                       | 1-24,<br>33-37,<br>39-43 |
| A                                                    | column 11, line 25 - column 12, line 10<br>-----                                                                                                                                                                                                                               | 25-32, 38                |
| A                                                    | EP 0 901 285 A (MITSUBISHI ELECTRIC CORP)<br>10 March 1999 (1999-03-10)<br>abstract<br>page 4, line 31 - page 5, line 26<br>page 8, line 16 - line 45<br>page 13, line 7 - line 16<br>page 14, line 43 - line 50<br>figure 31<br>-----                                         | 1-43                     |
| A                                                    | REJAIE R ET AL: "Architectural considerations for playback of quality adaptive video over the Internet" IEEE INTERNATIONAL CONFERENCE ON NETWORKS. ICON. PROCEEDINGS OF ICON, XX, XX, 5 September 2000 (2000-09-05), pages 204-209, XP002177090<br>the whole document<br>----- | 1-43                     |
| A                                                    | BOURAS C ET AL: "On-demand hypermedia/multimedia service over broadband networks" PROCEEDINGS OF THE INTERNATIONAL SYMPOSIUM OF HIGH PERFORMANCE DISTRIBUTED COMPUTING, XX, XX, 6 August 1996 (1996-08-06), pages 224-231, XP002180545<br>the whole document                   | 1-43                     |
| A                                                    | EP 0 739 138 A (AT & T CORP)<br>23 October 1996 (1996-10-23)<br>-----                                                                                                                                                                                                          |                          |

**INTERNATIONAL SEARCH REPORT**  
 Information on patent family members

|           |                |
|-----------|----------------|
| Internati | Application No |
| PCT/CA    | 02/00436       |

| Patent document cited in search report |   | Publication date | Patent family member(s) | Publication date |
|----------------------------------------|---|------------------|-------------------------|------------------|
| US 6014694                             | A | 11-01-2000       | AU 7928998              | A 19-01-1999     |
|                                        |   |                  | EP 0992160              | A1 12-04-2000    |
|                                        |   |                  | WO 9900984              | A1 07-01-1999    |
|                                        |   |                  | JP 2002511216           | T 09-04-2002     |
| -----                                  |   |                  |                         |                  |
| EP 0901285                             | A | 10-03-1999       | WO 9838798              | A1 03-09-1998    |
|                                        |   |                  | EP 0901285              | A1 10-03-1999    |
| -----                                  |   |                  |                         |                  |
| EP 0739138                             | A | 23-10-1996       | CA 2173881              | A1 20-10-1996    |
|                                        |   |                  | EP 0739138              | A2 23-10-1996    |
|                                        |   |                  | JP 8298464              | A 12-11-1996     |
| -----                                  |   |                  |                         |                  |