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(12) **United States Patent**
Chou

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(54) **MULTIMEDIA PRESENTATION LATENCY MINIMIZATION**

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(73) Assignee: **Microsoft Corporation**, Redmond, WA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/205,875**

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(51) **Int. Cl.**[7] **H04N 7/173**

(52) **U.S. Cl.** **725/87**; 725/94; 725/98; 725/118; 709/219; 709/247; 348/384.1; 348/395.1; 348/438.1; 375/240.1; 375/240.11

(58) **Field of Search** 725/94, 98, 118, 725/240.26, 87; 370/468, 236, 230–232, 235; 709/219, 247; 348/394.1, 395.1, 409.1, 410.1, 425.1, 438.1; 375/240.1, 240.11, 240.19, 240.08

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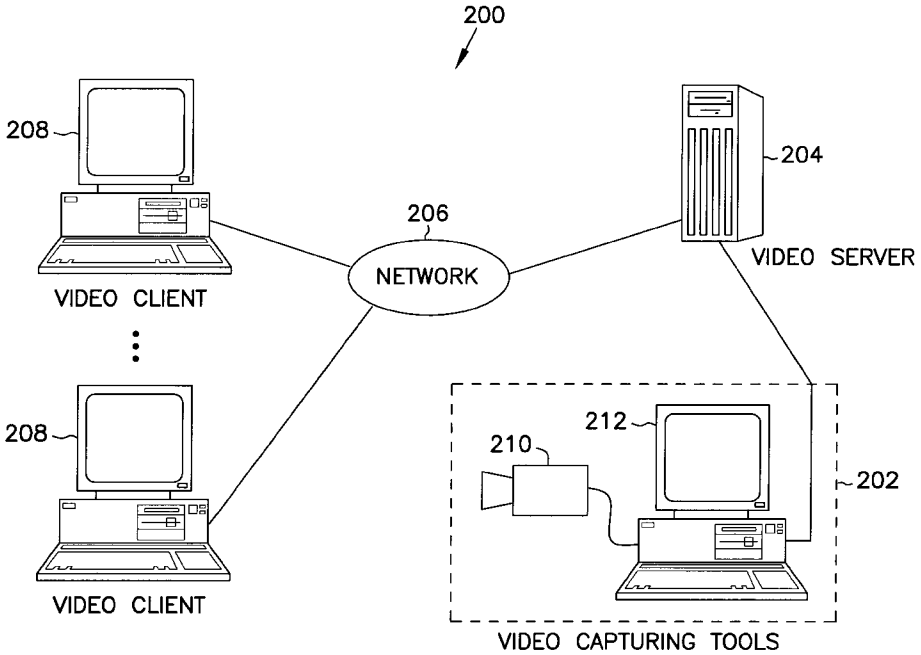
(57) **ABSTRACT**

To obtain real-time responses with interactive multimedia servers, the server provides at least two different audio/visual data streams. A first data stream has fewer bits per frame and provides a video image much more quickly than a second data stream with a higher number of bits and hence higher quality video image. The first data stream becomes available to a client much faster and may be more quickly displayed on demand while the second data stream is sent to improve the quality as soon as the playback buffer can handle it. In one embodiment, an entire video signal is layered, with a base layer providing the first signal and further enhancement layers comprising the second. The base layer may be actual image frames or just the audio portion of a video stream. The first and second streams are gradually combined in a manner such that the playback buffer does not overflow or underflow.

18 Claims, 6 Drawing Sheets



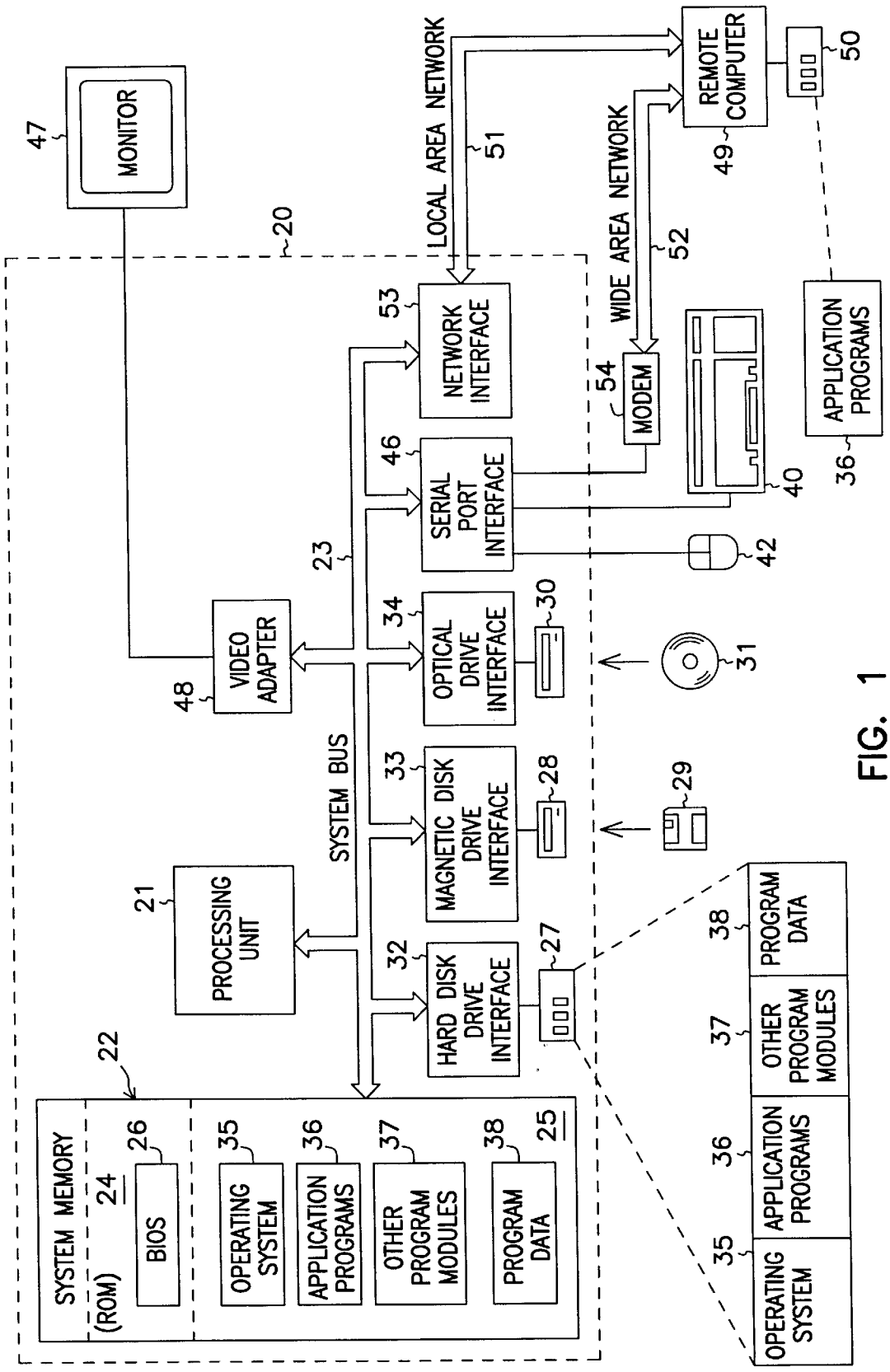


FIG. 1

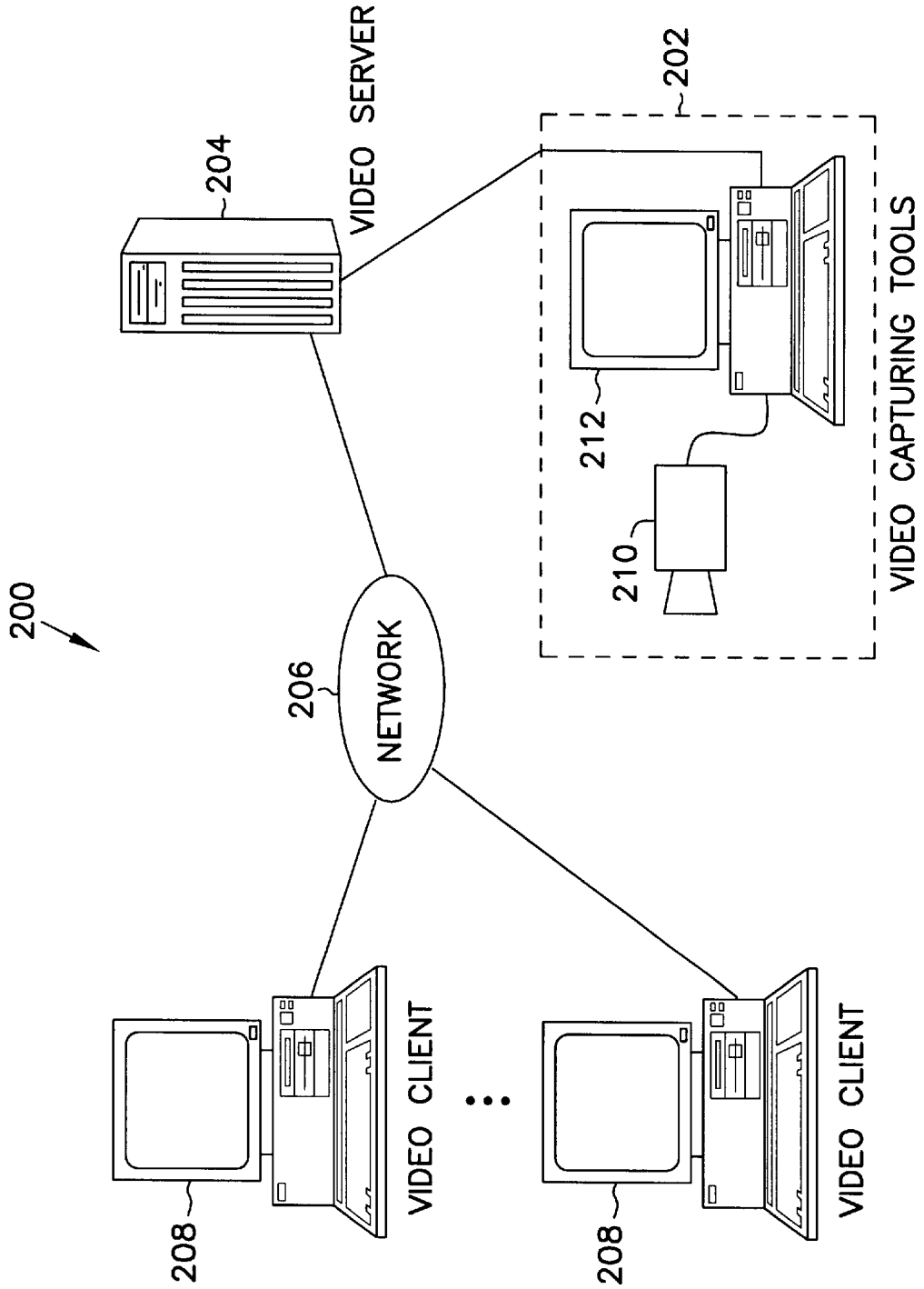


FIG. 2

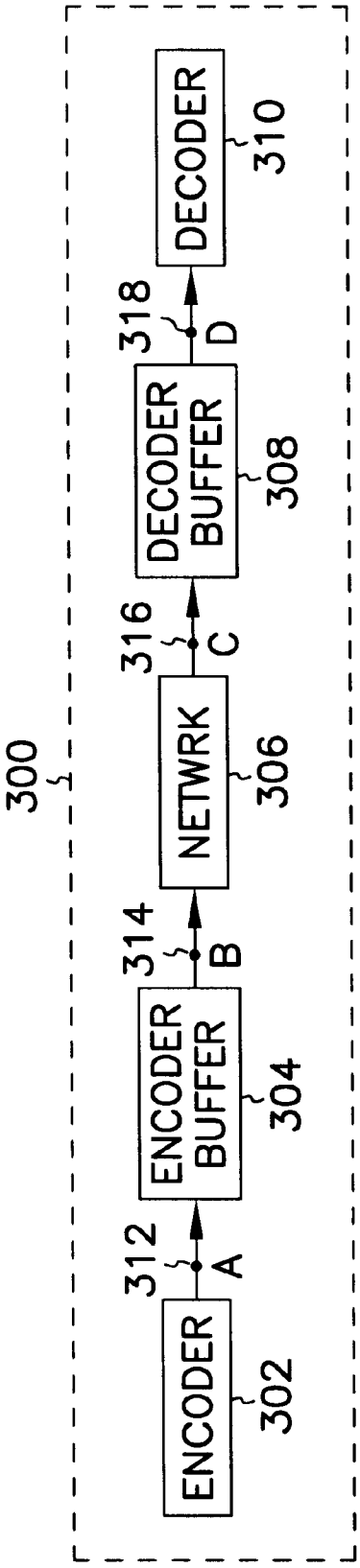


FIG. 3

FIG. 4A

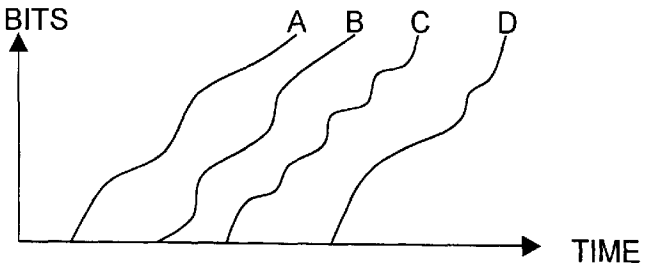


FIG. 4B

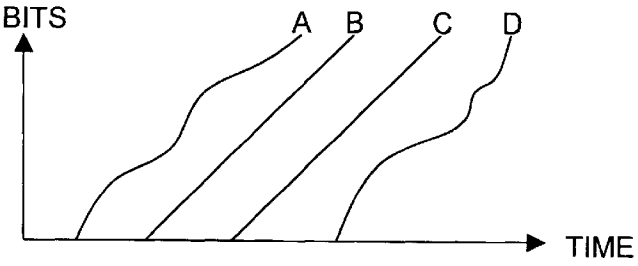


FIG. 4C

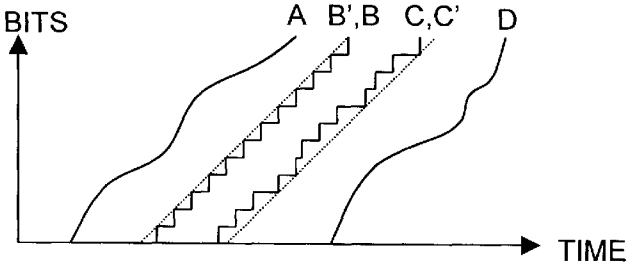


FIG. 4D

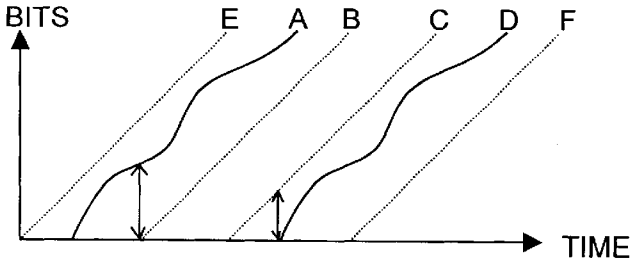
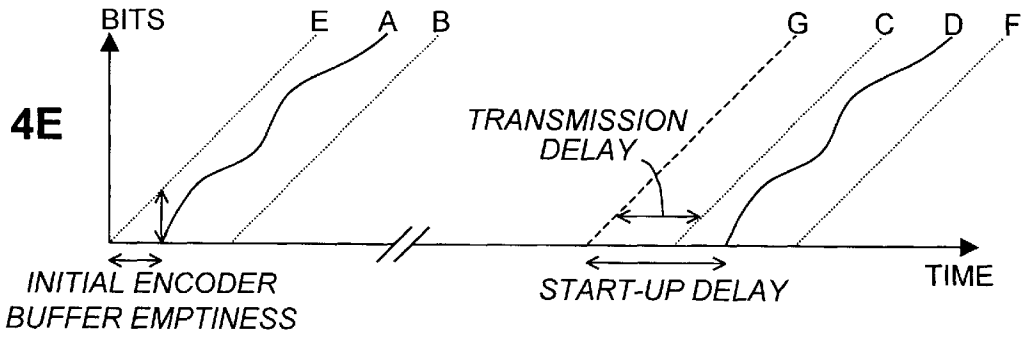


FIG. 4E



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