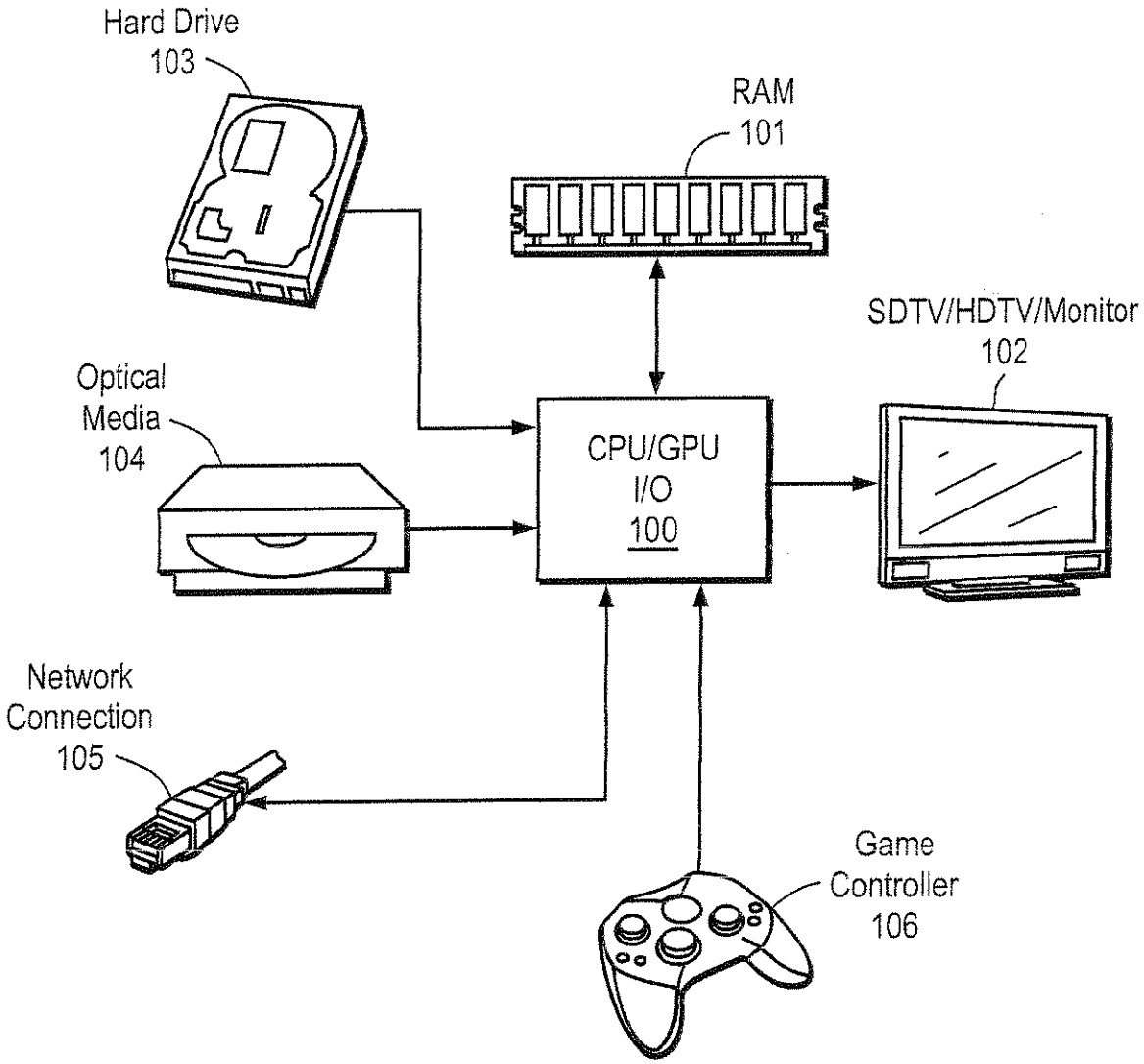


FIG. 1
(Prior Art)

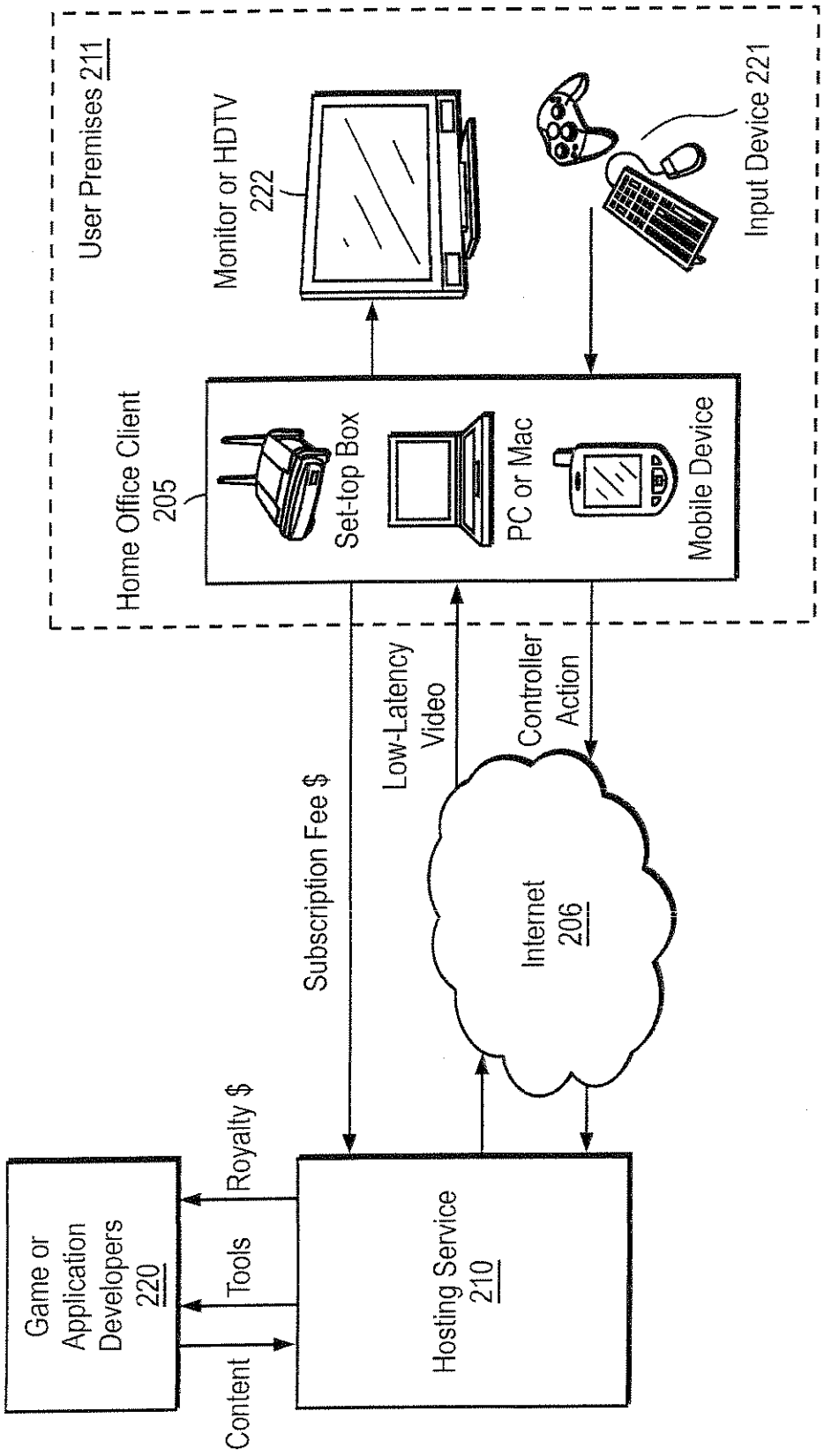

User Premises 211
Monitor or HDTV 222
Input Device 221
Home Office Client 205
Set-top Box
PC or Mac
Mobile Device
Subscription Fee $
Low-Latency Video
Controller Action
Internet 206
Royalty $
Tools
Content
Game or Application Developers 220
Hosting Service 210

FIG. 2a

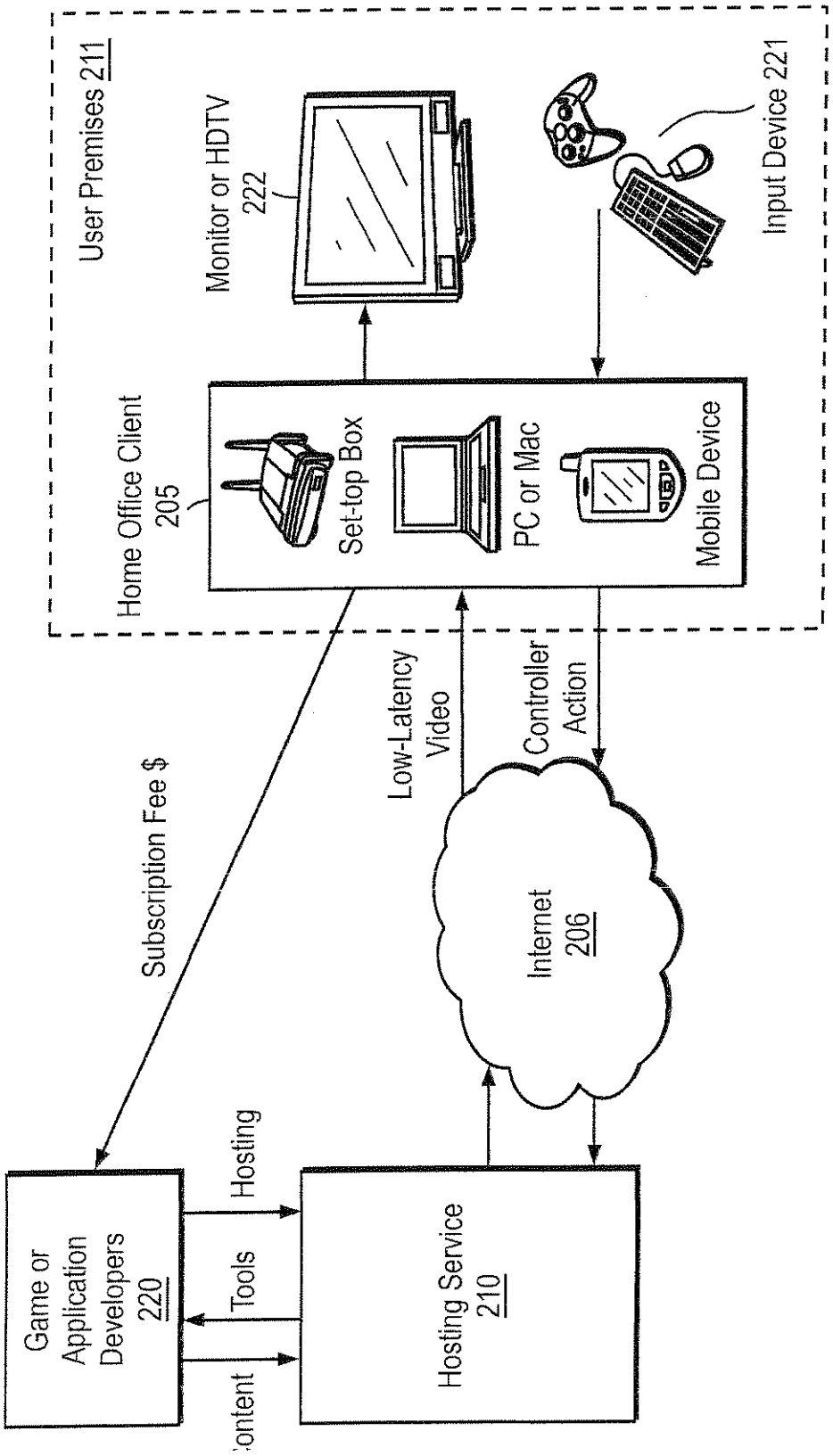

User Premises 211
Monitor or HDTV 222
Input Device 221
Home Office Client 205
Set-top Box
PC or Mac
Mobile Device
Subscription Fee $
Low-Latency Video
Controller Action
Internet 206
Hosting
Tools
Content
Game or Application Developers 220
Hosting Service 210

FIG. 2b

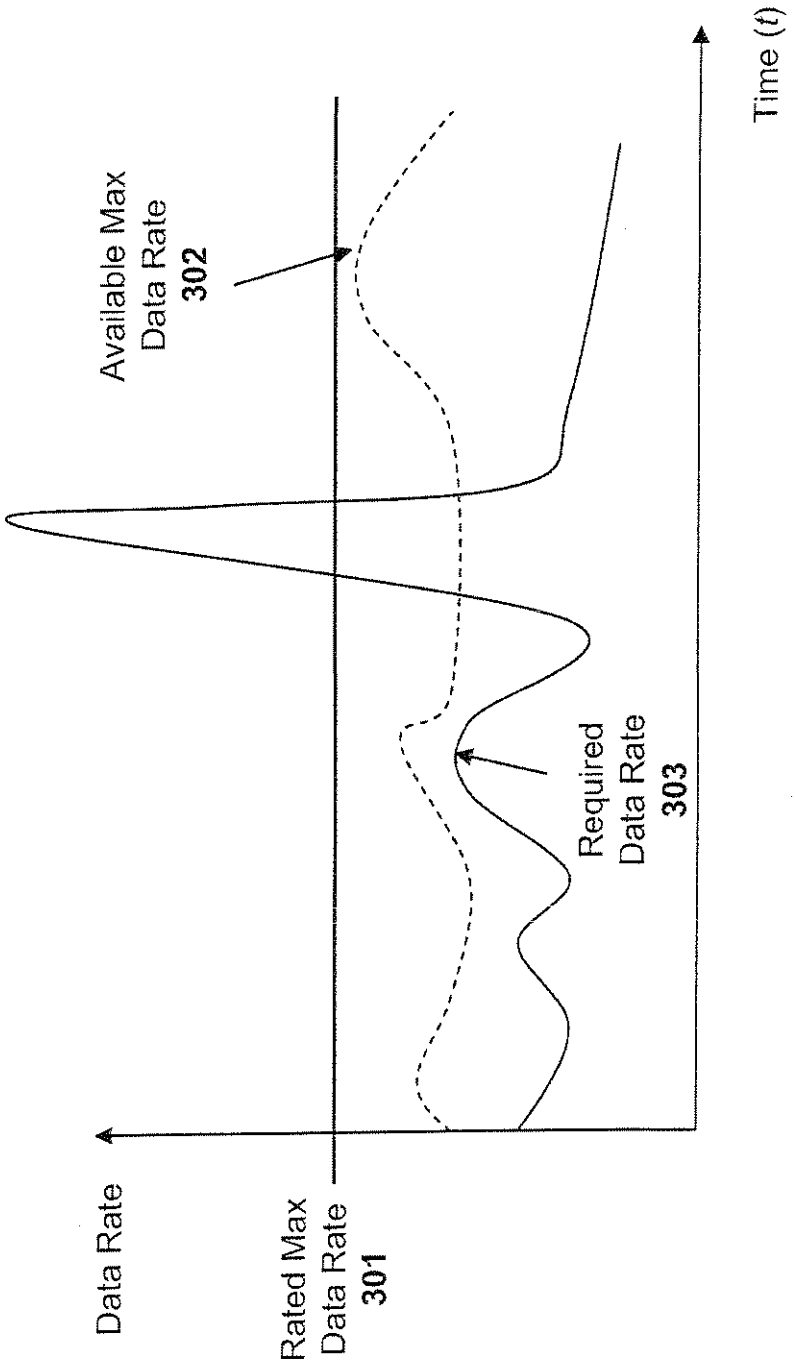

Data Rate
Time (t)
Rated Max
Data Rate
301
Available Max
Data Rate
302
Required
Data Rate
303

Fig. 3

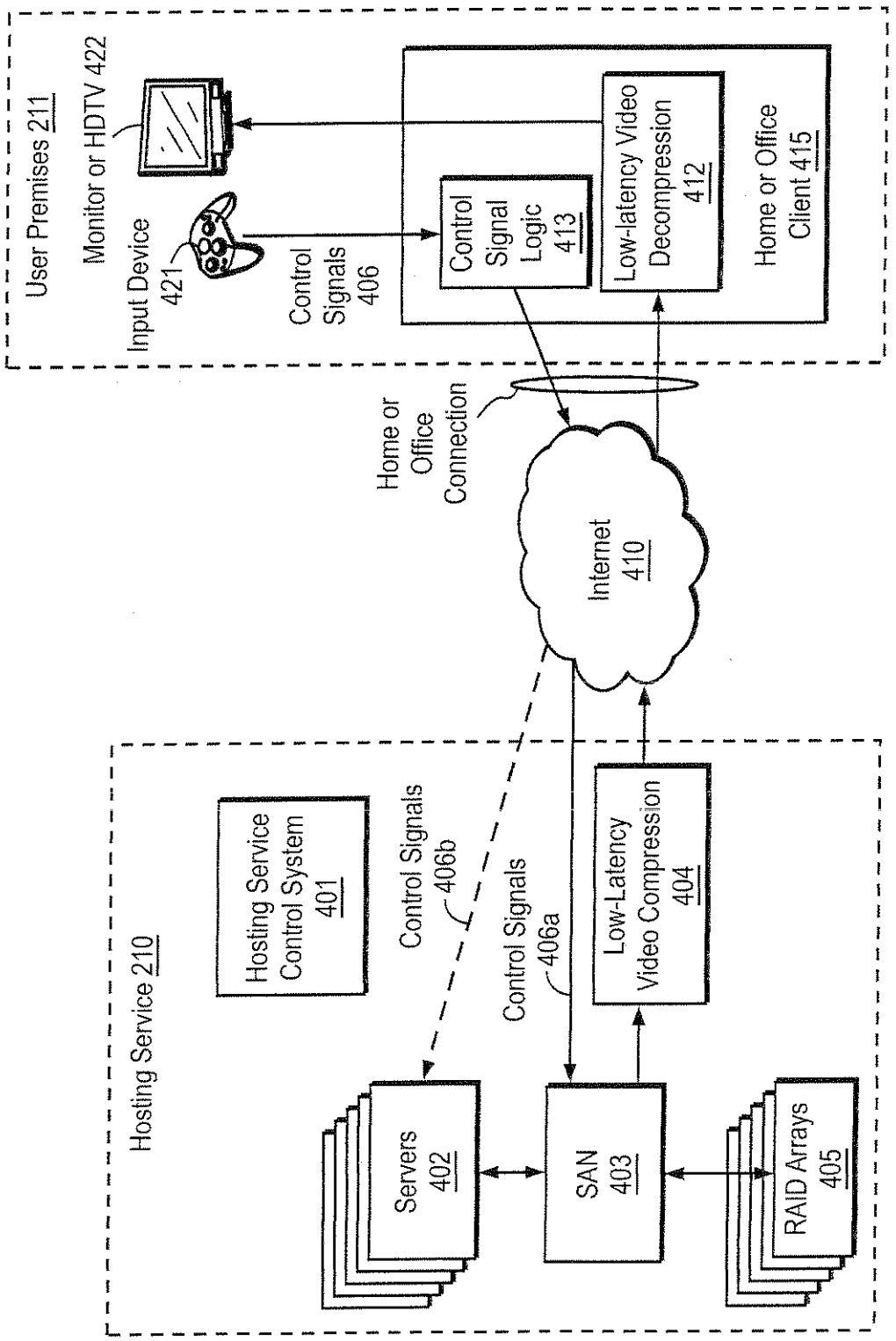

User Premises 211
Monitor or HDTV 422
Input Device 421
Control Signals 406
Control Signal Logic 413
Low-latency Video Decompression 412
Home or Office Client 415
Home or Office Connection
Internet 410
Hosting Service 210
Hosting Service Control System 401
Control Signals 406b
Control Signals 406a
Low-Latency Video Compression 404
Servers 402
SAN 403
RAID Arrays 405

FIG. 4a

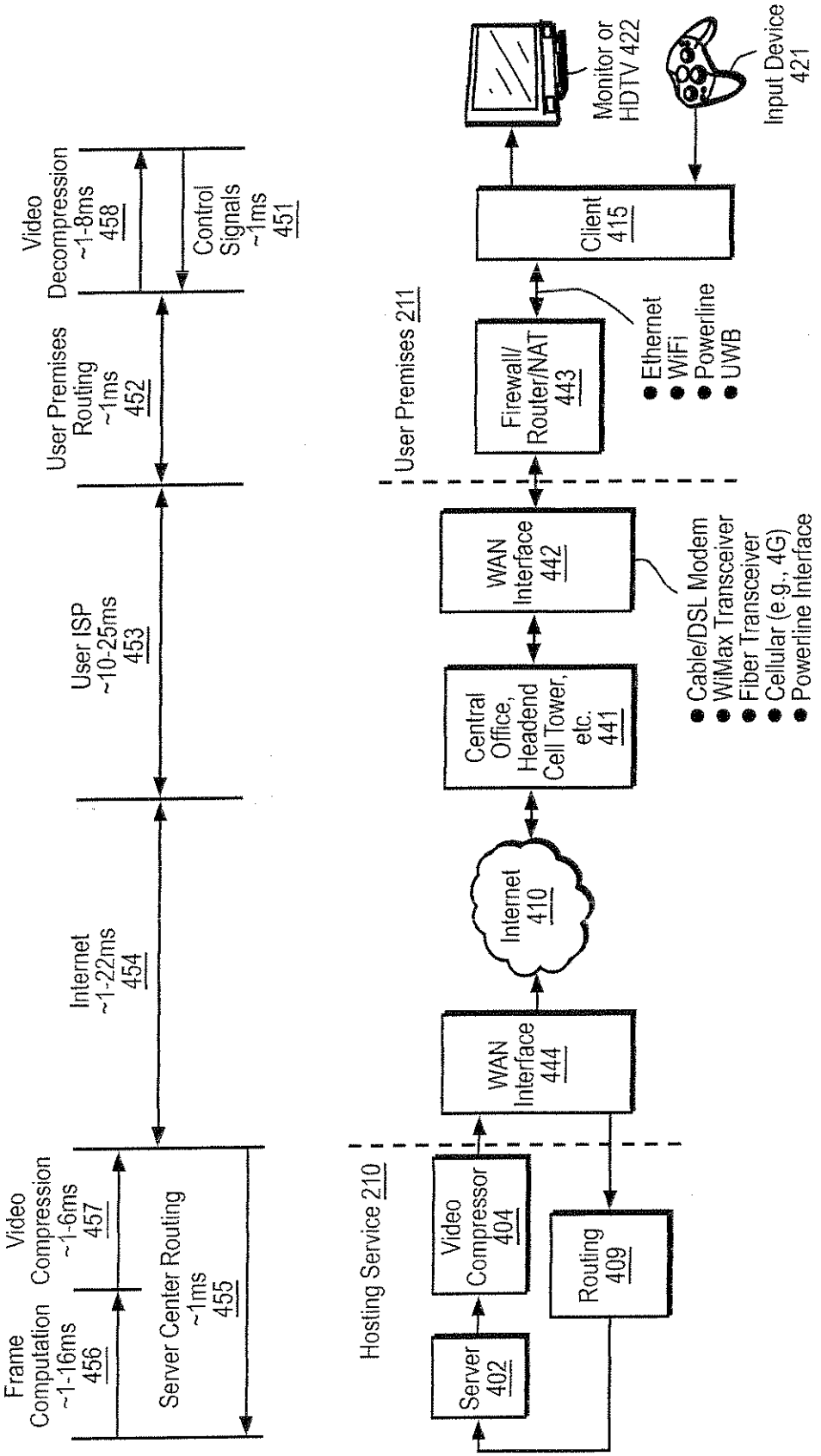

Hosting Service 210
Server 402
Video Compressor 404
Routing 409
WAN Interface 444
Internet 410
Central Office, Headend Cell Tower, etc. 441
WAN Interface 442
Cable/DSL Modem
WiMax Transceiver
Fiber Transceiver
Cellular (e.g., 4G)
Powerline Interface
User Premises 211
Firewall/ Router/NAT 443
Ethernet
WiFi
Powerline
UWB
Client 415
Monitor or HDTV 422
Input Device 421
Frame Computation ~1-16ms 456
Video Compression ~1-6ms 457
Server Center Routing ~1ms 455
Internet ~1-22ms 454
User ISP ~10-25ms 453
User Premises Routing ~1ms 452
Video Decompression ~1-8ms 458
Control Signals ~1ms 451

FIG. 4b

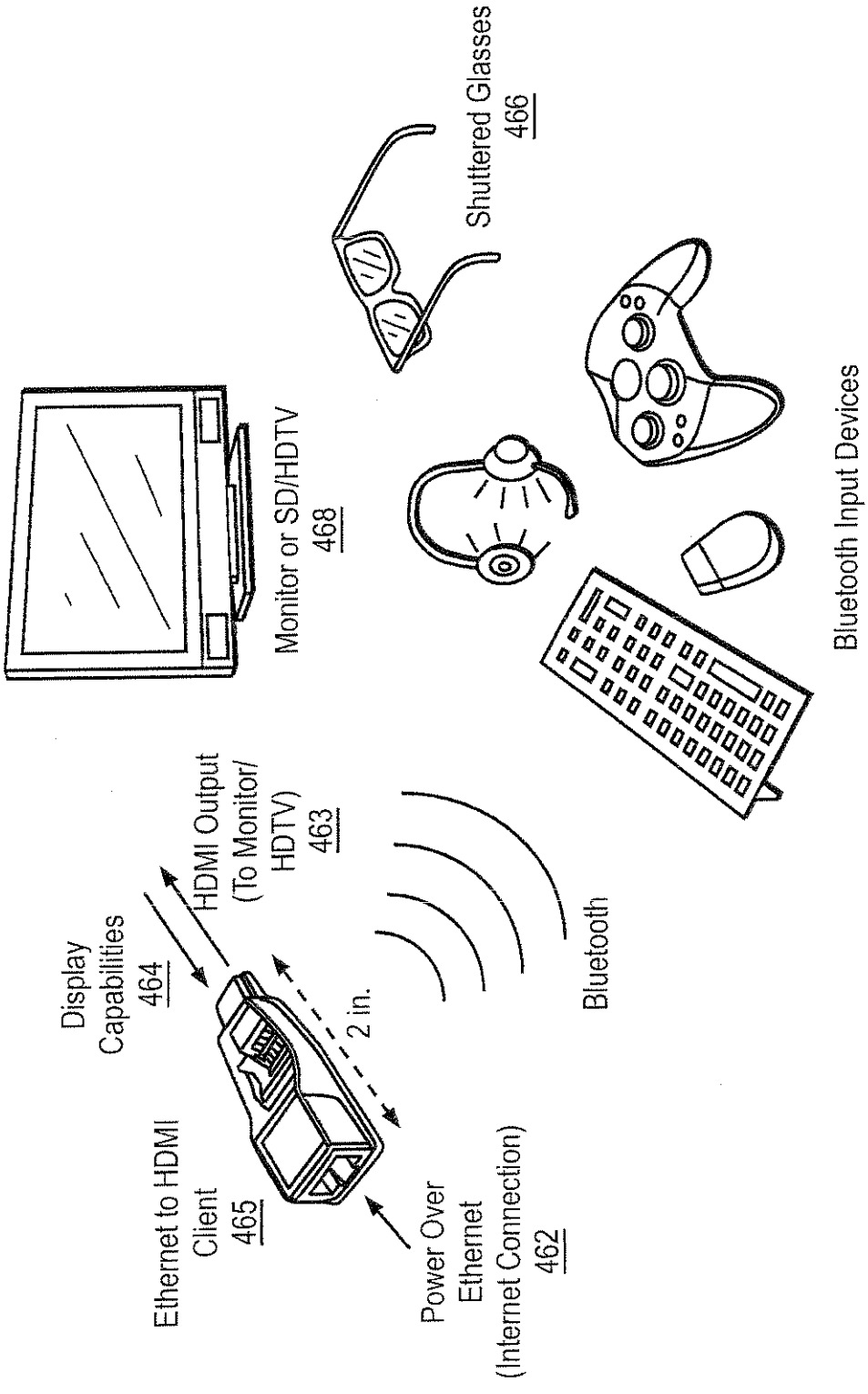

Display Capabilities 464
HDMI Output (To Monitor/ HDTV) 463
Ethernet to HDMI Client 465
2 in.
Power Over Ethernet (Internet Connection) 462
Bluetooth
Monitor or SD/HDTV 468
Shuttered Glasses 466
Bluetooth Input Devices 469

FIG. 4c

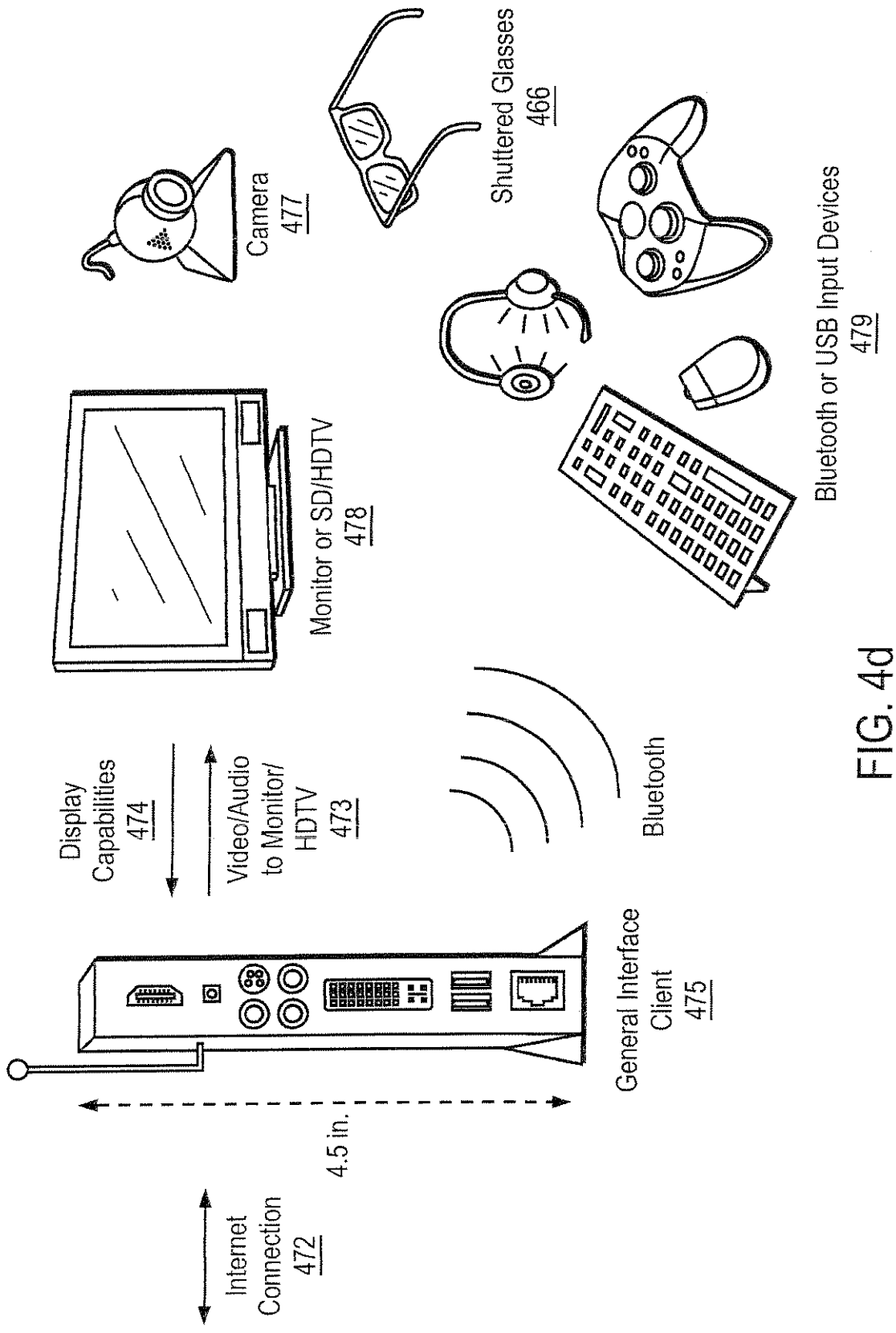

Internet Connection 472
4.5 in.
General Interface Client 475
Bluetooth
Video/Audio to Monitor/ HDTV 473
Display Capabilities 474
Monitor or SD/HDTV 478
Camera 477
Shuttered Glasses 466
Bluetooth or USB Input Devices 479

FIG. 4d

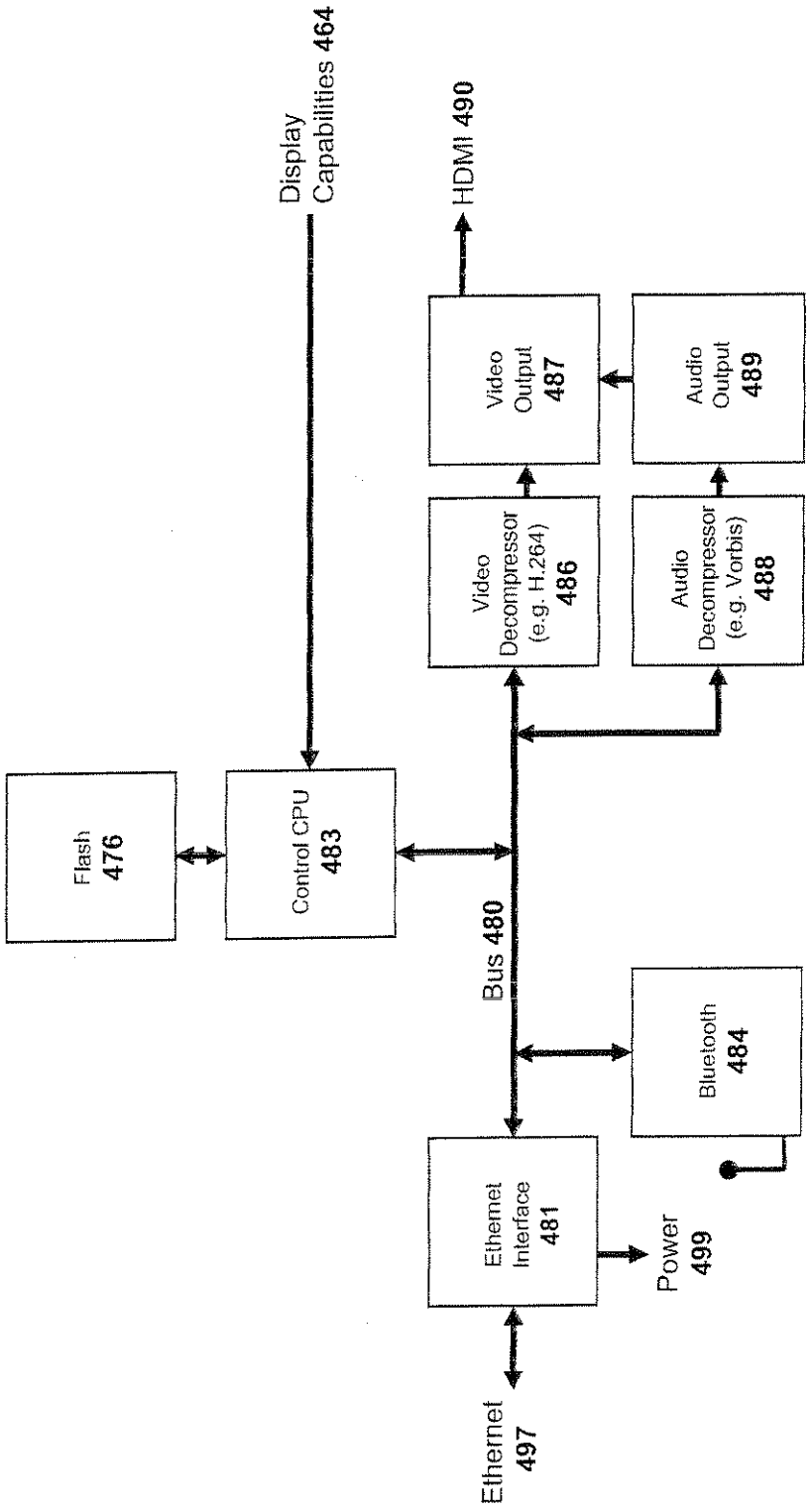

Display Capabilities 464
HDMI 490
Video Output 487
Audio Output 489
Video Decompressor (e.g. H.264) 486
Audio Decompressor (e.g. Vorbis) 488
Flash 476
Control CPU 483
Bus 480
Bluetooth 484
Ethernet Interface 481
Power 499
Ethernet 497

Fig. 4e

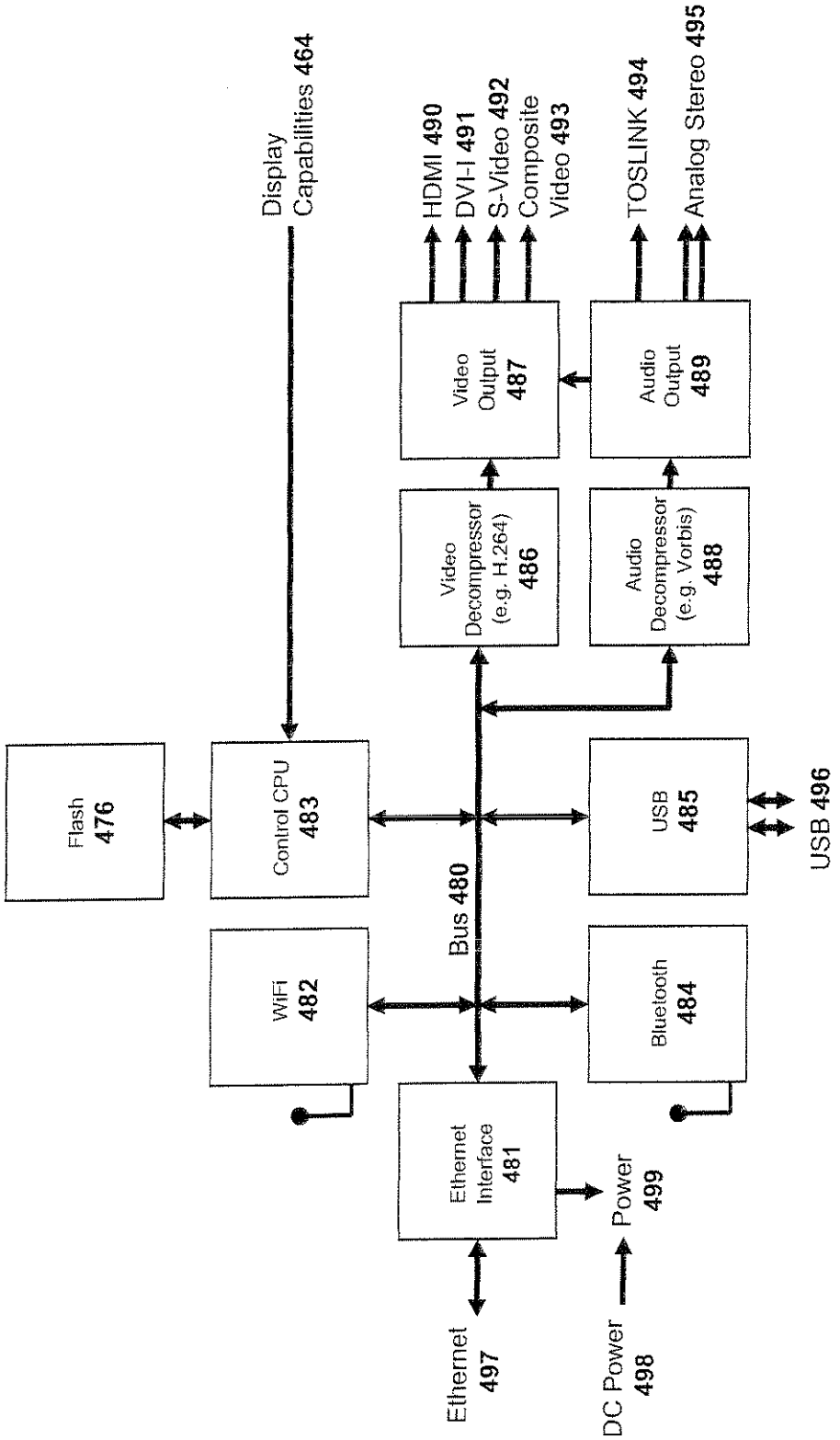

Display Capabilities 464
HDMI 490
DVI-I 491
S-Video 492
Composite Video 493
TOSLINK 494
Analog Stereo 495
Video Output 487
Audio Output 489
Video Decompressor (e.g. H.264) 486
Audio Decompressor (e.g. Vorbis) 488
Flash 476
Control CPU 483
USB 485
USB 496
Bus 480
WiFi 482
Bluetooth 484
Ethernet Interface 481
Power 499
Ethernet 497
DC Power 498

Fig. 4f

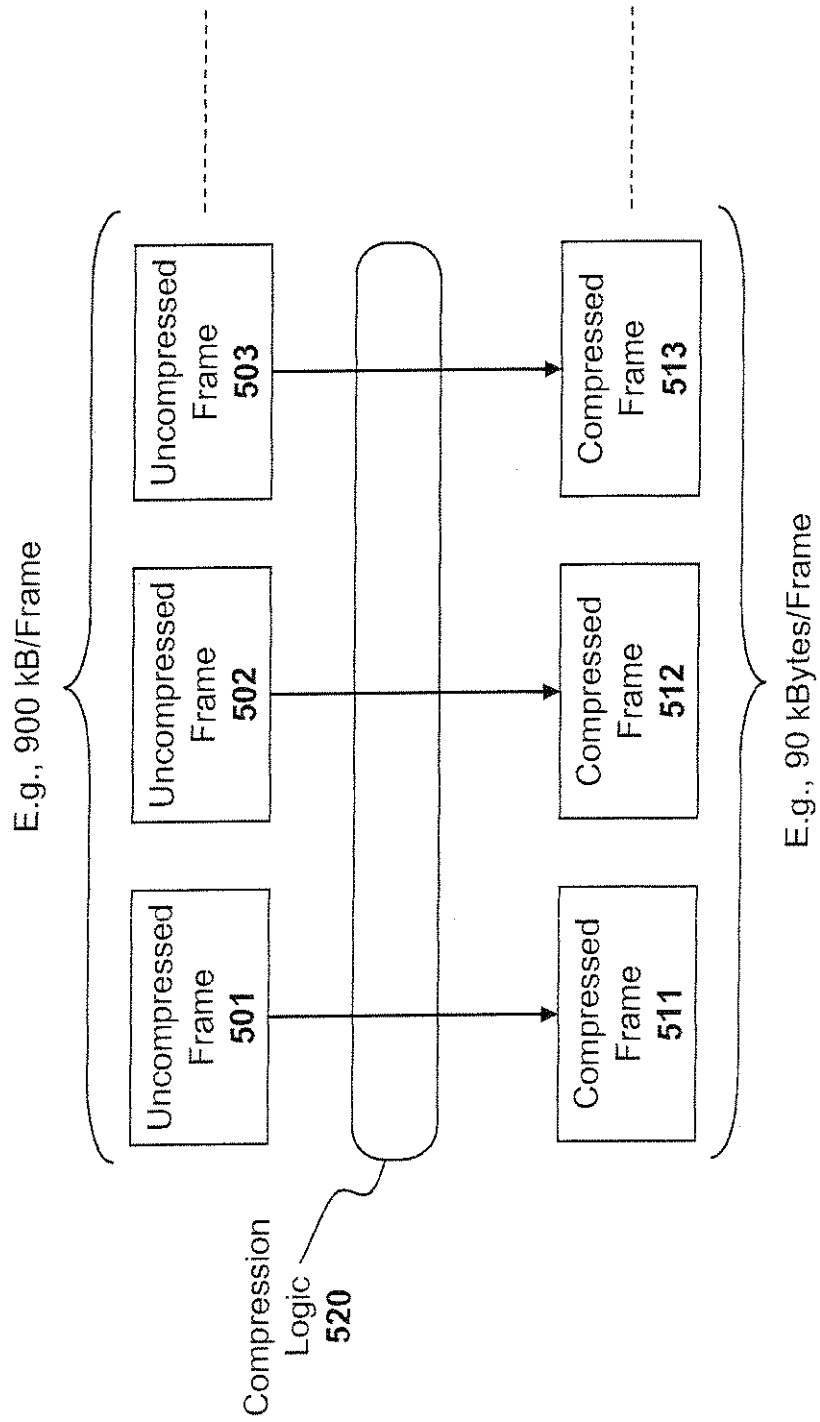


Fig. 5
(prior art)

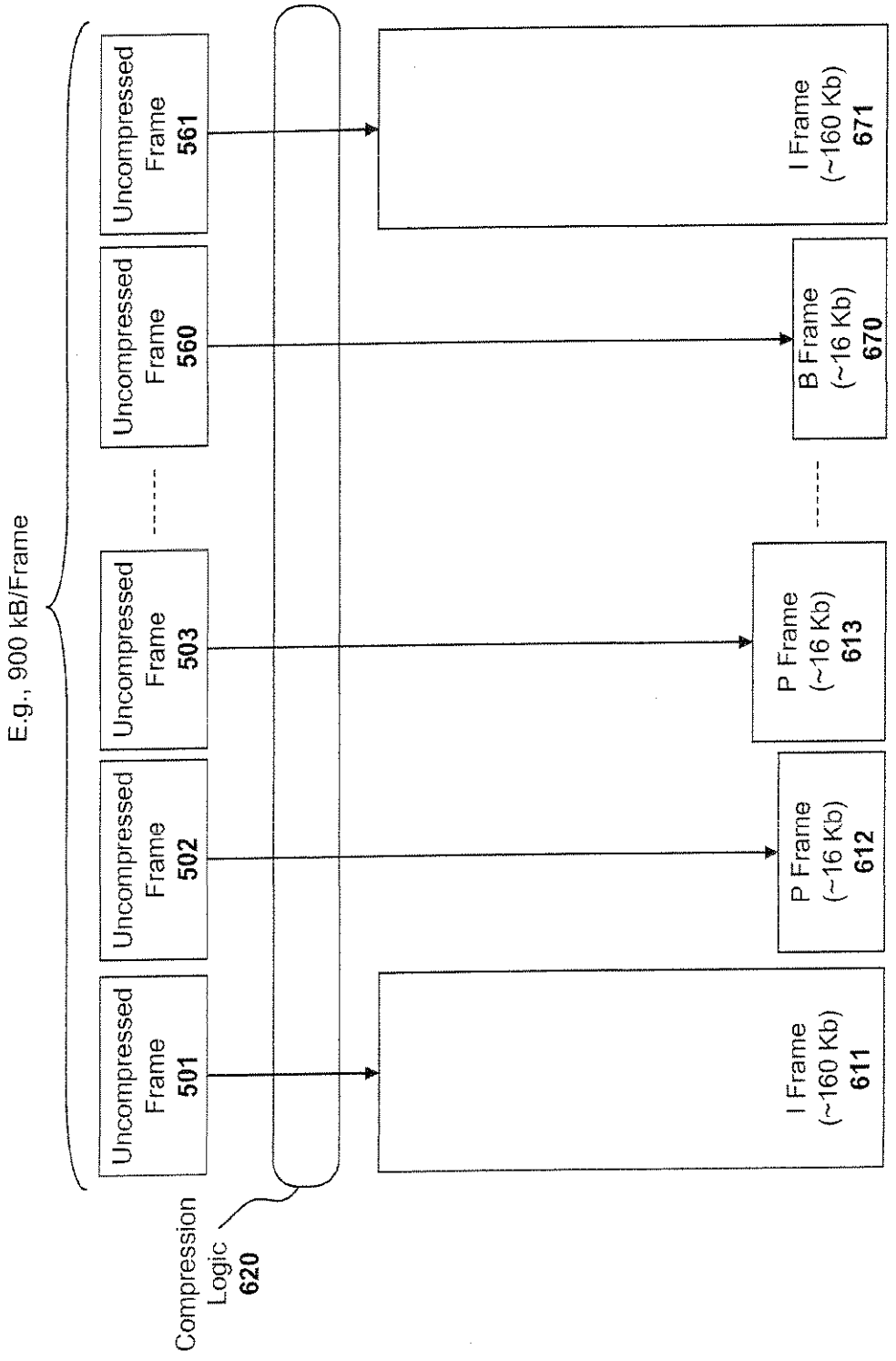


Fig. 6a
(prior art)

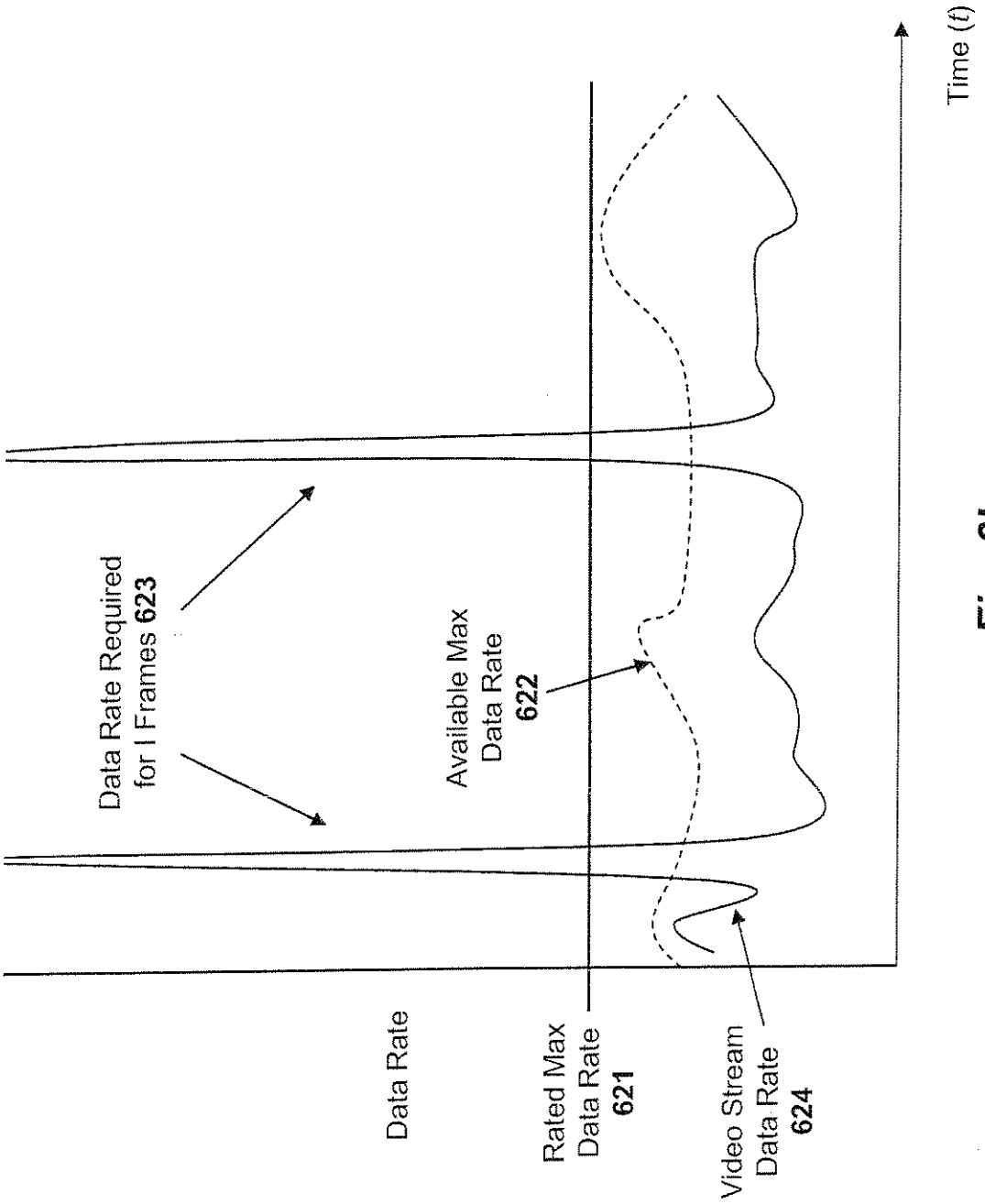

Data Rate Required for I Frames 623
Available Max Data Rate 622
Data Rate
Rated Max Data Rate 621
Video Stream Data Rate 624
Time (t)

Fig. 6b

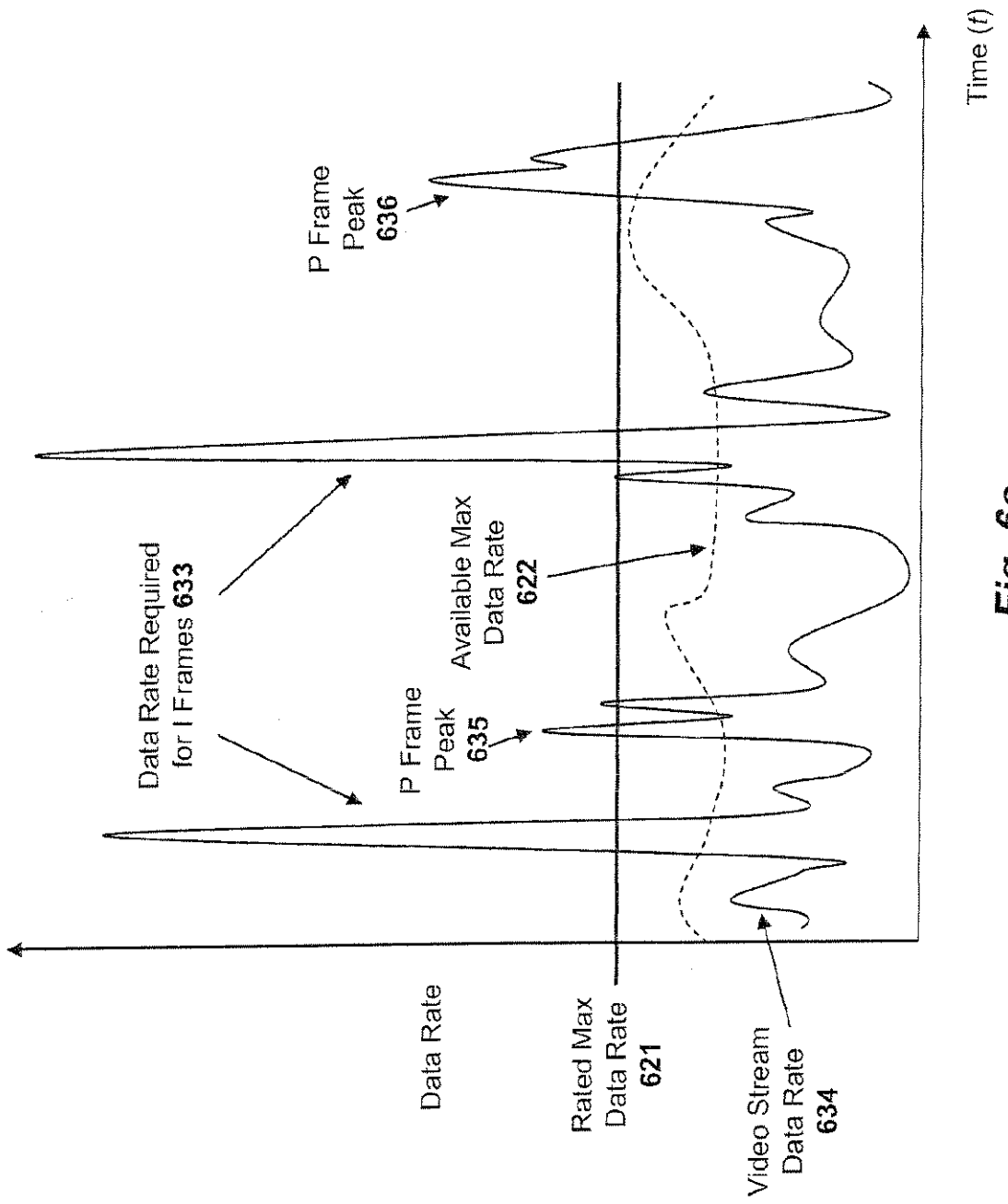

Data Rate
Time (t)
Data Rate Required for I Frames 633
P Frame Peak 635
Available Max Data Rate 622
P Frame Peak 636
Rated Max Data Rate 621
Video Stream Data Rate 634

Fig. 6c

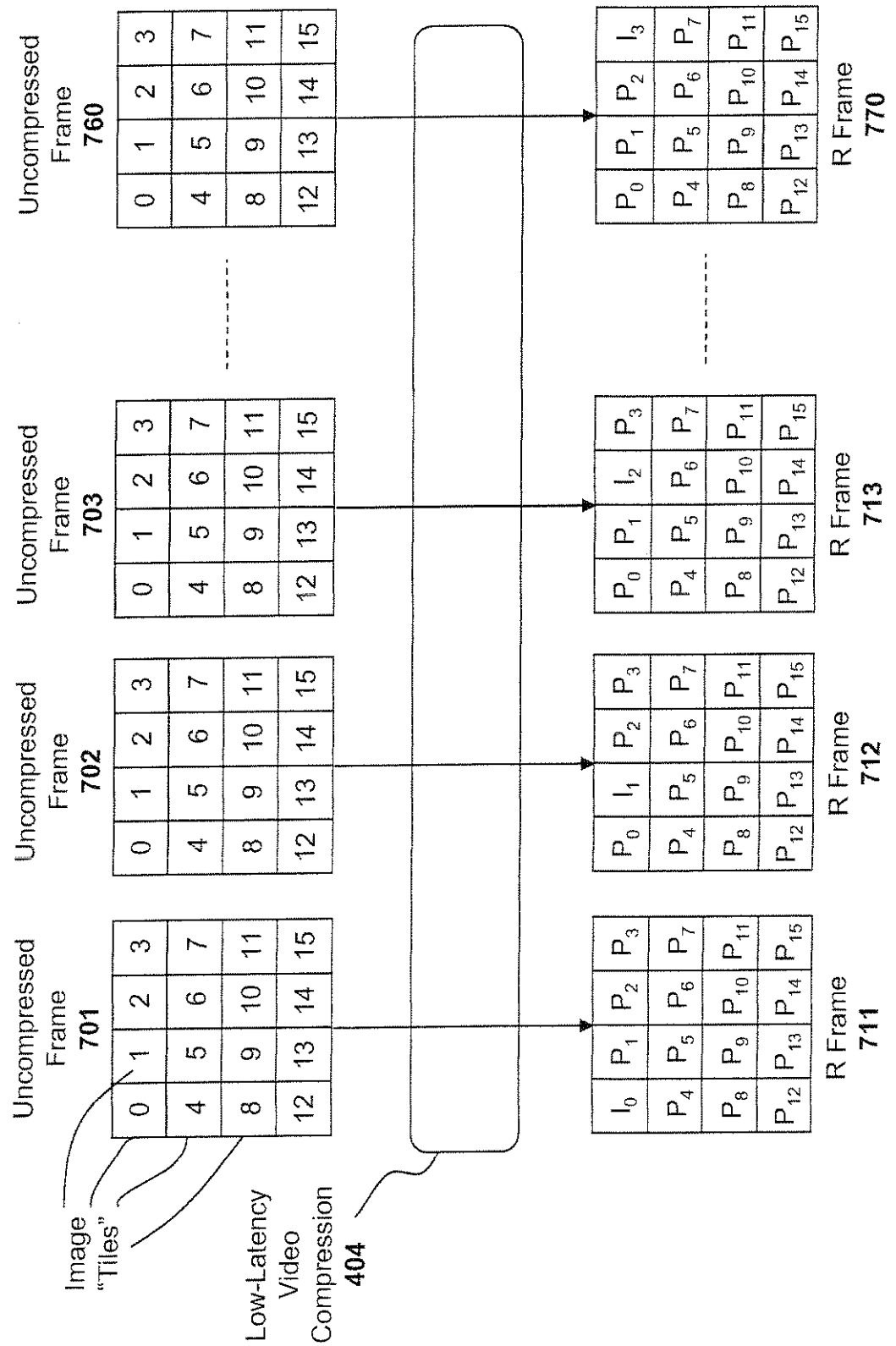

Uncompressed Frame 701
Uncompressed Frame 702
Uncompressed Frame 703
Uncompressed Frame 760
Image "Tiles"
Low-Latency Video Compression 404
R Frame 711
R Frame 712
R Frame 713
R Frame 770

Fig. 7a

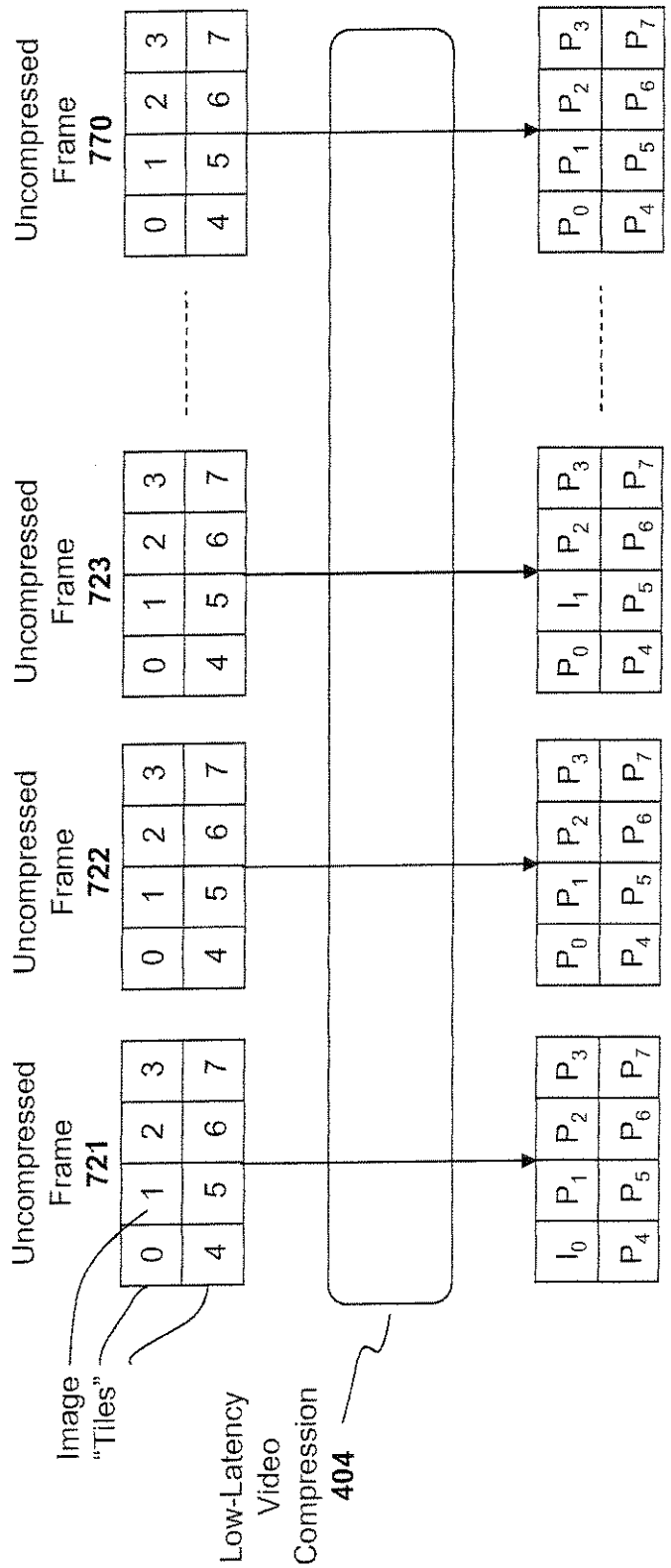

Uncompressed Frame 721
Uncompressed Frame 722
Uncompressed Frame 723
Uncompressed Frame 770
Image "Tiles"
Low-Latency Video Compression 404
R Frame 731
R Frame 732
R Frame 733
R Frame 780

Fig. 7b

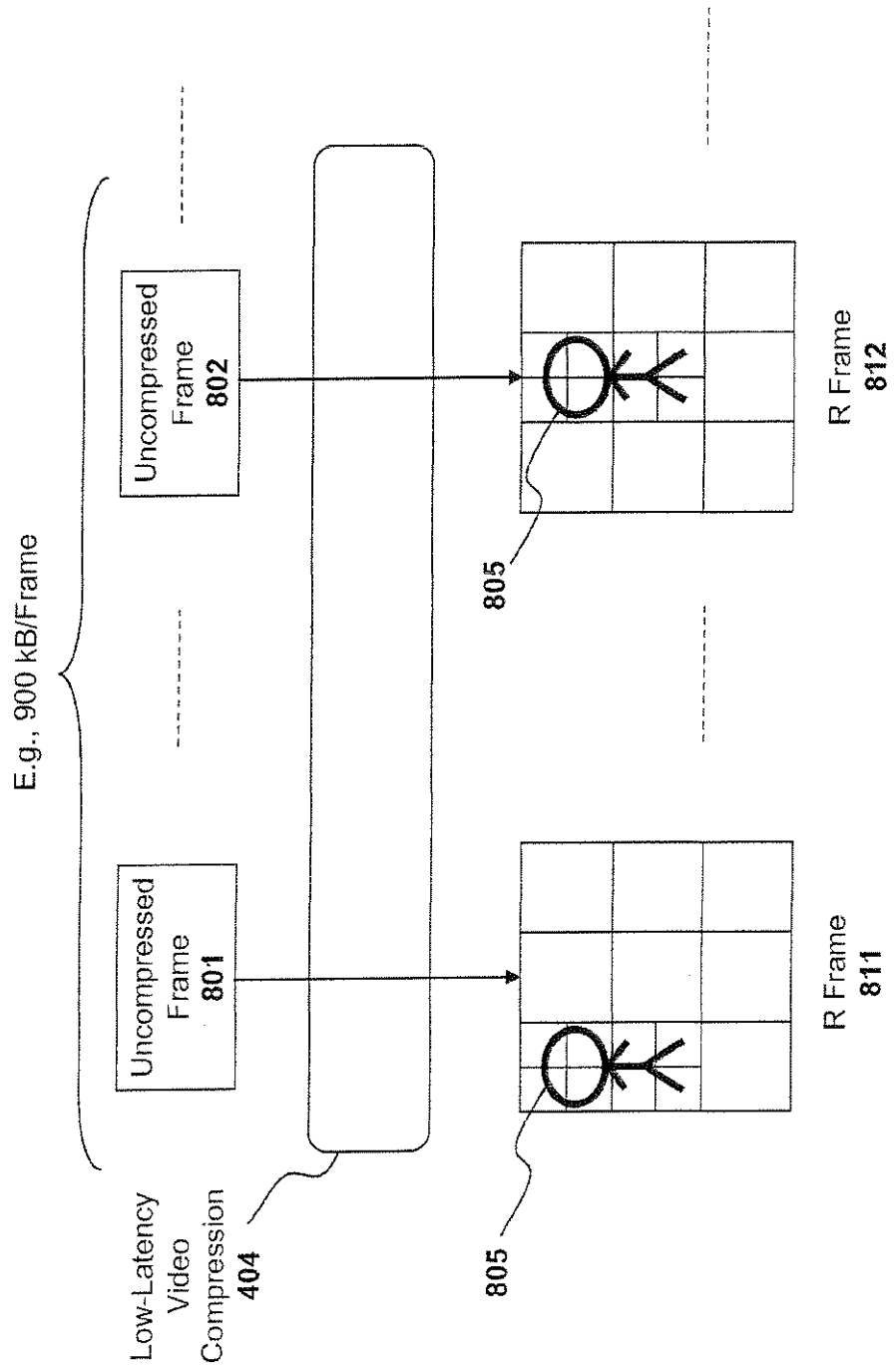

E.g., 900 kB/Frame
Uncompressed Frame 802
Uncompressed Frame 801
Low-Latency Video Compression 404
805
805
R Frame 812
R Frame 811

Fig. 8

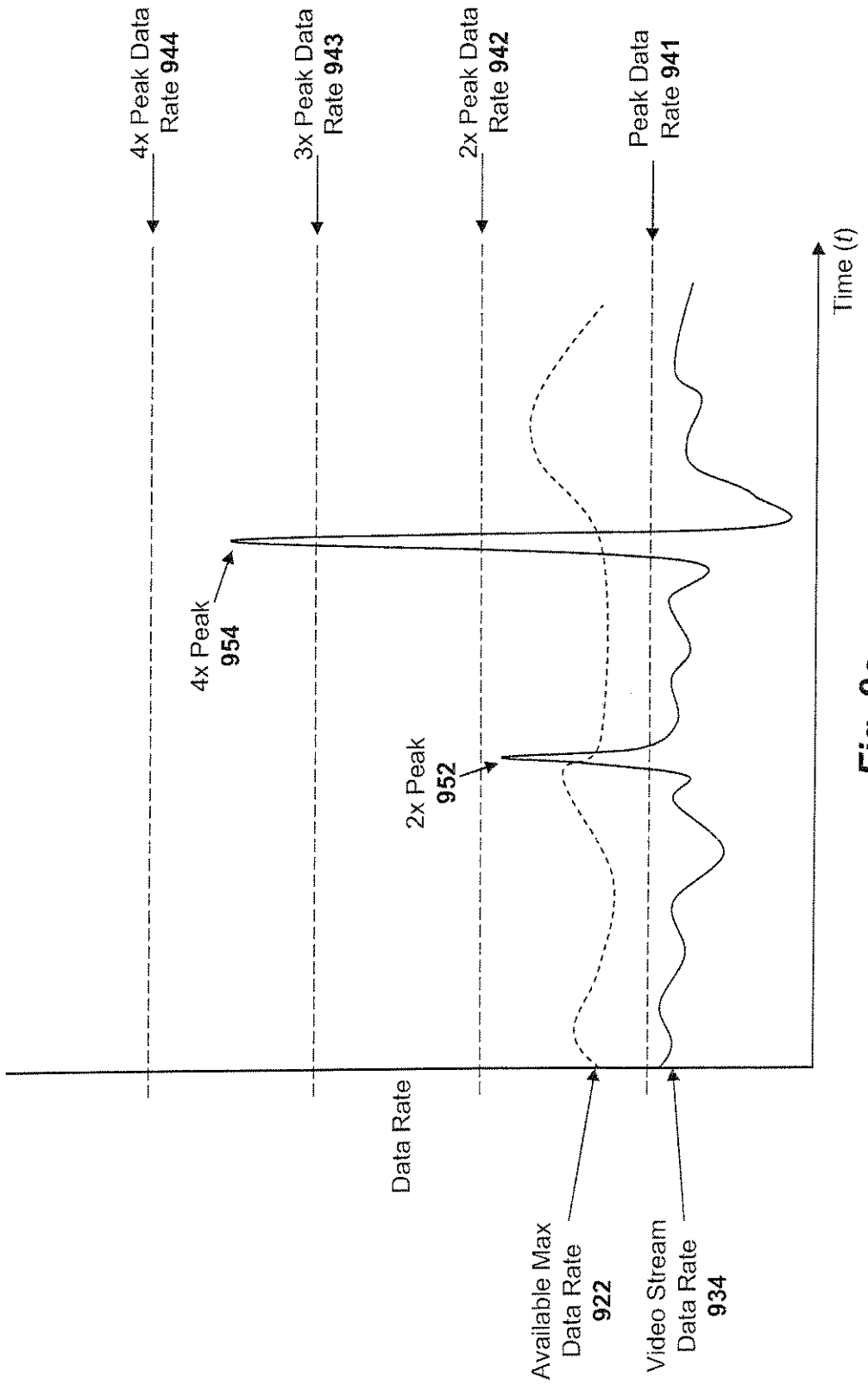

4x Peak Data Rate 944
3x Peak Data Rate 943
2x Peak Data Rate 942
Peak Data Rate 941
4x Peak 954
2x Peak 952
Data Rate
Time (t)
Available Max Data Rate 922
Video Stream Data Rate 934

Fig. 9a

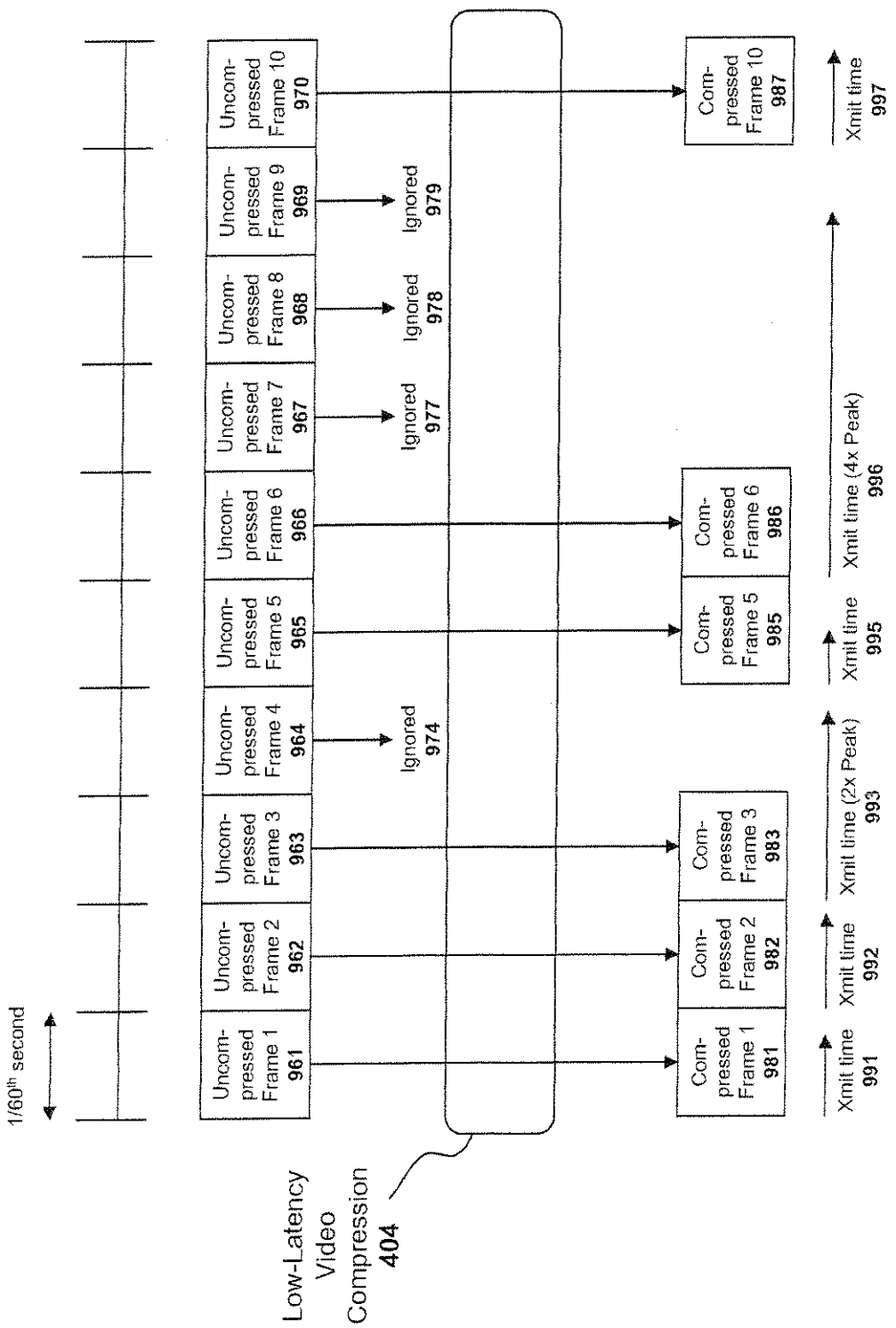

1/60th second
Uncom-pressed Frame 1 961
Uncom-pressed Frame 2 962
Uncom-pressed Frame 3 963
Uncom-pressed Frame 4 964
Uncom-pressed Frame 5 965
Uncom-pressed Frame 6 966
Uncom-pressed Frame 7 967
Uncom-pressed Frame 8 968
Uncom-pressed Frame 9 969
Uncom-pressed Frame 10 970
Low-Latency Video Compression 404
Ignored 974
Ignored 977
Ignored 978
Ignored 979
Com-pressed Frame 1 981
Com-pressed Frame 2 982
Com-pressed Frame 3 983
Com-pressed Frame 5 985
Com-pressed Frame 6 986
Com-pressed Frame 10 987
Xmit time 991
Xmit time 992
Xmit time (2x Peak) 993
Xmit time 995
Xmit time (4x Peak) 996
Xmit time 997

Fig. 9b

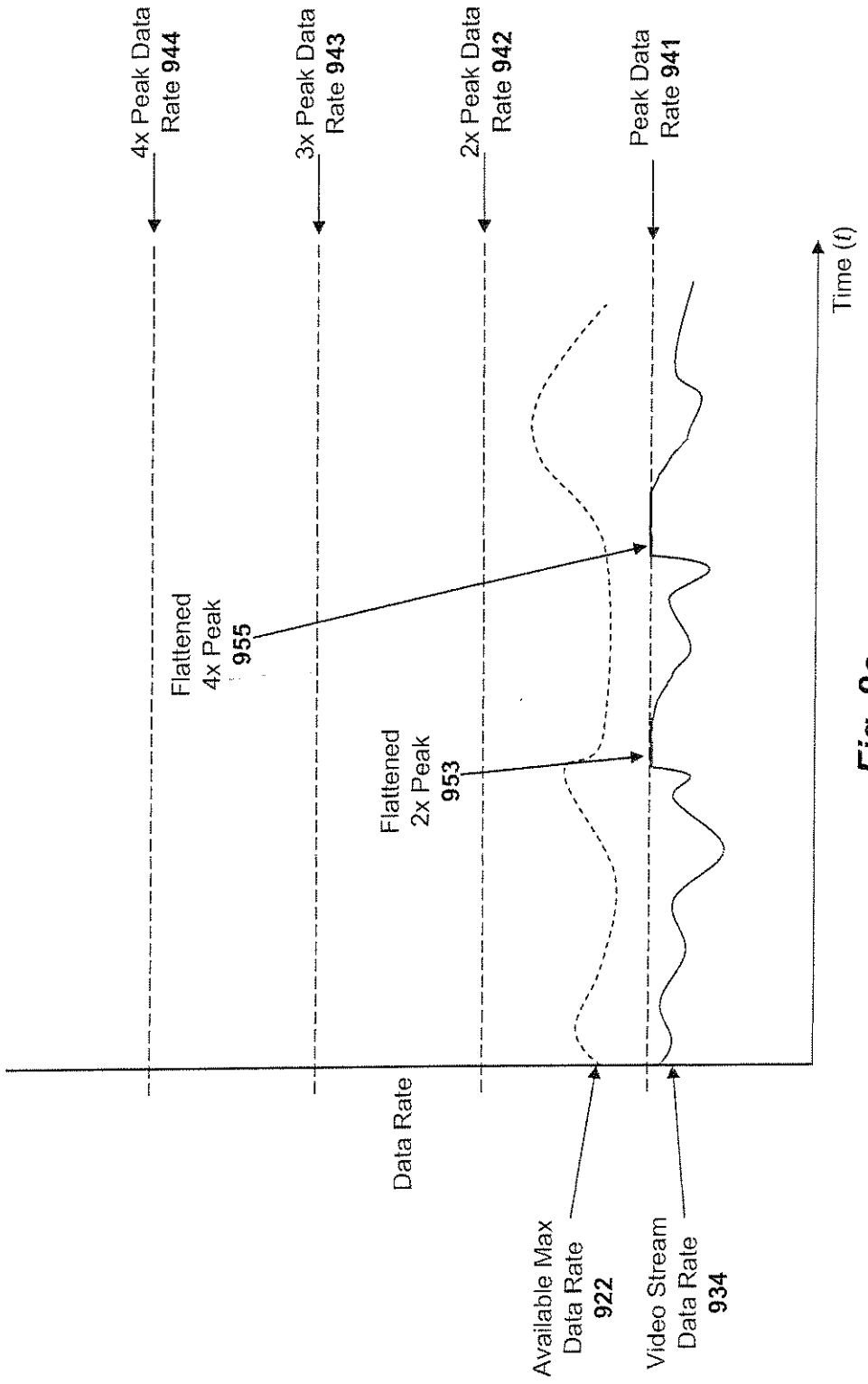

4x Peak Data Rate 944
3x Peak Data Rate 943
2x Peak Data Rate 942
Peak Data Rate 941
Flattened 4x Peak 955
Flattened 2x Peak 953
Data Rate
Time (t)
Available Max Data Rate 922
Video Stream Data Rate 934

Fig. 9c

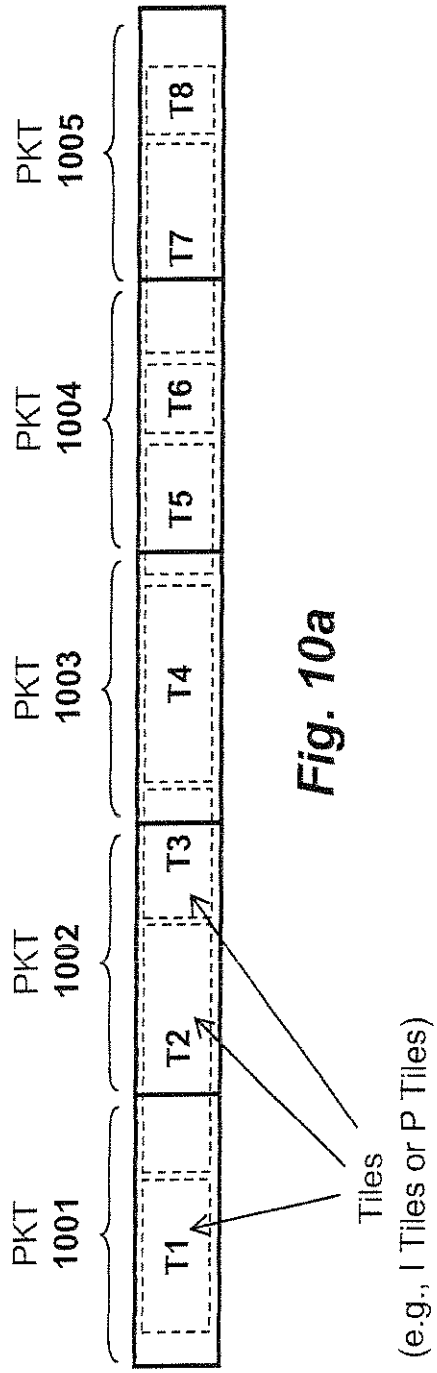

PKT 1001
PKT 1002
PKT 1003
PKT 1004
PKT 1005
T1
T2
T3
T4
T5
T6
T7
T8
Tiles
(e.g., I Tiles or P Tiles)

Fig. 10a

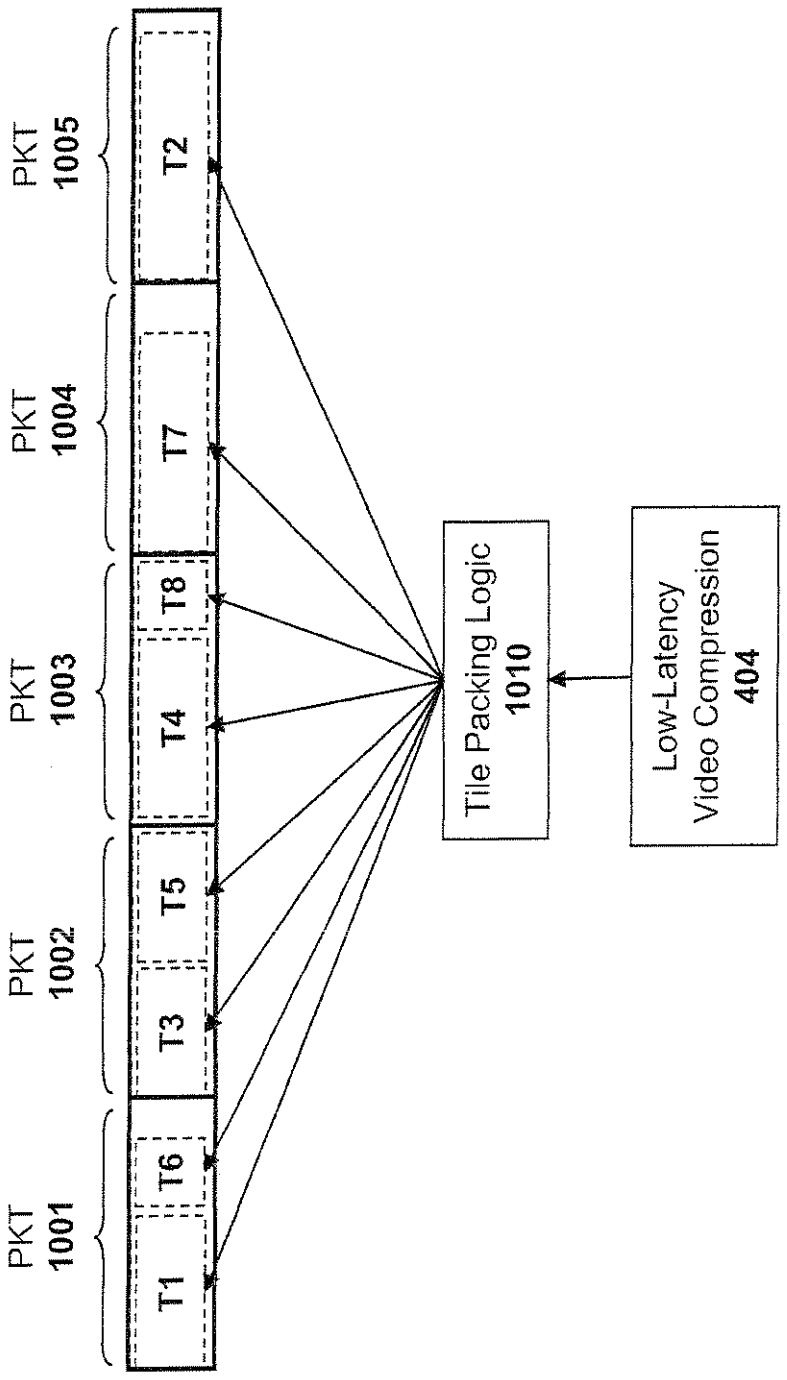

PKT
1001
T1
T6
PKT
1002
T3
T5
PKT
1003
T4
T8
PKT
1004
T7
PKT
1005
T2
Tile Packing Logic
1010
Low-Latency
Video Compression
404

Fig. 10b

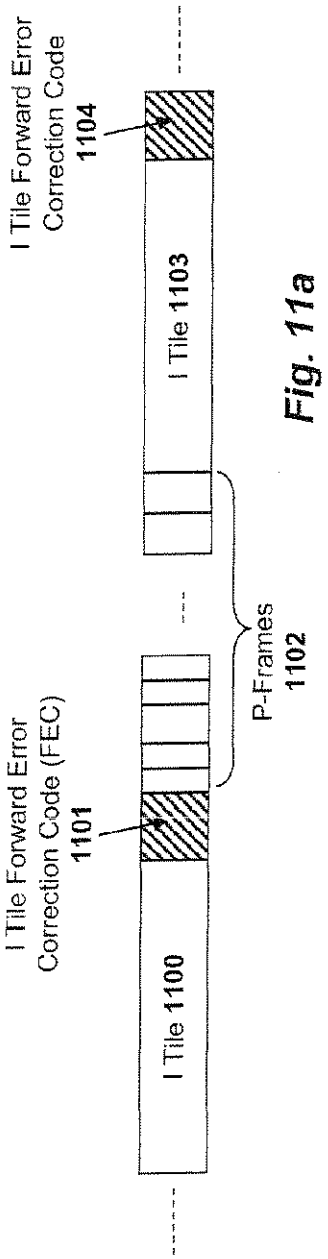


Fig. 11a

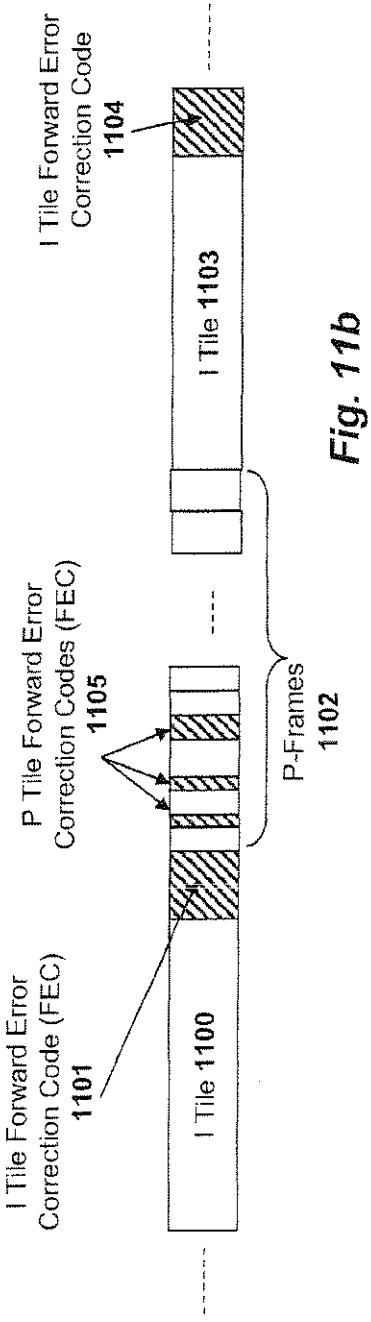


Fig. 11b

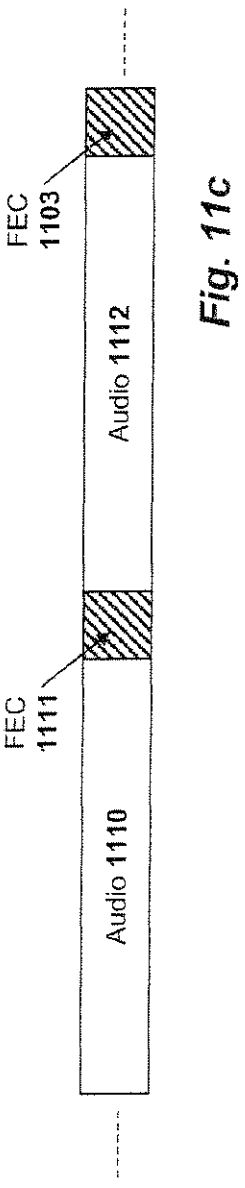


Fig. 11c

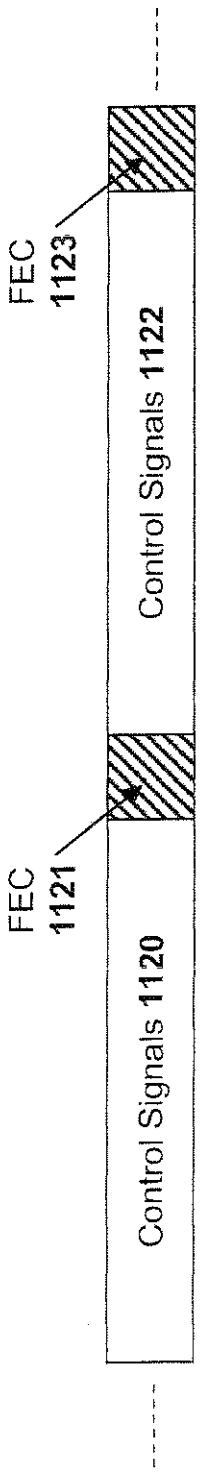

FEC
1123
Control Signals 1122
FEC
1121
Control Signals 1120

Fig. 11d

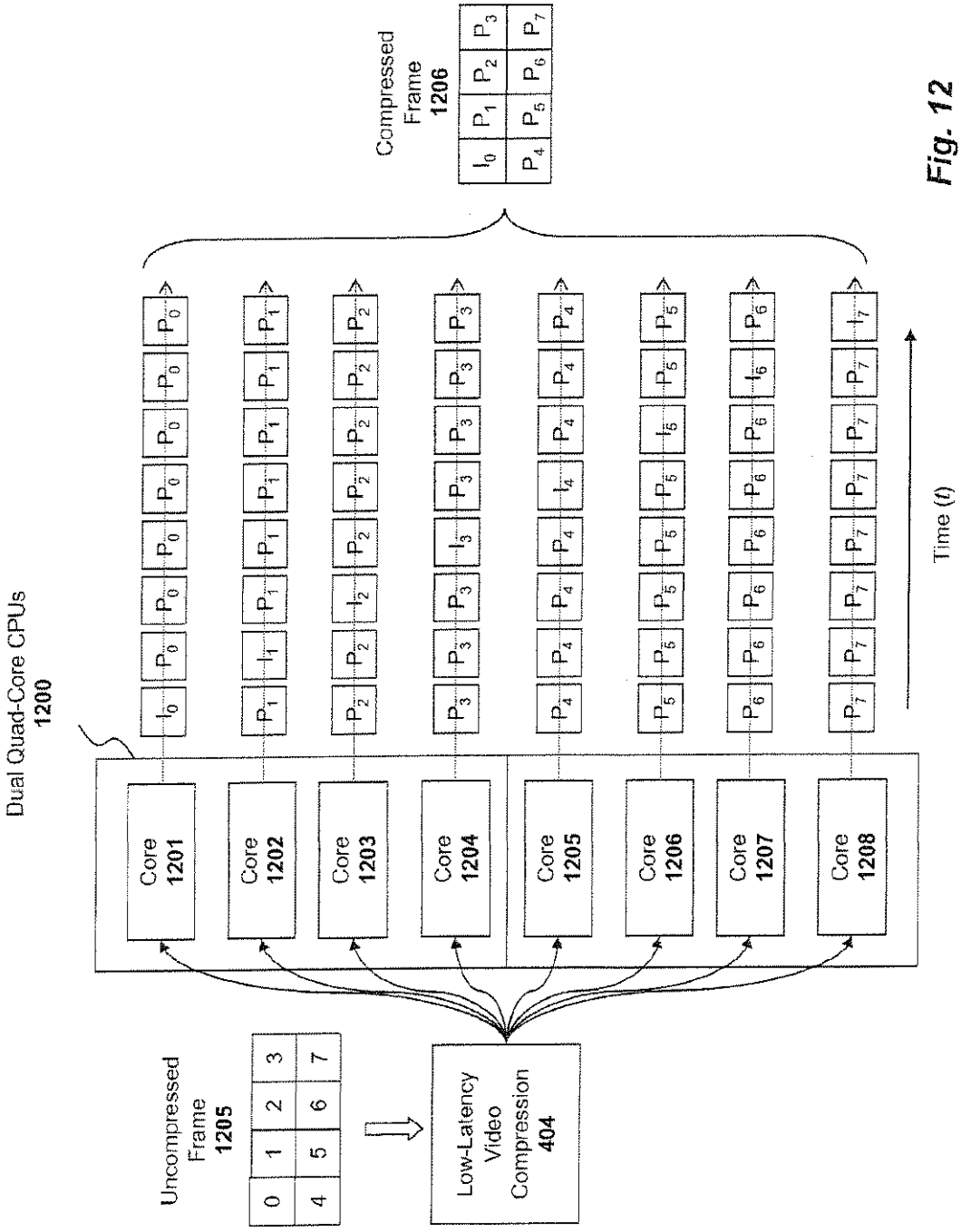

Dual Quad-Core CPUs
1200
Core 1201
Core 1202
Core 1203
Core 1204
Core 1205
Core 1206
Core 1207
Core 1208
Uncompressed Frame 1205
0 1 2 3
4 5 6 7
Low-Latency Video Compression 404
Compressed Frame 1206
I0 P1 P2 P3
P4 P5 P6 P7
Time (t)

Fig. 12

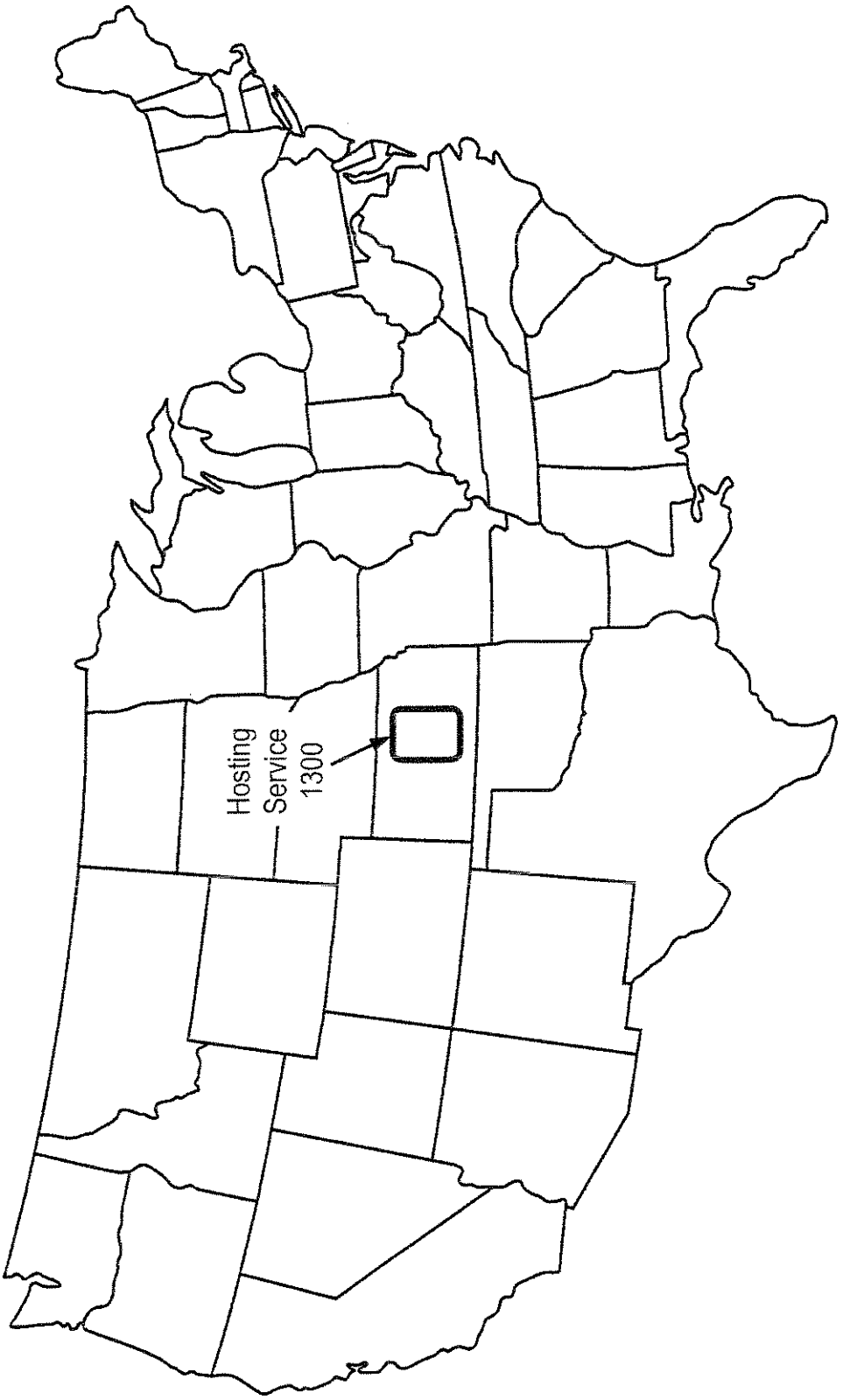


FIG. 13a

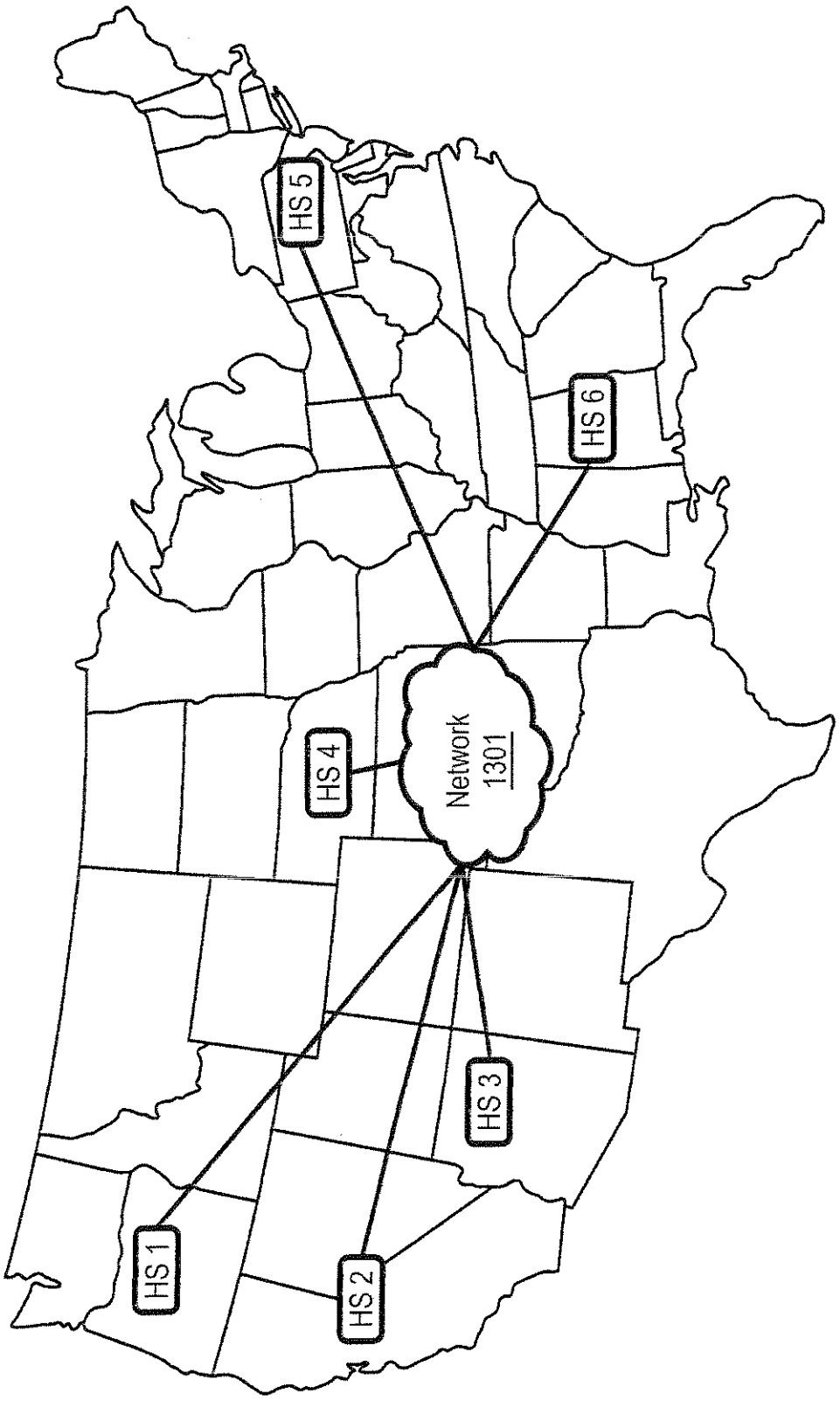


FIG. 13b

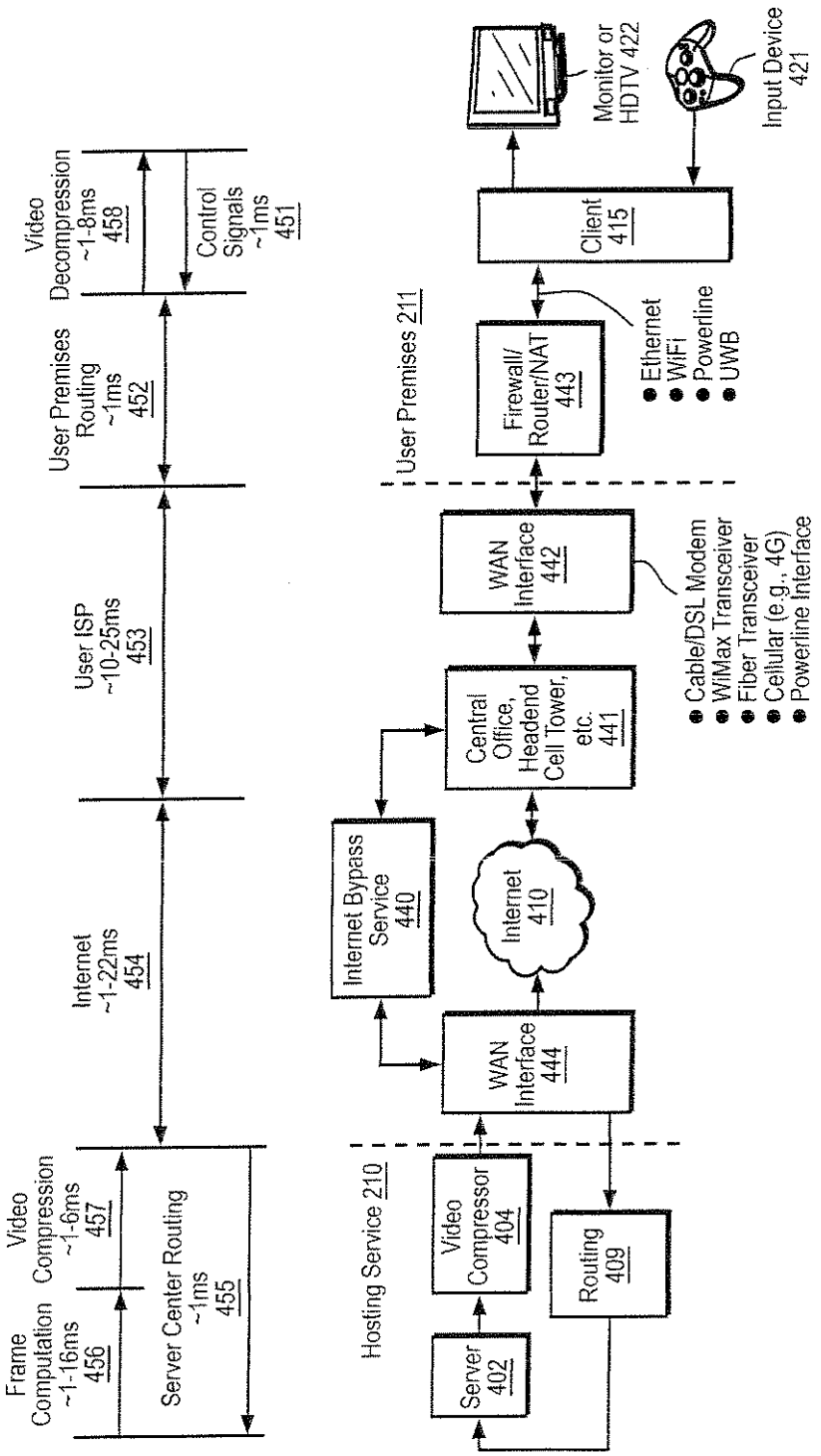

Frame Computation ~1-16ms 456
Video Compression ~1-6ms 457
Server Center Routing ~1ms 455
Internet ~1-22ms 454
User ISP ~10-25ms 453
User Premises Routing ~1ms 452
Video Decompression ~1-8ms 458
Control Signals ~1ms 451
Hosting Service 210
Server 402
Video Compressor 404
Routing 409
WAN Interface 444
Internet Bypass Service 440
Internet 410
Central Office, Headend Cell Tower, etc. 441
WAN Interface 442
Cable/DSL Modem
WiMax Transceiver
Fiber Transceiver
Cellular (e.g., 4G)
Powerline Interface
User Premises 211
Firewall/ Router/NAT 443
Ethernet
WiFi
Powerline
UWB
Client 415
Monitor or HDTV 422
Input Device 421

FIG. 14

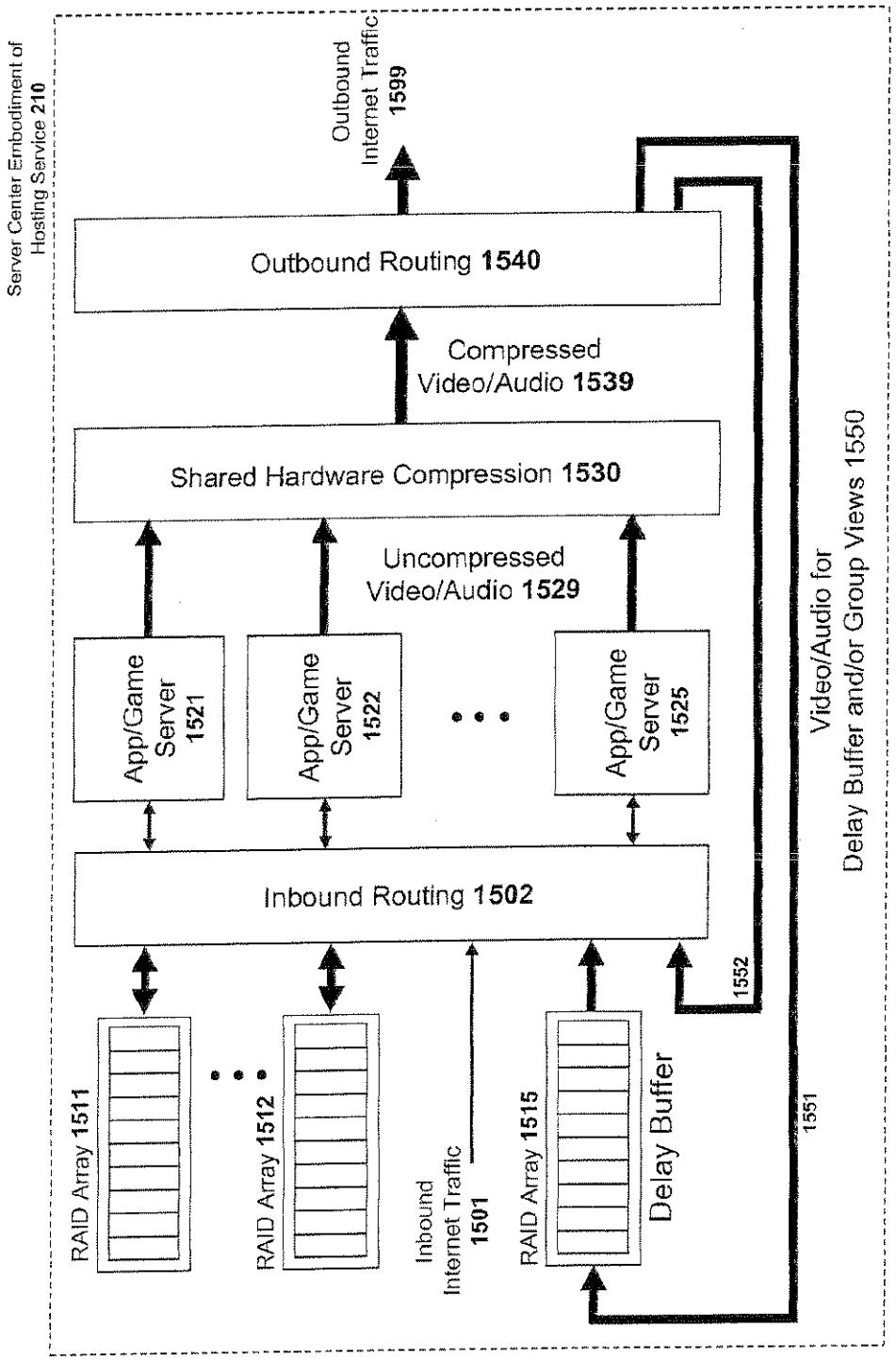

Server Center Embodiment of Hosting Service 210
Outbound Internet Traffic 1599
Outbound Routing 1540
Compressed Video/Audio 1539
Shared Hardware Compression 1530
Uncompressed Video/Audio 1529
App/Game Server 1521
App/Game Server 1522
App/Game Server 1525
Inbound Routing 1502
RAID Array 1511
RAID Array 1512
Inbound Internet Traffic 1501
RAID Array 1515
Delay Buffer
1552
1551
Video/Audio for Delay Buffer and/or Group Views 1550

Fig. 15

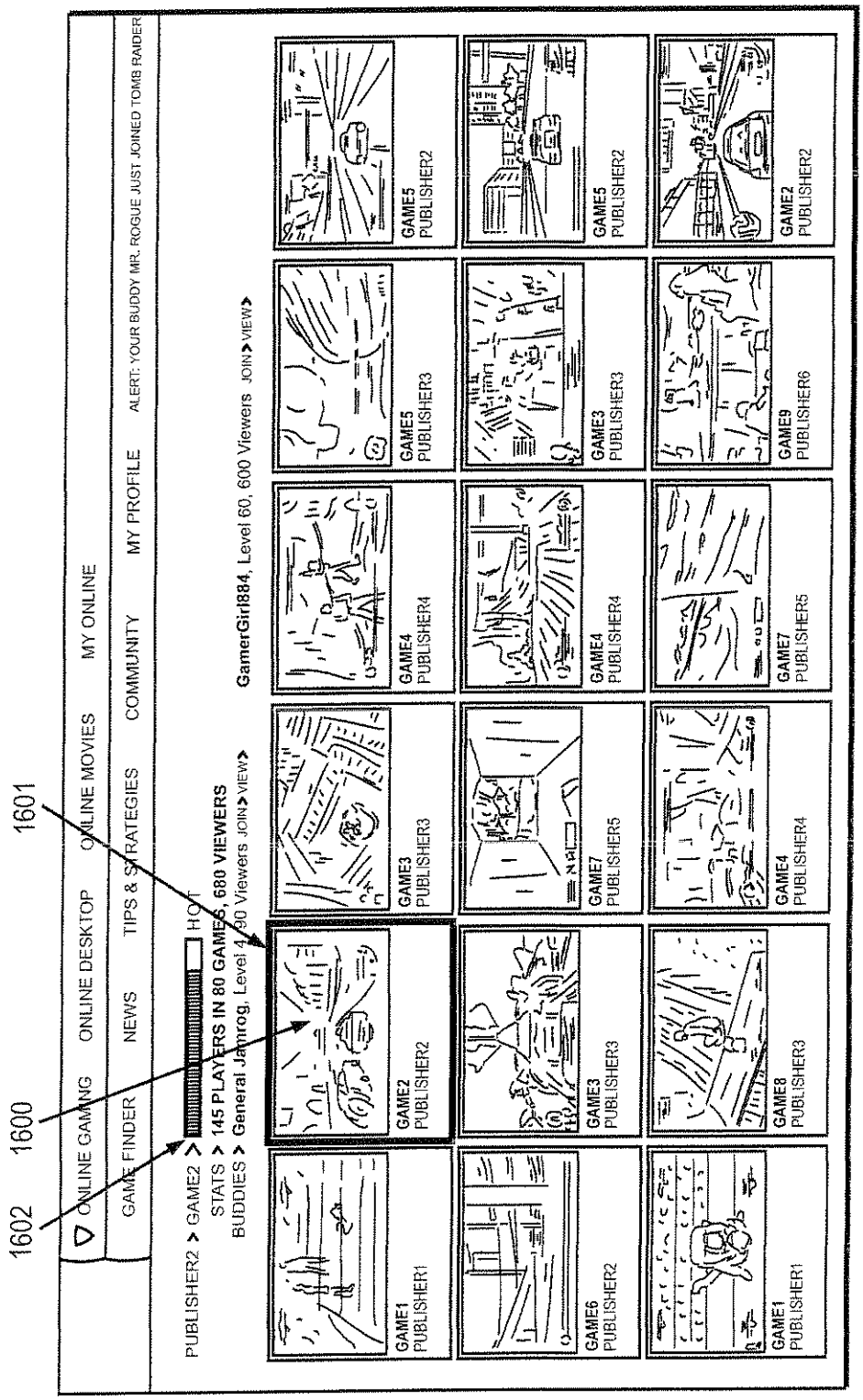

1602
1600
1601
ONLINE GAMING
ONLINE DESKTOP
ONLINE MOVIES
MY ONLINE
GAME FINDER
NEWS
TIPS & STRATEGIES
COMMUNITY
MY PROFILE
ALERT: YOUR BUDDY MR. ROGUE JUST JOINED TOMB RAIDER
PUBLISHER2 > GAME2 >
STATS > 145 PLAYERS IN 80 GAMES, 680 VIEWERS
BUDDIES > General Jamrog, Level 4, 90 Viewers JOIN > VIEW >
GamerGirl884, Level 60, 600 Viewers JOIN > VIEW >
GAME1 PUBLISHER1
GAME2 PUBLISHER2
GAME3 PUBLISHER3
GAME4 PUBLISHER4
GAME5 PUBLISHER2
GAME6 PUBLISHER2
GAME3 PUBLISHER3
GAME7 PUBLISHER5
GAME4 PUBLISHER4
GAME3 PUBLISHER3
GAME5 PUBLISHER2
GAME1 PUBLISHER1
GAME8 PUBLISHER3
GAME4 PUBLISHER4
GAME7 PUBLISHER5
GAME9 PUBLISHER6
GAME2 PUBLISHER2

FIG. 16

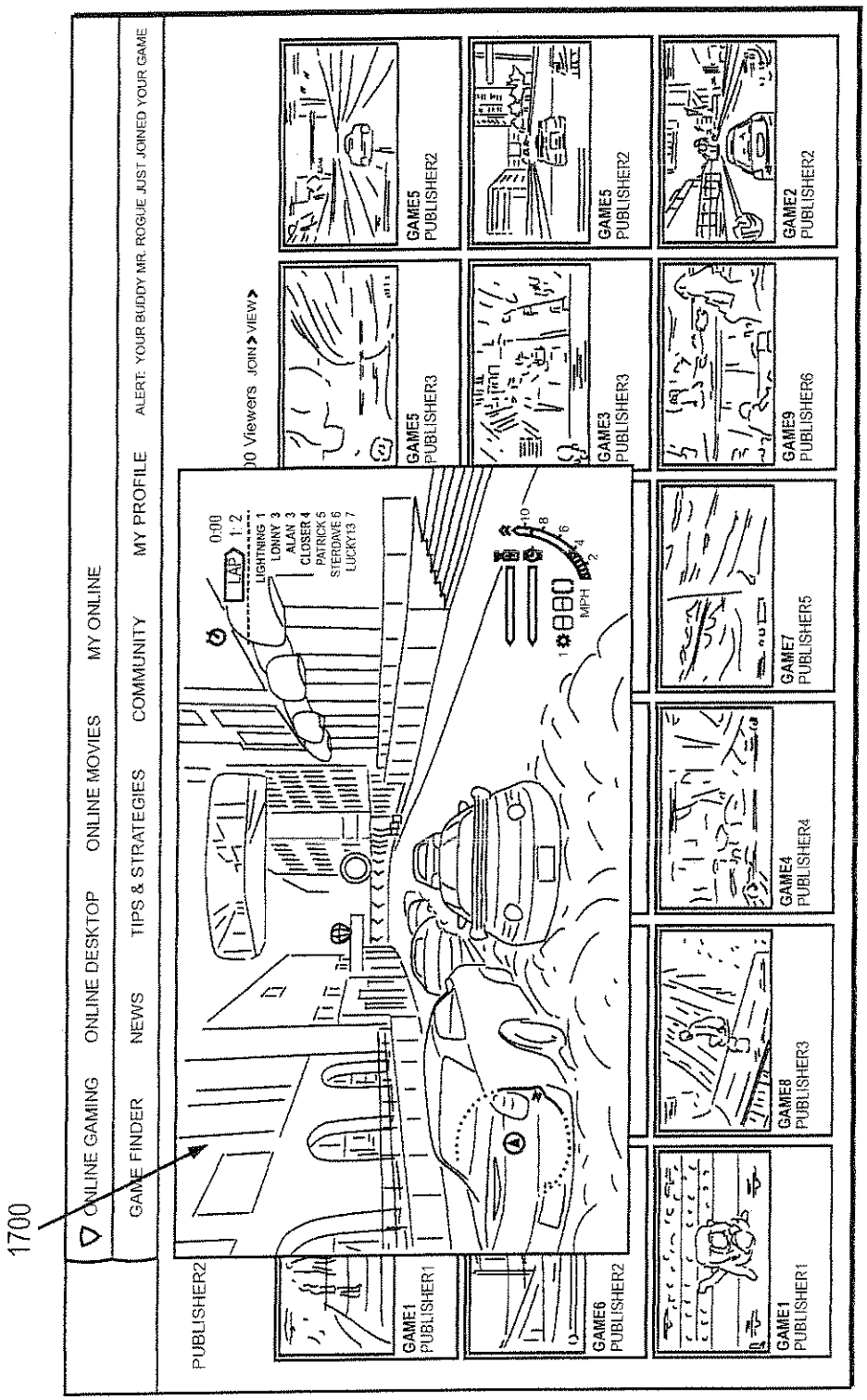

1700
ONLINE GAMING
ONLINE DESKTOP
ONLINE MOVIES
MY ONLINE
GAME FINDER
NEWS
TIPS & STRATEGIES
COMMUNITY
MY PROFILE
ALERT: YOUR BUDDY MR. ROGUE JUST JOINED YOUR GAME
PUBLISHER2
LAP
0:00
1: 2
LIGHTNING 1
LONNY 3
ALAN 3
CLOSER 4
PATRICK 5
STERDAVE 6
LUCKY13 7
MPH
GAME1
PUBLISHER1
GAME6
PUBLISHER2
GAME8
PUBLISHER3
GAME4
PUBLISHER4
GAME7
PUBLISHER5
GAME3
PUBLISHER3
GAME5
PUBLISHER3
GAME5
PUBLISHER2
GAME9
PUBLISHER6
GAME5
PUBLISHER2
GAME2
PUBLISHER2

FIG. 17

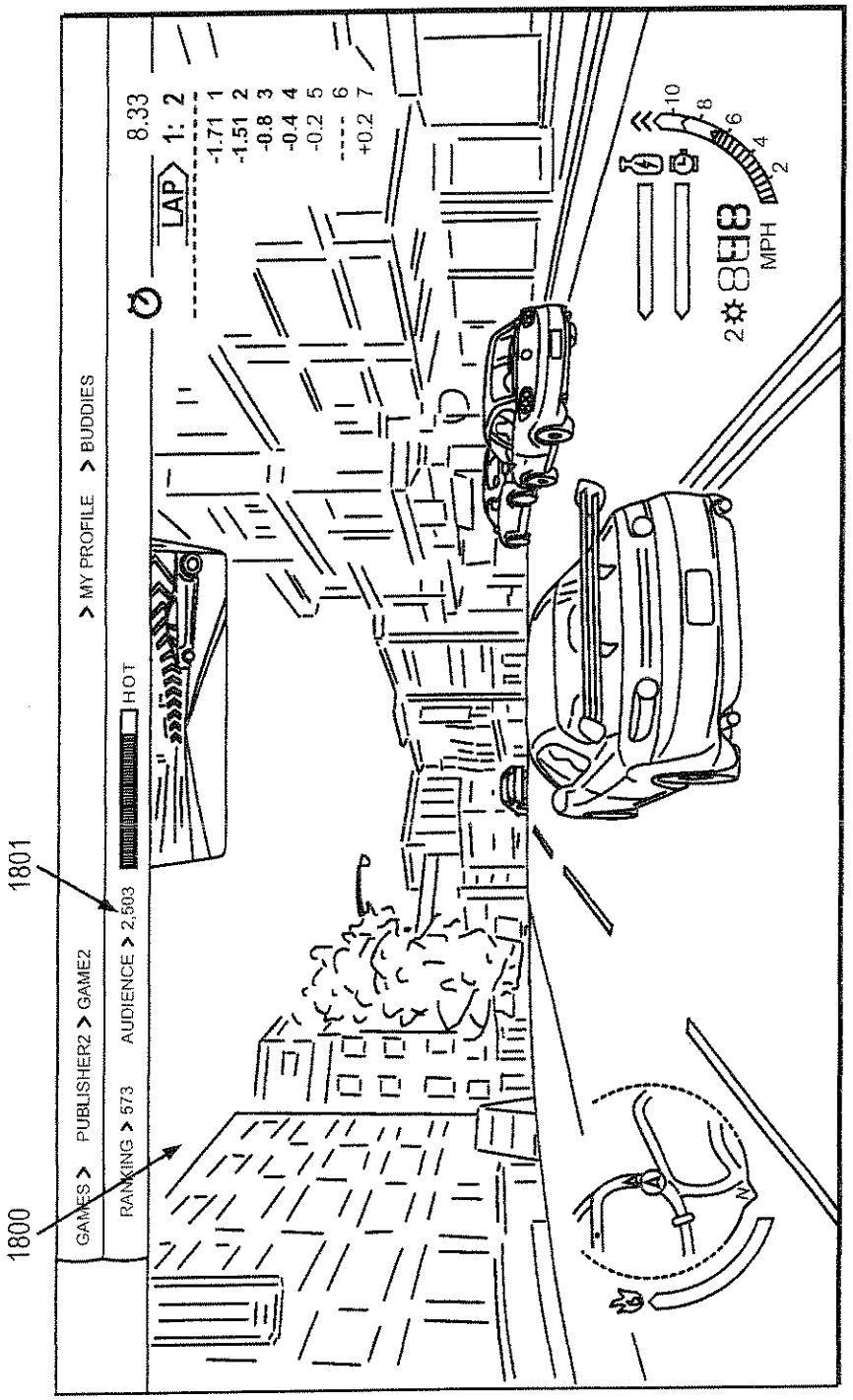

1800
1801
GAMES > PUBLISHER2 > GAME2
RANKING > 573
AUDIENCE > 2,503
HOT
> MY PROFILE > BUDDIES
LAP 1: 2
8.33
-1.71 1
-1.51 2
-0.8 3
-0.4 4
-0.2 5
---- 6
+0.2 7
MPH

FIG. 18

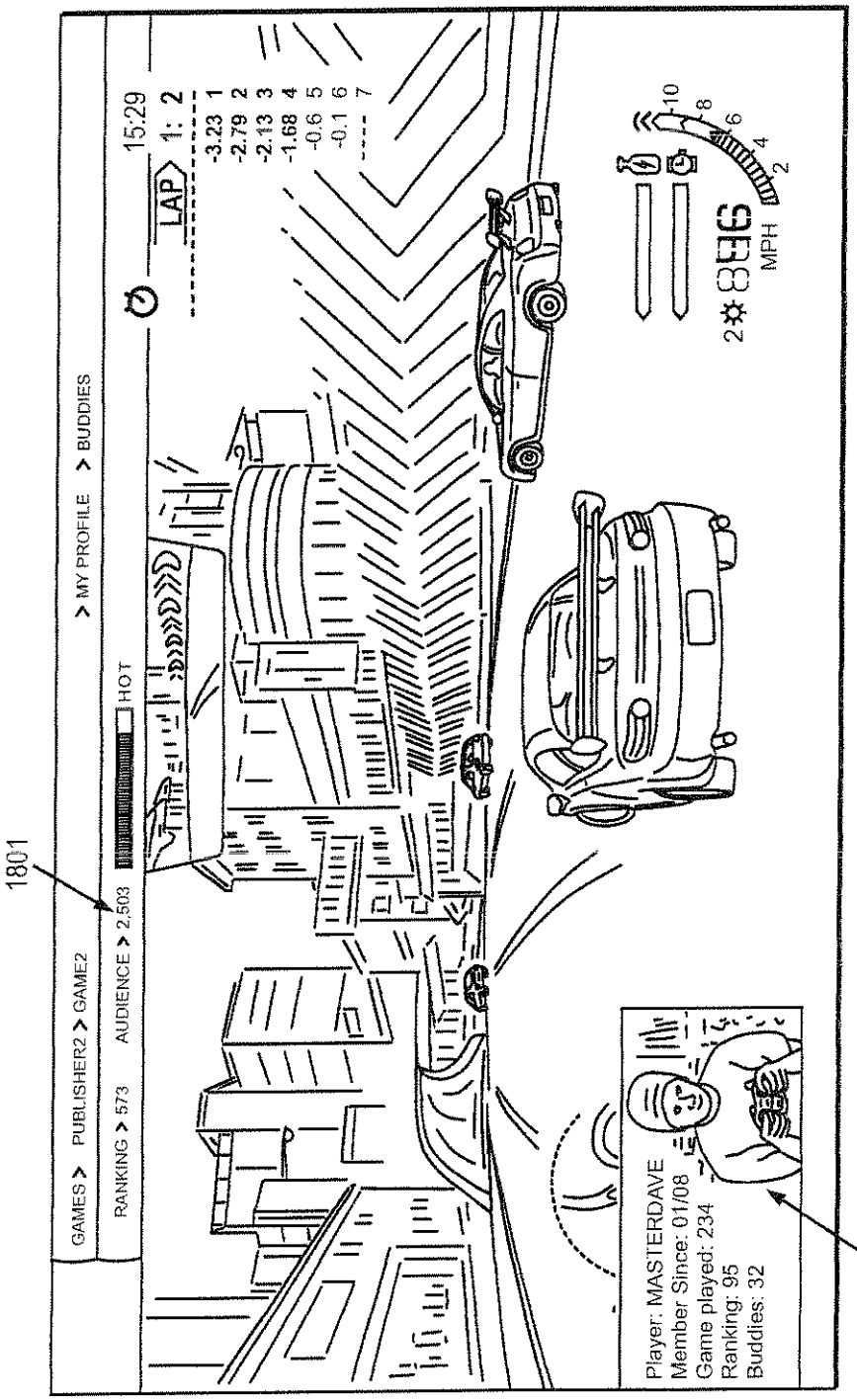

1801
GAMES > PUBLISHER2 > GAME2
> MY PROFILE > BUDDIES
RANKING > 573
AUDIENCE > 2,503
HOT
15:29
LAP 1: 2
-3.23 1
-2.79 2
-2.13 3
-1.68 4
-0.6 5
-0.1 6
7
MPH
Player: MASTERDAVE
Member Since: 01/08
Game played: 234
Ranking: 95
Buddies: 32
1900

FIG. 19

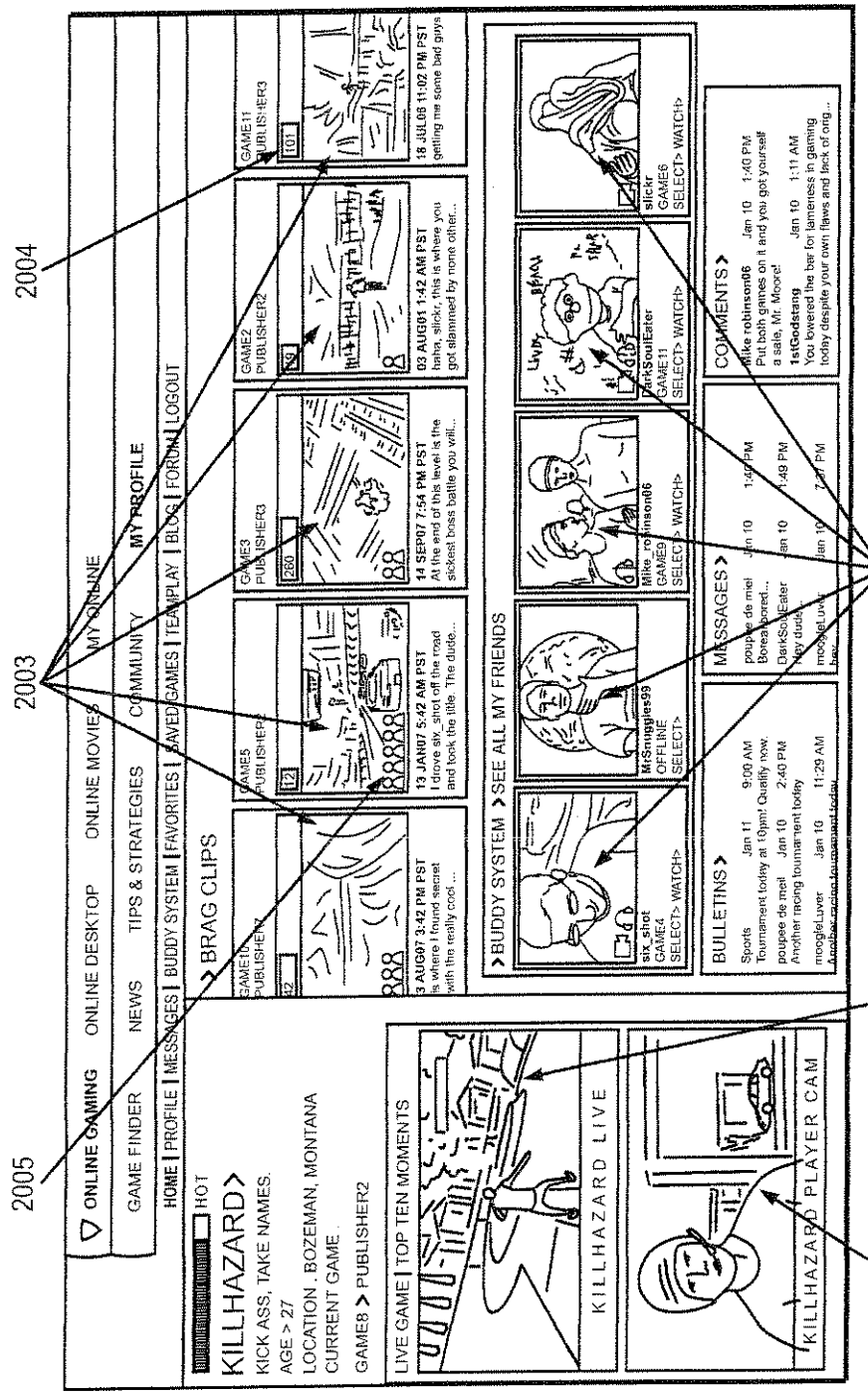

ONLINE GAMING
ONLINE DESKTOP
ONLINE MOVIES
MY ONLINE
GAME FINDER
NEWS
TIPS & STRATEGIES
COMMUNITY
MY PROFILE
HOME | PROFILE | MESSAGES | BUDDY SYSTEM | FAVORITES | SAVED GAMES | TEAMPLAY | BLOG | FORUM | LOGOUT
HOT
KILLHAZARD>
KICK ASS, TAKE NAMES.
AGE > 27
LOCATION . BOZEMAN, MONTANA
CURRENT GAME
GAME8 > PUBLISHER2
> BRAG CLIPS
LIVE GAME | TOP TEN MOMENTS
KILLHAZARD LIVE
KILLHAZARD PLAYER CAM
> BUDDY SYSTEM > SEE ALL MY FRIENDS
BULLETINS >
MESSAGES >
COMMENTS >
2000
2001
2002
2003
2004
2005

FIG. 20

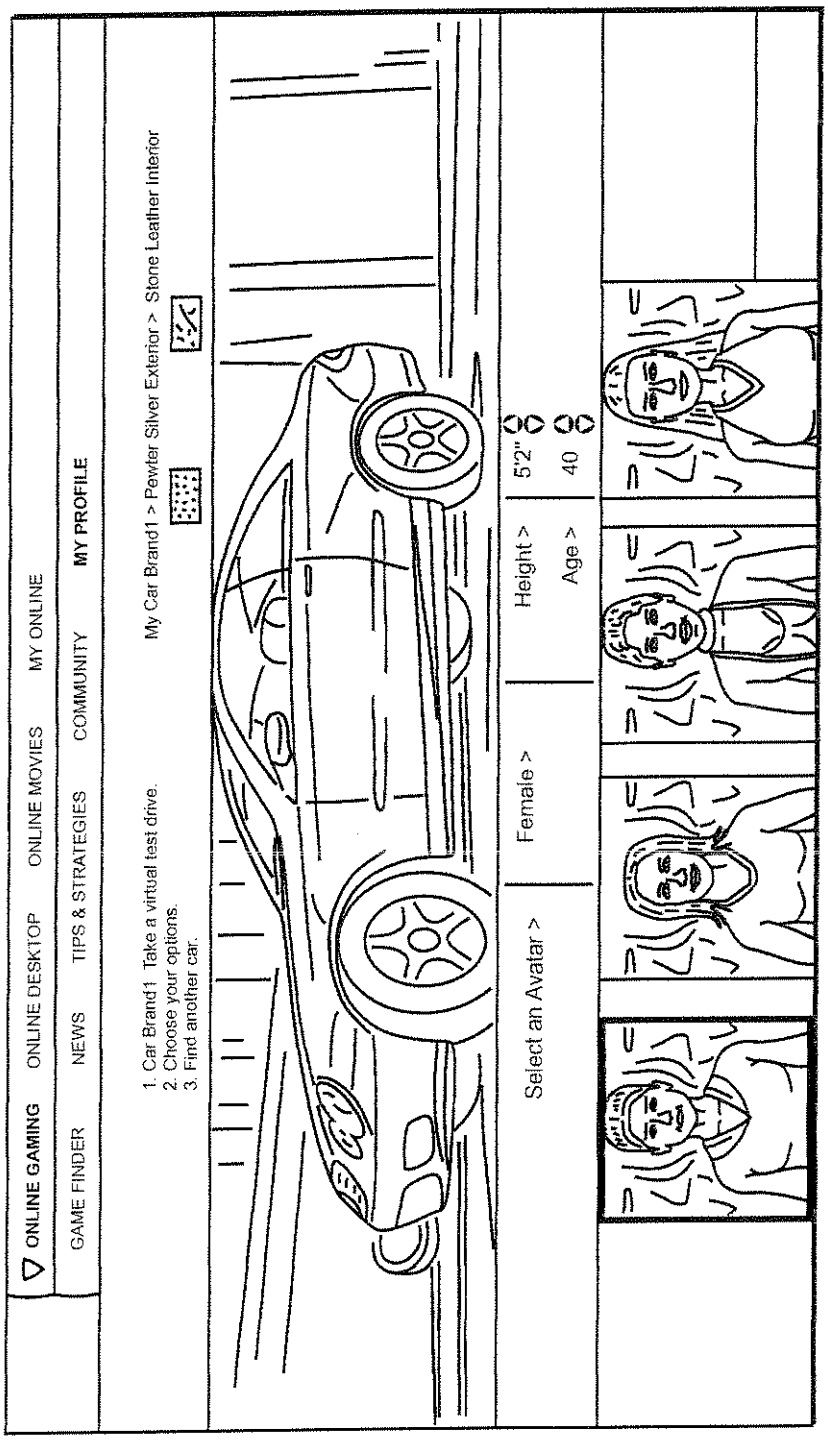

ONLINE GAMING
ONLINE DESKTOP
ONLINE MOVIES
MY ONLINE
GAME FINDER
NEWS
TIPS & STRATEGIES
COMMUNITY
MY PROFILE
1. Car Brand1. Take a virtual test drive.
2. Choose your options.
3. Find another car.
My Car Brand1 > Pewter Silver Exterior > Stone Leather Interior
Select an Avatar >
Female >
Height >
5'2"
Age >
40

FIG. 21

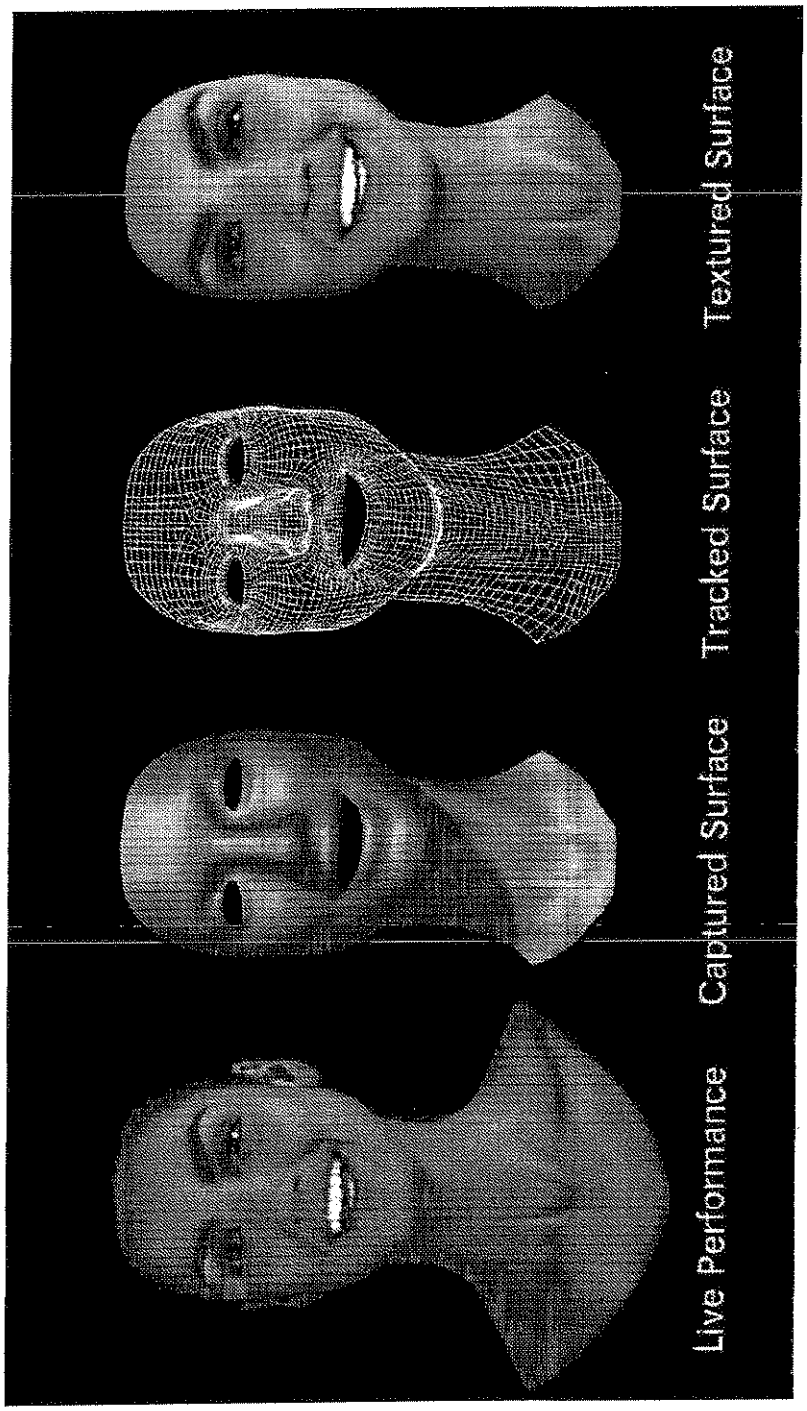

Live Performance
Captured Surface
Tracked Surface
Textured Surface

Fig. 22

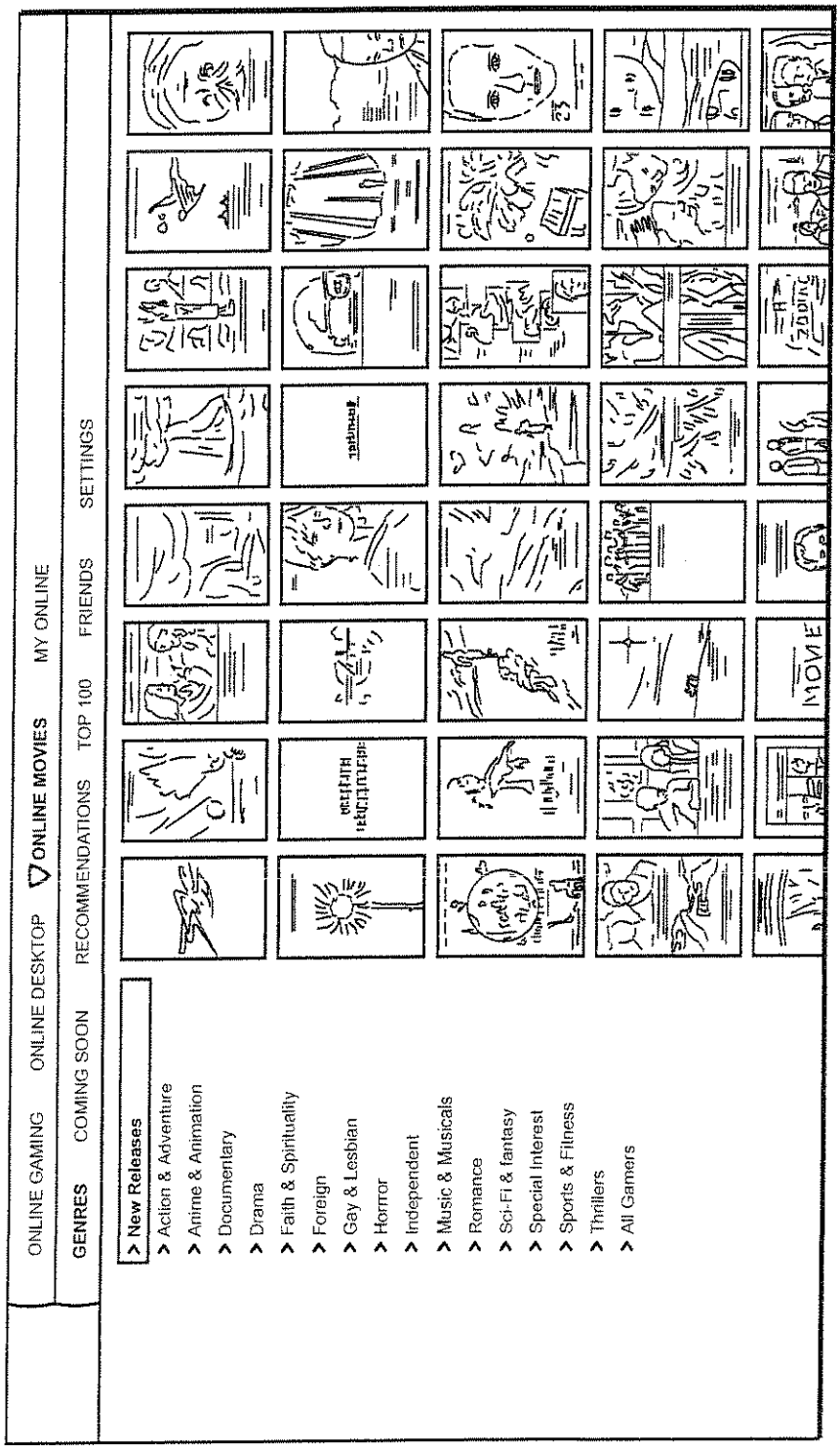

ONLINE GAMING
ONLINE DESKTOP
ONLINE MOVIES
MY ONLINE
GENRES
COMING SOON
RECOMMENDATIONS
TOP 100
FRIENDS
SETTINGS
> New Releases
> Action & Adventure
> Anime & Animation
> Documentary
> Drama
> Faith & Spirituality
> Foreign
> Gay & Lesbian
> Horror
> Independent
> Music & Musicals
> Romance
> Sci-Fi & fantasy
> Special Interest
> Sports & Fitness
> Thrillers
> All Gamers

FIG. 23

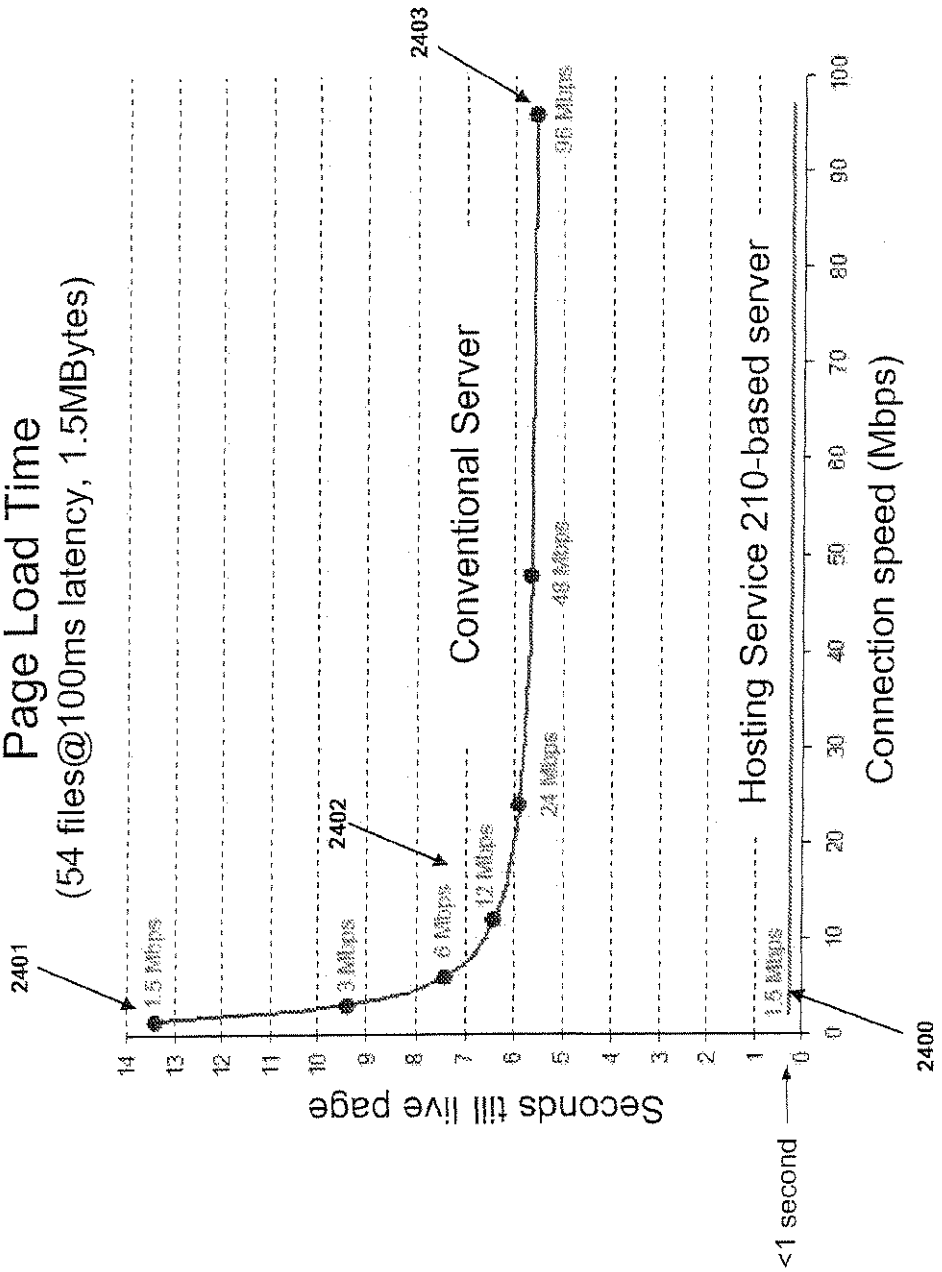

Page Load Time
(54 files@100ms latency, 1.5MBytes)
Seconds till live page
Connection speed (Mbps)
Conventional Server
Hosting Service 210-based server
<1 second
1.5 Mbps
3 Mbps
6 Mbps
12 Mbps
24 Mbps
48 Mbps
96 Mbps
2400
2401
2402
2403

Fig. 24