

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
27 December 2007 (27.12.2007)

PCT

(10) International Publication Number  
**WO 2007/149100 A4**

(51) International Patent Classification:  
**H04N 7/16** (2006.01)

(21) International Application Number:  
PCT/US2006/024688

(22) International Filing Date: 23 June 2006 (23.06.2006)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
11/473,543 22 June 2006 (22.06.2006) US

(71) Applicant (for all designated States except US): **TIVO INC.** [US/US]; 2160 Gold Street, Alviso, CA 95002-2160 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **SMITH, Kevin P.** [US/US]; 1165 Karen Way, Mountain View, CA 94043 (US). **STEVENS, Paul** [US/US]; 1010 El Solyo Heights Drive, Felton, California 95018 (US). **FEDER, Adam** [US/US]; 898 Windmill Park Lane, Mountain View, California 94043 (US). **BARTON, James** [US/US]; 2160 Gold Street, Alviso, California 95002 (US).

(74) Agents: **IMAM, Anwar** et al.; **HICKMAN PALERMO TRUONG & BECKER LLP**, 2055 Gateway Place, Suite 550, San Jose, California 95110-1089 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, 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, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, 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, 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).

**Published:**

- with international search report
- with amended claims

(88) Date of publication of the international search report:  
4 December 2008

Date of publication of the amended claims: 22 January 2009

(54) Title: IN-BAND DATA RECOGNITION AND SYNCHRONIZATION SYSTEM

(57) Abstract: A method and apparatus for recognizing and synchronizing to in-band data at a multimedia device is provided. A content stream includes in-band data. The in-band data is processed and in-band data pattern data associated with the content stream are created. Metadata are attached to the event identification data. The event identification data are provided to multimedia devices which receive broadcasted multimedia content streams containing video programs with in-band data. The in-band data are processed and compared to the event identification data. If a match occurs, the multimedia device uses the metadata to perform specified actions.



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**AMENDED CLAIMS****received by the International Bureau on 11 September 2008 (11.09.2008)**Claims

1. A method for processing in-band data at a multimedia device, comprising:  
receiving a multimedia content stream, wherein the multimedia content stream  
contains in-band data;  
processing the in-band data, including computing hash values from the in-band data;  
determining whether the computed hash values match a particular pattern comprising  
at least two hash values among a plurality of patterns, wherein the particular  
pattern is associated with one or more events in the multimedia content  
stream; and  
identifying one or more events in the multimedia content stream based on metadata  
associated with the matched particular pattern.
2. The method of Claim 1, wherein the in-band data is closed-caption data.
3. The method of Claim 1, wherein the in-band data is Enhanced Television (ETV)  
signaling data.
4. The method of Claim 1, further comprising:  
in response to identifying one or more events in the multimedia content stream,  
displaying an icon to a user on a display screen as the multimedia content  
stream is displayed to a user.
5. The method of Claim 1, further comprising:  
in response to identifying one or more events in the multimedia content stream,  
storing one or more segments of the multimedia content stream on the  
multimedia device that are related to the one or more identified events.
6. The method of Claim 1, wherein the multimedia content stream further comprises one  
or more video programs, and wherein the identifying step identifies one or more events in the  
one or more video programs.
7. The method of Claim 1, wherein the determining step further comprises:

processing metadata associated with the matched particular pattern.

8. The method of Claim 7, wherein the metadata instructs the multimedia device to perform an action.
9. The method of Claim 7, wherein the metadata instructs the multimedia device to skip over a segment of the multimedia content stream.
10. The method of Claim 7, wherein the metadata instructs the multimedia device to re-order two or more segments of the multimedia content stream.
11. The method of Claim 10, further comprising:  
creating, at the multimedia device, a customized multimedia content stream  
containing the two or more re-ordered segments; and  
displaying the customized multimedia content stream to a user.
12. The method of Claim 7, wherein metadata associated with the identified location instructs the multimedia device to store one or more segments of the content stream on a storage device, and wherein the storage device contains one or more extracted segments from one or more different content streams.
13. The method of Claim 12, further comprising:  
creating, at the multimedia device, a customized multimedia content stream  
containing any combinations of segments stored on the storage device; and  
displaying the customized content stream to a user.
14. The method of Claim 1, wherein a user can skip to an identified event.
15. The method of Claim 1, further comprising:  
receiving event identification data associating one or more patterns of in-band data  
with one or more events; and  
storing the received event identification data on a storage device as part of the  
plurality of patterns.

16. The method of Claim 15, wherein the storage device is a hard disk drive.
17. The method of Claim 15, wherein the storage device is any type of removable storage media.
18. The method of Claim 15, wherein the storage device is any type of volatile and/or non-volatile storage medium.
19. The method of Claim 1, wherein the multimedia content stream is a television broadcast stream.
20. An apparatus for processing in-band data at a multimedia device, comprising:
  - a module for receiving a multimedia content stream, wherein the multimedia content stream contains in-band data;
  - a module for processing the in-band data,
    - wherein the module for processing in-band data computes hash values from the in-band data;
  - a module for determining whether the computed hash values match a particular pattern comprising at least two hash values among a plurality of patterns, wherein the particular pattern is associated with one or more events in the multimedia content stream; and
  - a module for identifying one or more events in the content stream based on metadata associated with the matched particular pattern.
21. The apparatus of Claim 20, wherein the in-band data is closed-caption data.
22. The apparatus of Claim 20, wherein the in-band data is Enhanced Television (ETV) signaling data.
23. The apparatus of Claim 20, further comprising:
  - a module for, in response to identifying one or more events in the multimedia content stream, displaying an icon to a user on a display screen as the multimedia content stream is displayed to a user.

24. The apparatus of Claim 20, further comprising:  
a module for, in response to identifying one or more events in the multimedia content stream, storing one or more segments of the multimedia content stream on the multimedia device that are related to the one or more identified events.
25. The apparatus of Claim 20, wherein the multimedia content stream further comprises one or more video programs, and wherein the identifying module identifies one or more events in the one or more video programs.
26. The apparatus of Claim 20, wherein the module for determining further comprises:  
a module for processing metadata associated with the matched particular pattern.
27. The apparatus of Claim 26, wherein the metadata instructs the multimedia device to perform an action.
28. The apparatus of Claim 26, wherein the metadata instructs the multimedia device to skip over a segment of the multimedia content stream.
29. The apparatus of Claim 26, wherein the metadata instructs the multimedia device to re-order two or more segments of the multimedia content stream.
30. The apparatus of Claim 29, further comprising:  
a module for creating, at the multimedia device, a customized multimedia content stream containing the two or more re-ordered segments; and  
a module for displaying the customized multimedia content stream to a user.
31. The apparatus of Claim 26, wherein metadata associated with the identified location instructs the second device to store one or more segments of the second content stream on a storage device, and wherein the storage device contains one or more extracted segments from one or more different content streams.
32. The apparatus of Claim 31, further comprising:

a module for creating, at the multimedia device, a customized multimedia content stream containing any combination of segments stored on the storage device; and  
a module for displaying the customized content stream to a user.

33. The apparatus of Claim 20, wherein a user can skip to an identified event.
34. The apparatus of Claim 20, further comprising:  
a module for receiving event identification data associating one or more patterns of in-band data with one or more events; and  
a module for storing the received event identification data on a storage device as part of the plurality of patterns.
35. The apparatus of Claim 34, wherein the storage device is a hard disk drive.
36. The apparatus of Claim 34, wherein the storage device is any type of removable storage media.
37. The apparatus of Claim 34, wherein the storage device is any type of volatile and/or non-volatile storage medium.
38. The apparatus of Claim 20, wherein the multimedia content stream is a television broadcast stream.
39. A computer-readable storage medium carrying one or more sequences of instructions for processing in-band data at a multimedia device, which instructions, when executed by one or more processors, cause the one or more processors to carry out the steps of:  
receiving a multimedia content stream, wherein the multimedia content stream contains in-band data;  
processing the in-band data, including computing hash values from the in-band data;  
determining whether the computed hash values match a particular pattern comprising at least two hash values among a plurality of patterns, wherein the particular pattern is associated with one or more events in the multimedia content stream; and

identifying one or more events in the multimedia content stream based on metadata associated with the matched particular pattern.

40. The computer-readable storage medium of Claim 39, wherein the in-band data is closed-caption data.

41. The computer-readable storage medium of Claim 39, wherein the in-band data is Enhanced Television (ETV) signaling data.

42. The computer-readable storage medium of Claim 39, further comprising instructions for:  
in response to identifying one or more events in the content stream, displaying an icon to a user on a display screen as the content stream is displayed to a user.

43. The computer-readable storage medium of Claim 39, further comprising instructions for:  
in response to identifying one or more events in the multimedia content stream, storing one or more segments of the multimedia content stream on the multimedia device that are related to the one or more identified events.

44. The computer-readable storage medium of Claim 39, wherein the multimedia content stream further comprises one or more video programs, and wherein the identifying step identifies one or more events in the one or more video programs.

45. The computer-readable storage medium of Claim 39, wherein the determining step further comprises:  
processing metadata associated with the matched particular pattern.

46. The computer-readable storage medium of Claim 45, wherein the metadata instructs the multimedia device to perform an action.

47. The computer-readable storage medium of Claim 45, wherein the metadata instructs the multimedia device to skip over a segment of the multimedia content stream.

48. The computer-readable storage medium of Claim 45, wherein the metadata instructs the multimedia device to re-order two or more segments of the multimedia content stream.
49. The computer-readable storage medium of Claim 48, further comprising instructions for:
- creating, at the multimedia device, a customized multimedia content stream
  - containing the two or more re-ordered segments; and
  - displaying the customized multimedia content stream to a user.
50. The computer-readable storage medium of Claim 45, wherein metadata associated with the identified location instructs the multimedia device to store one or more segments of the content stream on a storage device, and wherein the storage device contains one or more extracted segments from one or more different content streams.
51. The computer-readable storage medium of Claim 50, further comprising instructions for:
- creating, at the multimedia device, a customized multimedia content stream
  - containing any combination of segments stored on the storage device; and
  - displaying the customized content stream to a user.
52. The computer-readable storage medium of Claim 39, wherein a user can skip to an identified event.
53. The computer-readable storage medium of Claim 39, further comprising instructions for:
- receiving event identification data associating one or more patterns of in-band data
  - with one or more events; and
  - storing the received event identification data on a storage device as part of the plurality of patterns.
54. The computer-readable storage medium of Claim 53, wherein the storage device is a hard disk drive.

55. The computer-readable storage medium of Claim 53, wherein the storage device is any type of removable storage media.
56. The computer-readable storage medium of Claim 53, wherein the storage device is any type of volatile and/or non-volatile storage medium.
57. The computer-readable storage medium of Claim 39, wherein the multimedia content stream is a television broadcast stream.
58. A method for processing in-band data at a multimedia device, comprising:  
reading a multimedia content stream from a removable storage medium, wherein the multimedia content stream contains in-band data;  
processing the in-band data, including computing hash values from the in-band data;  
determining whether the computed hash values match a particular pattern comprising at least two hash values among a plurality of patterns, wherein the particular pattern is associated with one or more events in the multimedia content stream; and  
identifying one or more events in the multimedia content stream based on metadata associated with the matched particular pattern.
59. The method of Claim 58, wherein the in-band data is closed-caption data.
60. The method of Claim 58, wherein the in-band data is Enhanced Television (ETV) signaling data.
61. The method of Claim 58, further comprising the step of:  
in response to identifying one or more events in the multimedia content stream,  
displaying an icon to a user on a display screen as the multimedia content stream is displayed to a user.
62. The method of Claim 58, wherein the multimedia content stream further comprises one or more video programs, and wherein the identifying step identifies one or more events in the one or more video programs.

63. The method of Claim 58, wherein the determining step further comprises:  
processing metadata associated with the matched particular pattern.
64. The method of Claim 63, wherein the metadata instructs the multimedia device to perform an action.
65. The method of Claim 63, wherein the metadata instructs the multimedia device to skip over a segment of the multimedia content stream.
66. The method of Claim 63, wherein the metadata instructs the multimedia device to re-arrange two or more segments of the multimedia content stream.
67. The method of Claim 66, wherein the multimedia device re-arranges the two or more segments into a customized multimedia content stream.
68. The method of Claim 67, further comprising:  
creating, at the multimedia device, a customized multimedia content stream  
containing the two or more re-ordered segments; and  
displaying the customized multimedia content stream to a user.
69. The method of Claim 63, wherein metadata associated with the identified location instructs the multimedia device to store one or more segments of the content stream on a storage device, and wherein the storage device contains one or more extracted segments from one or more different content streams.
70. The method of Claim 69, further comprising:  
creating, at the multimedia device, a customized multimedia content stream  
containing any combination of segments stored on the storage device; and  
displaying the customized content stream to a user.
71. The method of Claim 58, further comprising:  
receiving event identification data associating one or more patterns of in-band data  
with one or more events; and

storing the received event identification data on a storage device as part of the plurality of patterns.

72. The method of Claim 71, wherein the storage device is a hard disk drive.
73. The method of Claim 71, wherein the storage device is any type of removable storage media.
74. The method of Claim 71, wherein the storage device is any type of volatile and/or non-volatile storage medium.
75. The method of Claim 58, wherein the multimedia content stream is a television broadcast stream.
76. An apparatus for processing in-band data at a multimedia device, comprising:  
a module for reading a multimedia content stream from a removable storage medium,  
wherein the multimedia content stream contains in-band data;  
a module for processing the in-band data,  
wherein the module for processing the in-band data computes hash values  
from the in-band data;  
a module for determining whether the computed hash values match a particular  
pattern comprising at least two hash values among a plurality of patterns,  
wherein the particular pattern is associated with one or more events in the  
multimedia content stream; and  
a module for identifying one or more events in the content stream based on metadata  
associated with the matched particular pattern.
77. The apparatus of Claim 76, wherein the in-band data is closed-caption data.
78. The apparatus of Claim 76, wherein the in-band data is Enhanced Television (ETV) signaling data.
79. The apparatus of Claim 76, further comprising:

a module for, in response to identifying one or more events in the multimedia content stream, displaying an icon to a user on a display screen as the multimedia content stream is displayed to a user.

80. The apparatus of Claim 76, wherein the multimedia content stream further comprises one or more video programs, and wherein the identifying module identifies one or more events in the one or more video programs.

81. The apparatus of Claim 76, wherein the module for determining further comprises: a module for processing metadata associated with the matched particular pattern.

82. The apparatus of Claim 81, wherein the metadata instructs the multimedia device to perform an action.

83. The apparatus of Claim 81, wherein the metadata instructs the multimedia device to skip over a segment of the multimedia content stream.

84. The apparatus of Claim 81, wherein the metadata instructs the multimedia device to re-order two or more segments of the multimedia content stream.

85. The apparatus of Claim 84, further comprising:  
a module for creating, at the multimedia device, a customized multimedia content stream containing the two or more re-ordered segments; and  
a module for displaying the customized multimedia content stream to a user.

86. The apparatus of Claim 81, wherein metadata associated with the identified location instructs the multimedia device to store one or more segments of the content stream on a storage device, and wherein the storage device contains one or more extracted segments from one or more different content streams.

87. The apparatus of Claim 86, further comprising:  
a module for creating, at the multimedia device, a customized multimedia content stream containing any combination of segments stored on the storage device;  
and

a module for displaying the customized content stream to a user.

88. The apparatus of Claim 76, wherein a user can skip to an identified event.
89. The apparatus of Claim 76, further comprising:  
a module for receiving event identification data associating one or more patterns of  
in-band data with one or more events; and  
a module for storing the received event identification data on a storage device as part  
of the plurality of patterns.
90. The apparatus of Claim 89, wherein the storage device is a hard disk drive.
91. The apparatus of Claim 89, wherein the storage device is any type of removable  
storage media.
92. The apparatus of Claim 89, wherein the storage device is any type of volatile and/or  
non-volatile storage medium.
93. The apparatus of Claim 76, wherein the multimedia content stream is a television  
broadcast stream