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Kalra et al.

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[54] **METHOD AND APPARATUS THAT PROVIDES A SCALABLE MEDIA DELIVERY SYSTEM**

WO 96/14711 5/1996 WIPO .
WO 96/23280 8/1996 WIPO .
WO 97/15149 4/1997 WIPO .

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OTHER PUBLICATIONS

Moura et al. "Retrieving quality video across heterogeneous networks", IEEE Personal Communications, Feb. 1996, pp. 44-54.

IBM Technical Disclosure Bulletin "Multi-Rate Video Transmission Scheme", vol. 38 No. 12, Dec. 1995. pp. 59-62.

Doenges, P.K. et al., "Audio/video and synthetic graphics/audio for mixed media," *Signal Processing: Image Communication*, vol. 9, No. 4, May 1997.

Arikawa, M. et al., "Dynamic LoD for QoS Management in the Next Generation VRML," *Proceedings of the Intl. Conf. on Multimedia Computing and Systems*, Jun. 17, 1996.

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[22] Filed: **Dec. 17, 1996**

[51] Int. Cl.⁶ **G06F 15/16; H04L 7/30**

[52] U.S. Cl. **395/200.61; 345/428; 348/420**

[58] Field of Search **395/200.61; 370/431, 370/437; 345/302, 428; 348/17, 18, 19, 20, 384, 387, 390, 420**

(List continued on next page.)

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[56] References Cited

U.S. PATENT DOCUMENTS

4,672,444	6/1987	Bergen et al.	348/441
5,068,726	11/1991	Kondo et al.	348/412
5,196,933	3/1993	Henot	348/419
5,574,724	11/1996	Bales et al.	370/410
5,612,742	3/1997	Krause et al.	348/385
5,659,691	8/1997	Durward et al.	345/329
5,675,721	10/1997	Freedman et al.	345/502
5,699,361	12/1997	Ding et al.	370/431
5,737,495	4/1998	Adams et al.	395/200.49

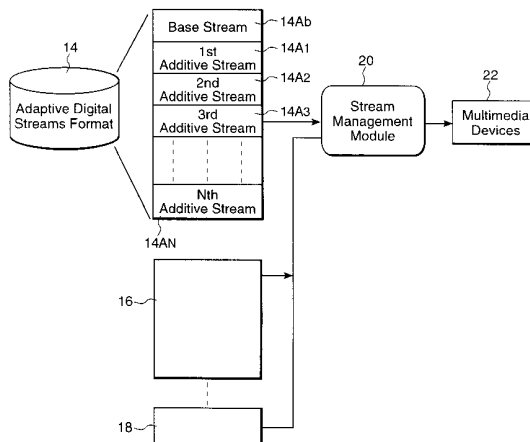
FOREIGN PATENT DOCUMENTS

0 577 327 A1	1/1994	European Pat. Off. .
0 593 013 A2	4/1994	European Pat. Off. .
0 661 826 A2	7/1995	European Pat. Off. .
0 661 885 A1	7/1995	European Pat. Off. .
0 687 112 A2	12/1995	European Pat. Off. .
0 739 140 A2	10/1996	European Pat. Off. .
0 751 685 A1	1/1997	European Pat. Off. .
WO 94/11993	5/1994	WIPO .

[57] ABSTRACT

The present invention provides an apparatus and method for encoding, storing, transmitting and decoding multimedia information in the form of scalable, streamed digital data. A base stream containing basic informational content and subsequent streams containing additive informational content are initially created from standard digital multimedia data by a transcoder. Client computers, each of which may have different configurations and capabilities are capable of accessing a stream server that contains the scalable streamed digital data. Each different client computer, therefore, may access different stream combinations according to a profile associated with each different client computer. Thus, the streams accessed from the server are tailored to match the profile of each client computer so that the best combination of streams can be provided to maximize the resolution of the 3D, audio and video components.

80 Claims, 39 Drawing Sheets



RPX Exhibit 1015

OTHER PUBLICATIONS

- Kudumakis, P.E. et al., "Wavelet packet Based Scalable Audio Coding," 1996 IEEE Intl. Symposium on Circuits and Systems (ISCAS) *Circuits and Systems Connecting the World*, Atlanta, May 12–15, 1996; vol. 2, May 1996, *Inst. of Electrical and Electronics Engineers*, pp. 41–44.
- "Transmission of non-telephone signals; information technology—generic coding of moving pictures and associated audio information: video" *ITU-T Telecommunication Standardization Sector of ITU*, Jul. 1995.
- Riegel, T.; "Coding of combined natural and computer rendered image sequences," *Proc. of SPIE* vol. 2451, 1995, pp. 207–211.
- Broll, W., et al.; "VRML: Today and Tomorrow," *Computers & Graphics* vol. 20, No. 3, May 1996, pp. 427–434.
- Funkhouser, T.A. and Sequin, C.H., "Adaptive Display Algorithm for Interactive Frame Rates during Visualization of Complex Virtual Environments," *Computer Graphics Proceedings, Annual Conf. Series* 1993, pp. 247–254.
- Hoppe, H., *Progressive Meshes*, *Computer Graphics Proceedings, Annual Conference Series*, 1996, pp. 99–108.
- Popovic, J.; and Hoppe, H., *Progressive Simplicial Complexes*, *Computer Graphics (SIGGRAPH '97 Proceedings)*, pp. 217–224.
- Clarke, R.J., *Standards for Image Sequence Coding* from *Digital Compression of Still Images and Video*, 1995, pp. 285–299.
- Kuan Hui Tan/Mohammad Ohanbari, *Layered Image Coding Using the DCT Pyramid* from *IEEE Transactions On Image Processing*, Apr. 1995, pp. 512–516.

Fig. 1

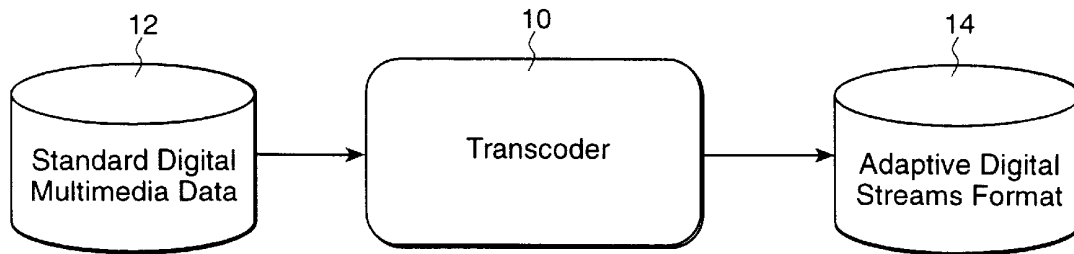


Fig. 2A

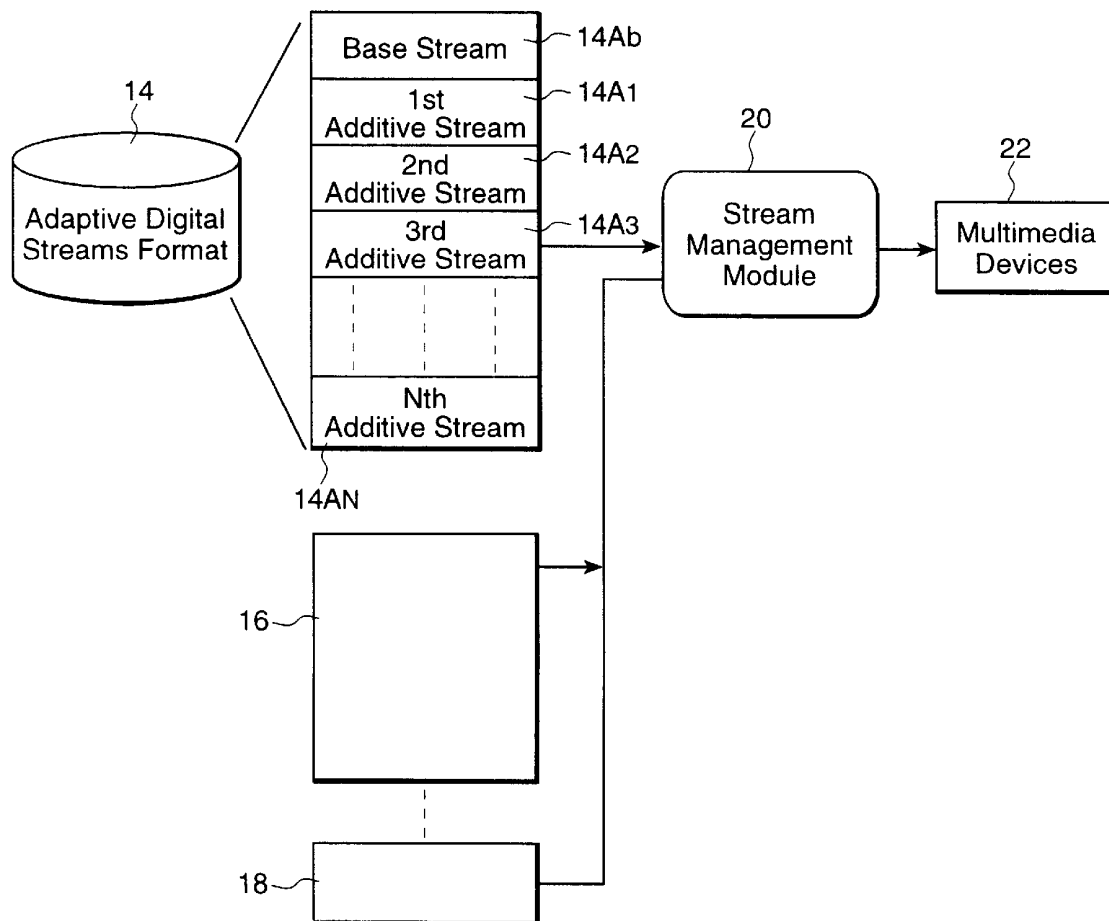


Fig. 2B

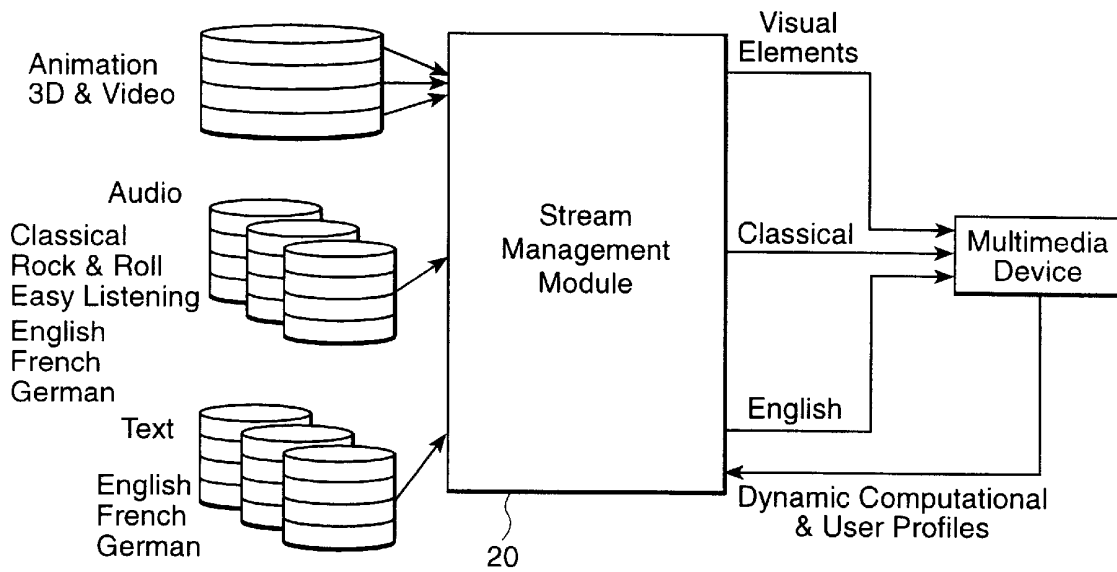


Fig. 3

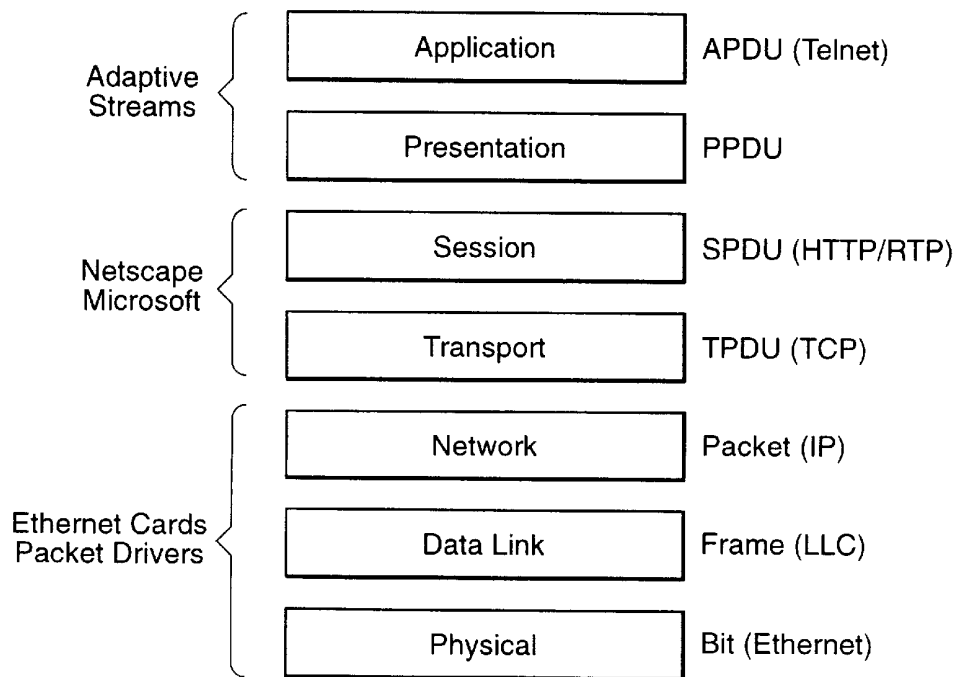
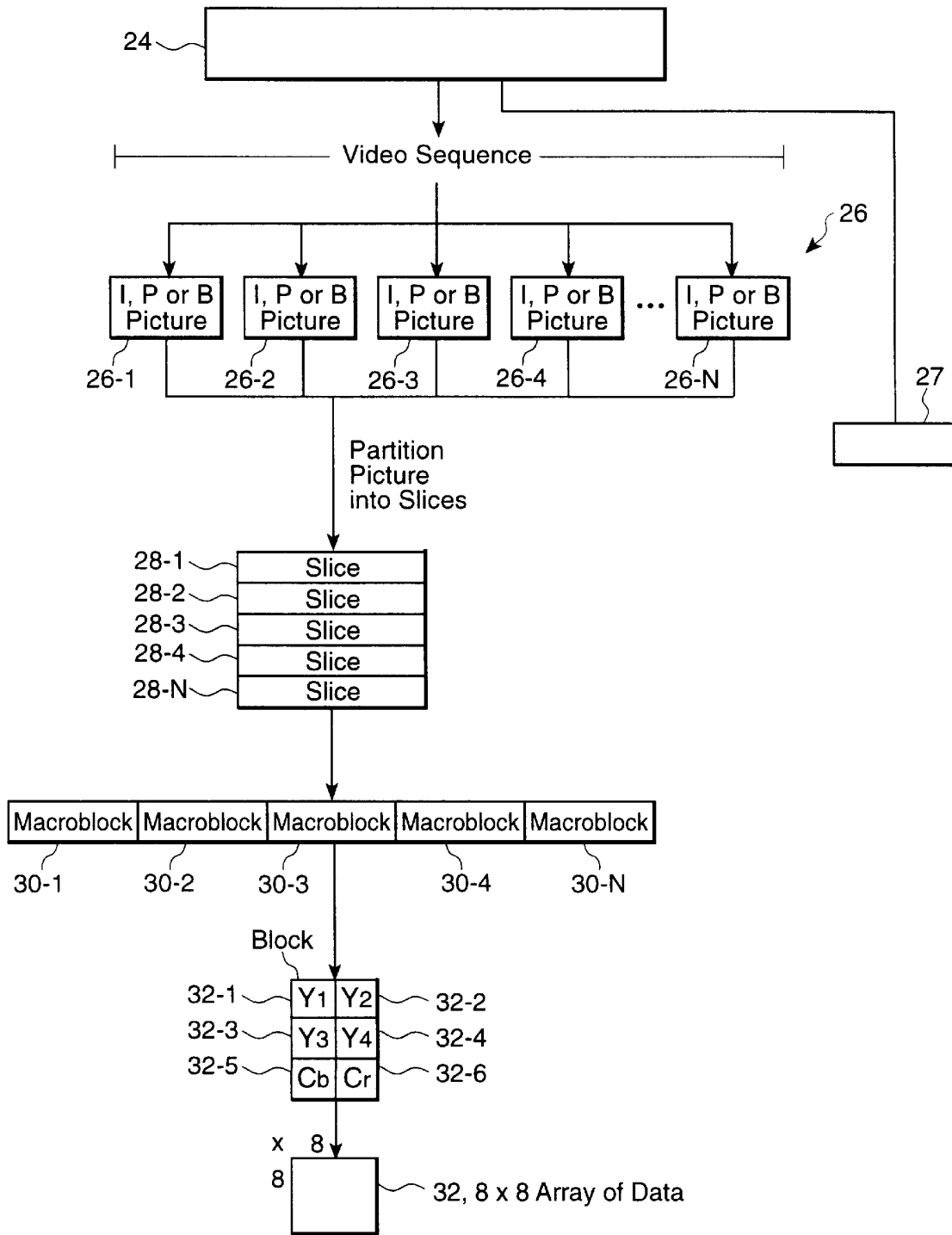


Fig. 4



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