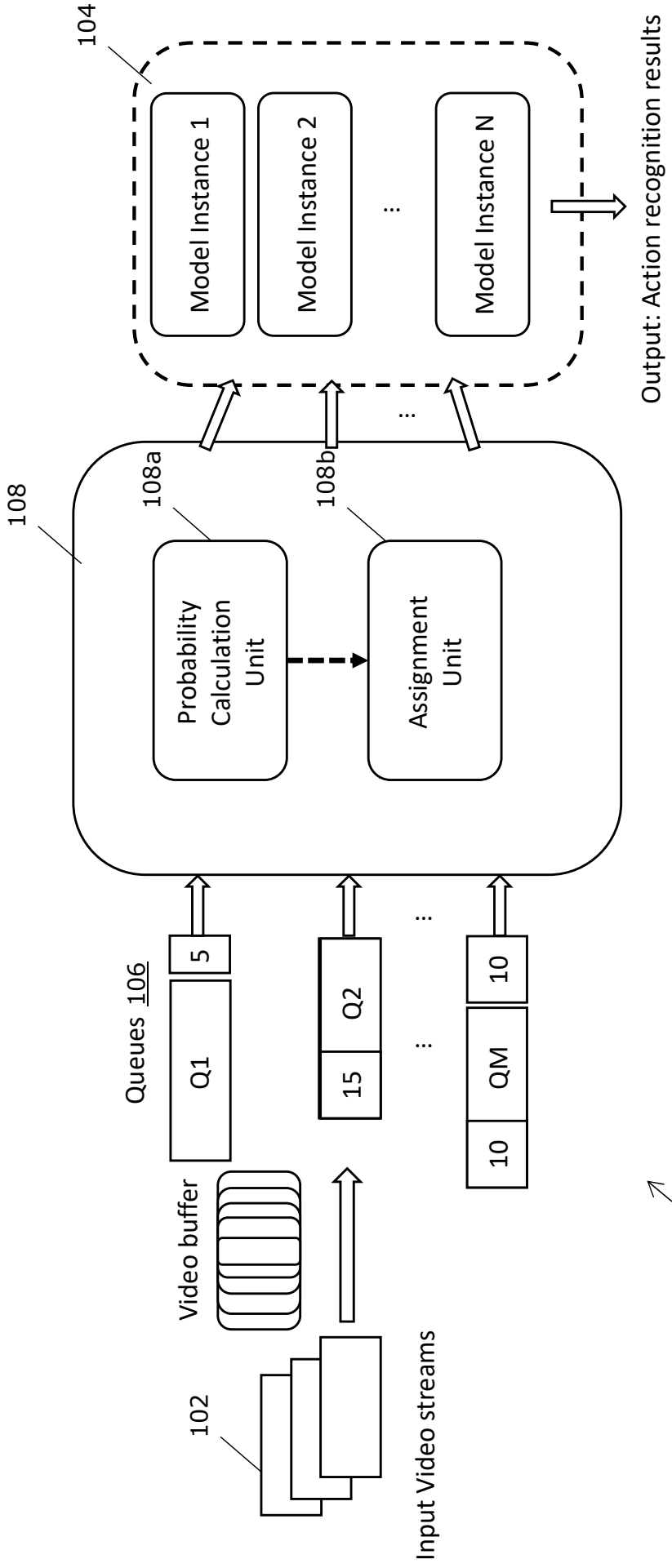

104
Model Instance 1
Model Instance 2
...
Model Instance N
Output: Action recognition results
108
108a
108b
Probability Calculation Unit
Assignment Unit
Queues 106
Q1
5
Q2
15
QM
10
10
Video buffer
102
Input Video streams
100

Figure 1

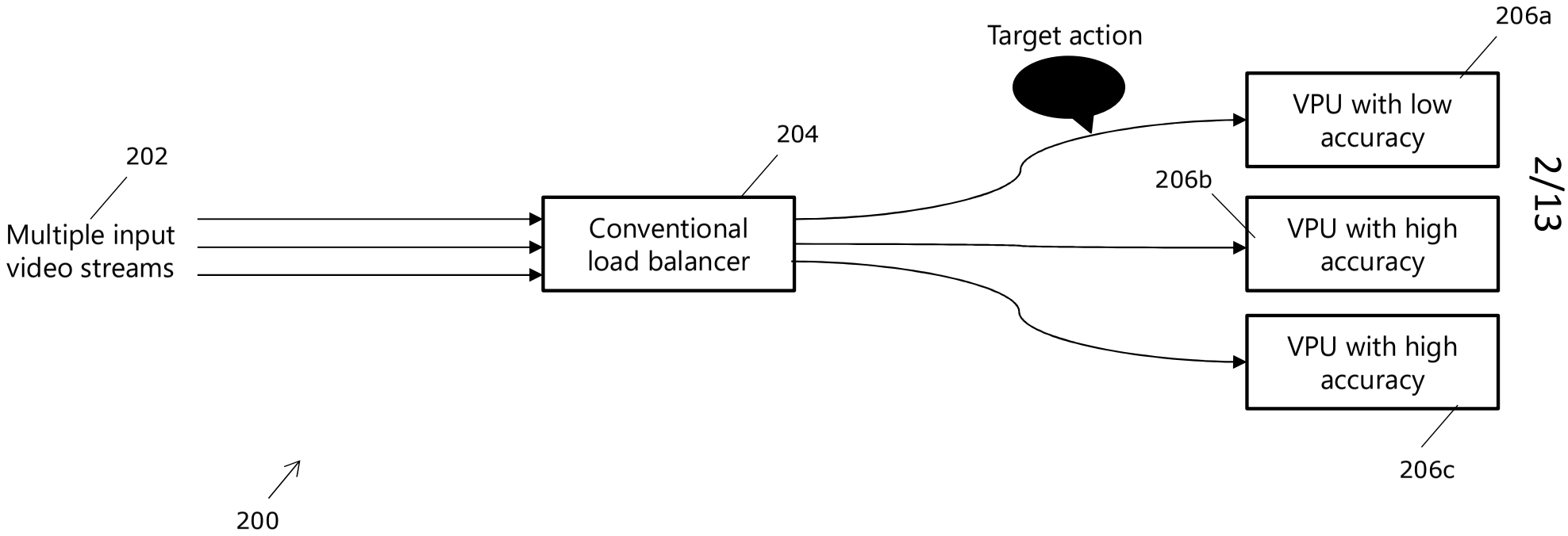

Target action
206a
VPU with low accuracy
204
202
206b
Multiple input video streams
Conventional load balancer
VPU with high accuracy
VPU with high accuracy
206c
200

Figure 2

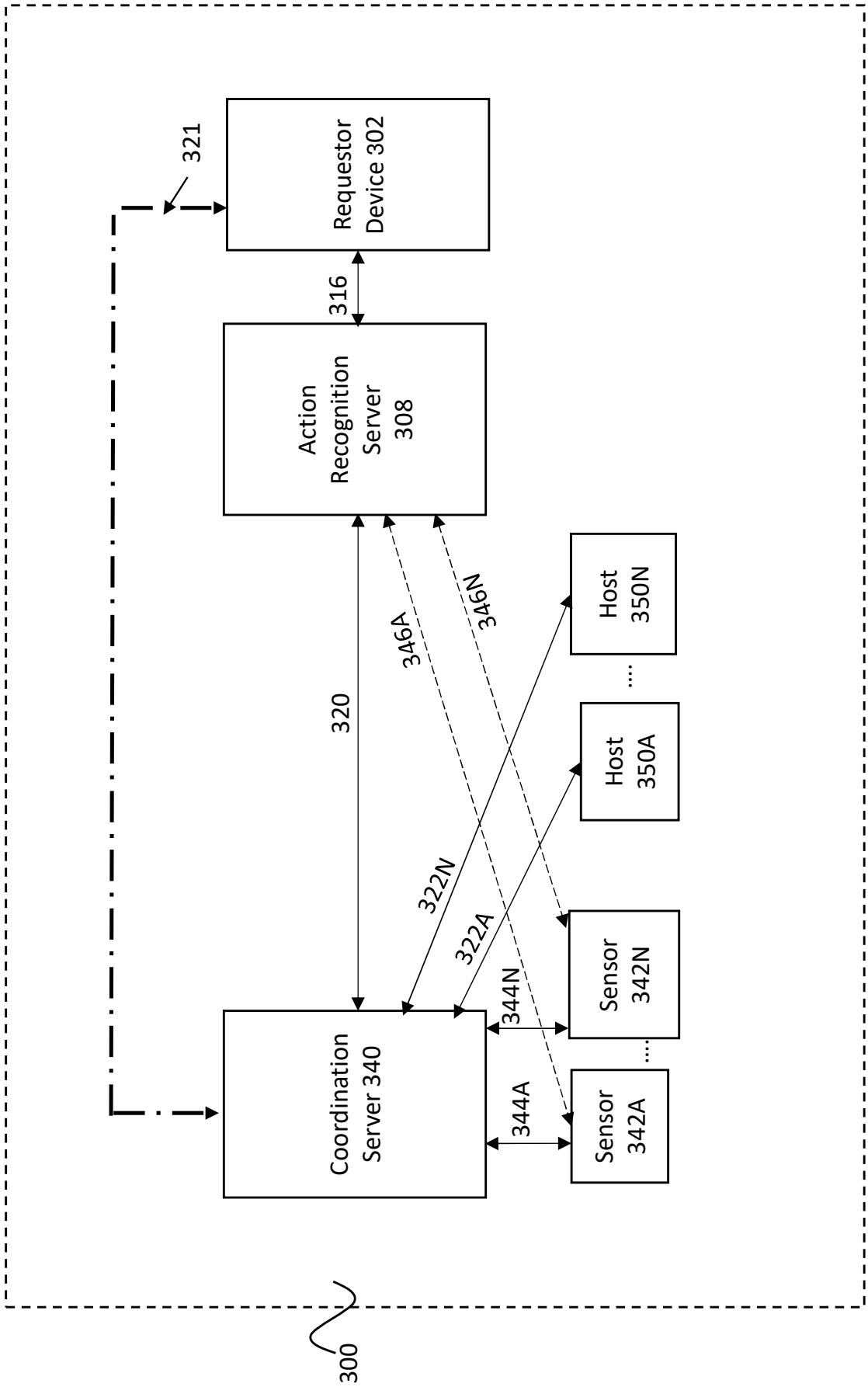

300
321
Requestor Device 302
316
Action Recognition Server 308
320
346A
346N
322N
322A
344N
344A
Coordination Server 340
Host 350N
Host 350A
Sensor 342N
Sensor 342A

Figure 3

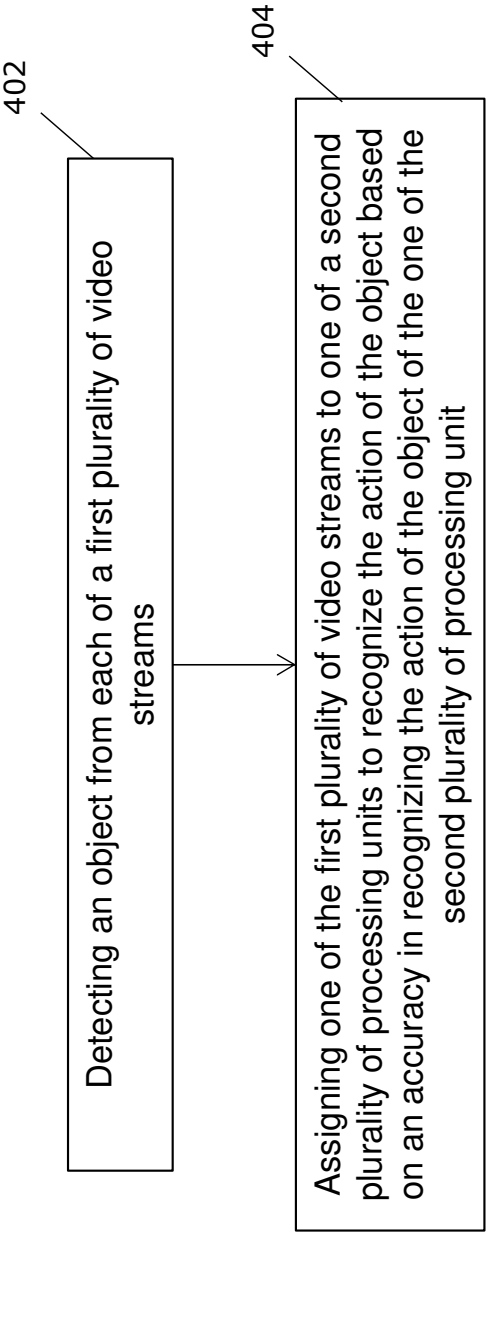

402
Detecting an object from each of a first plurality of video streams
404
Assigning one of the first plurality of video streams to one of a second plurality of processing units to recognize the action of the object based on an accuracy in recognizing the action of the object of the one of the second plurality of processing unit
400

Figure 4

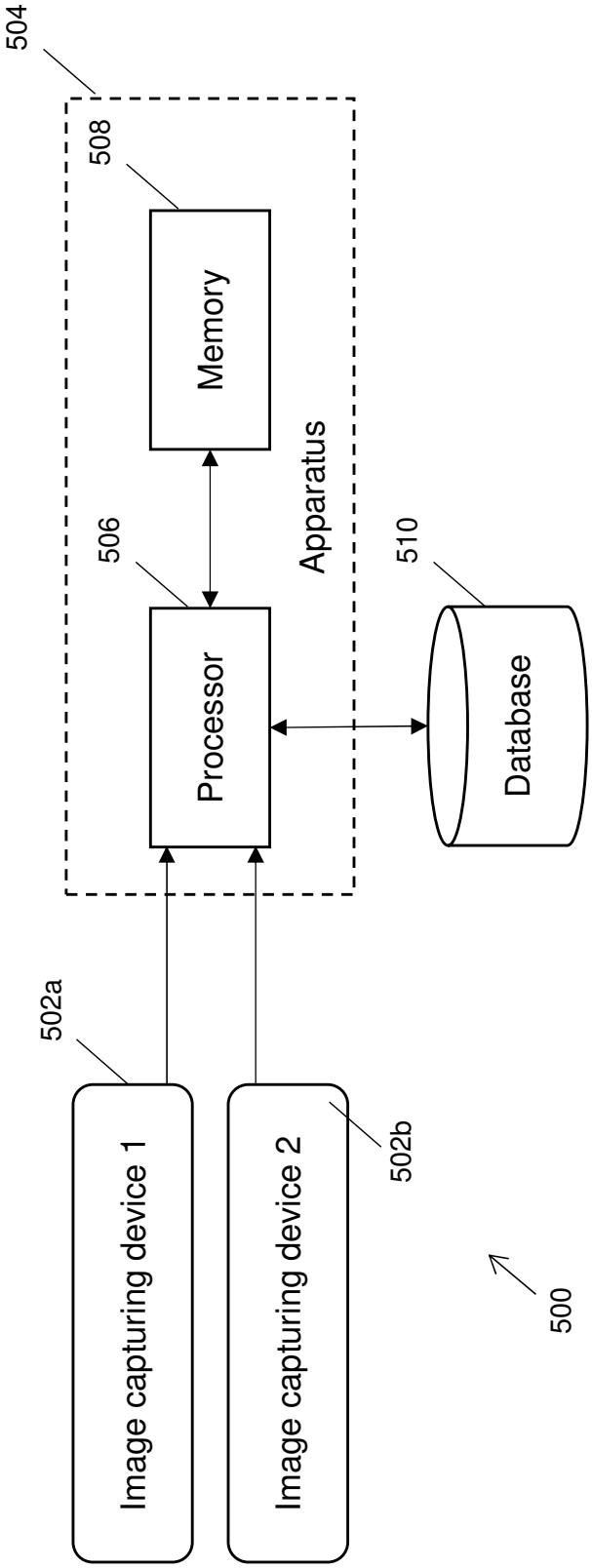

504
508
Memory
Apparatus
506
510
Processor
Database
502a
Image capturing device 1
Image capturing device 2
502b
500

Figure 5

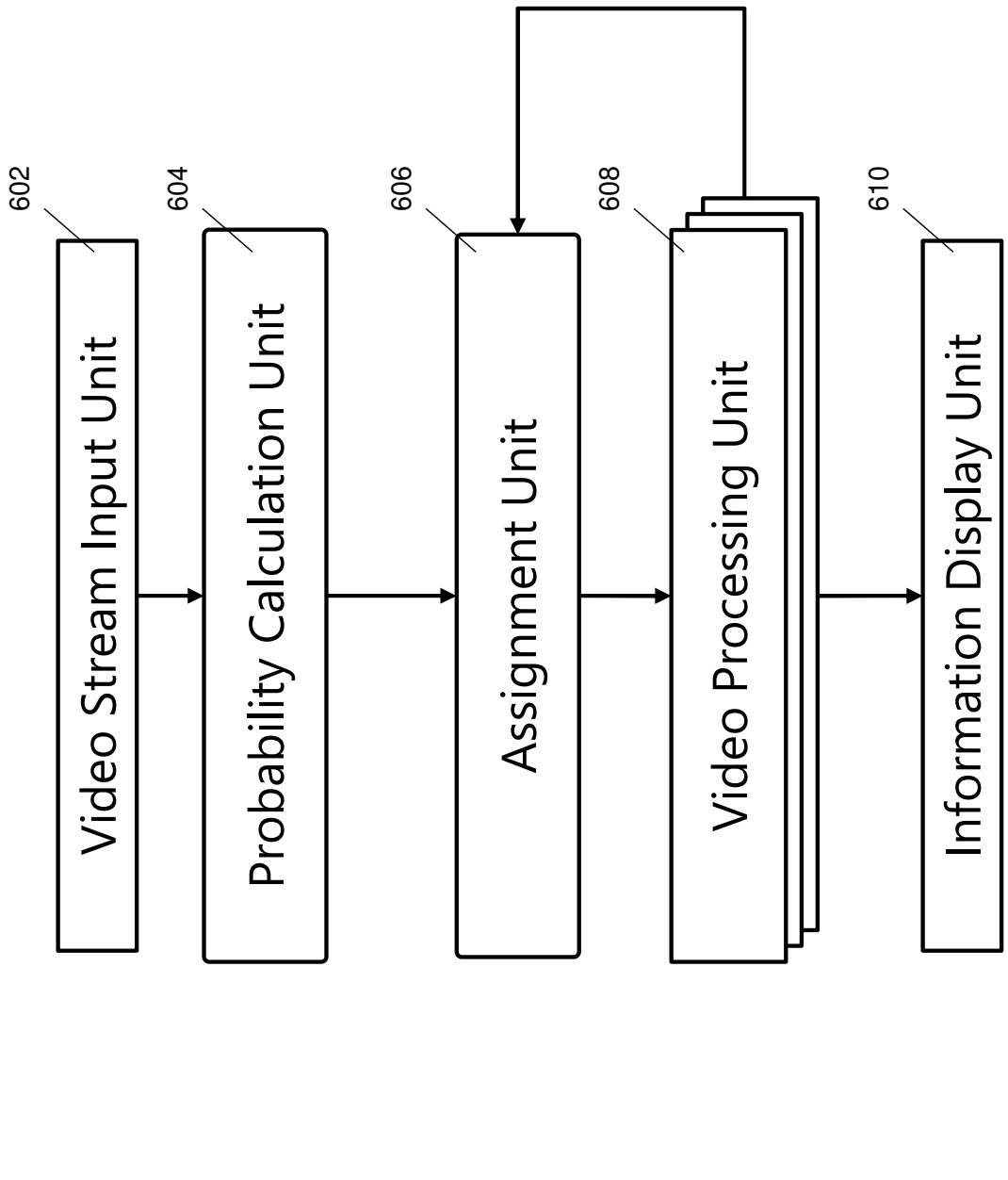

602
Video Stream Input Unit
604
Probability Calculation Unit
606
Assignment Unit
608
Video Processing Unit
610
Information Display Unit
600

Figure 6

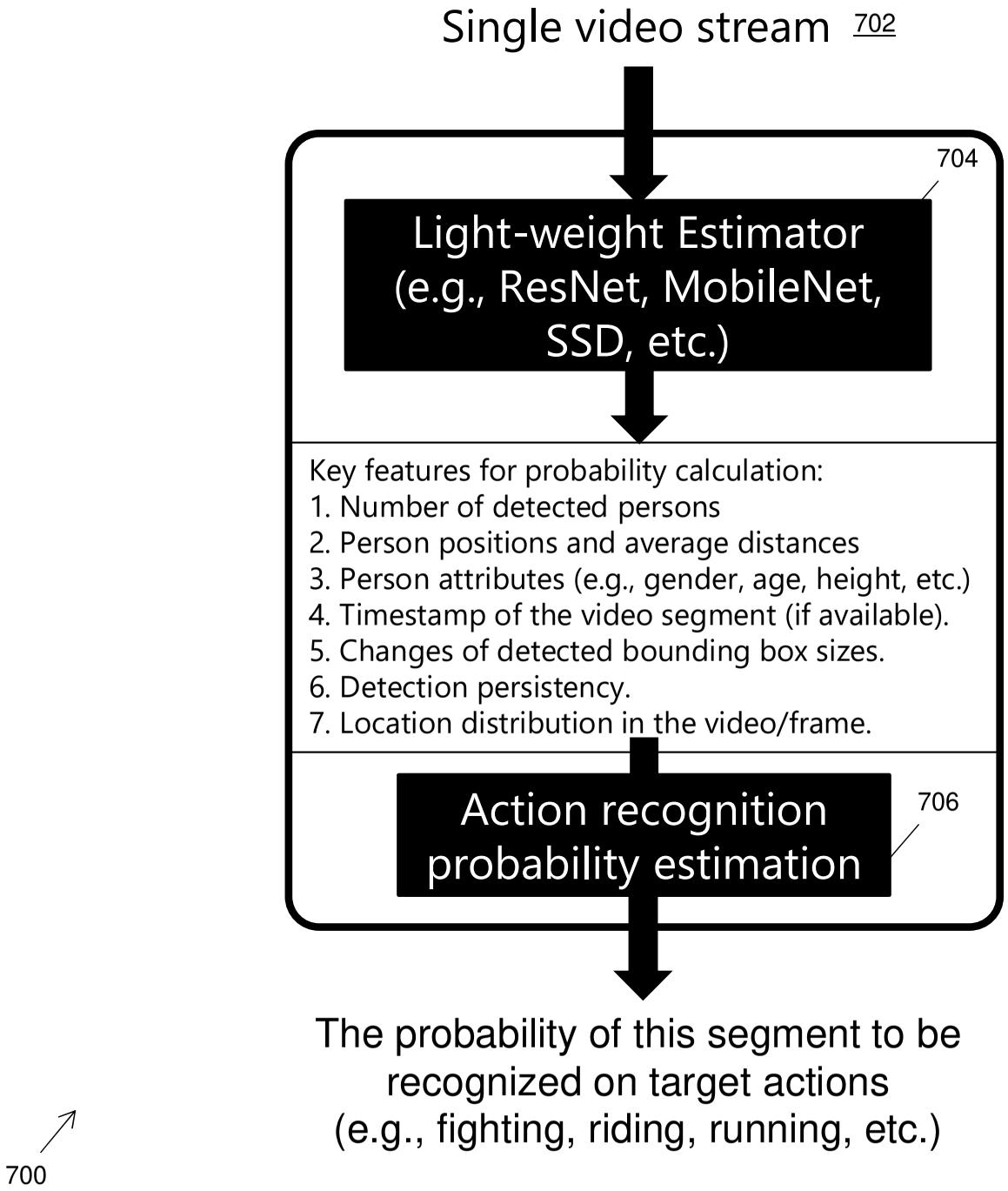

Single video stream 702
704
Light-weight Estimator (e.g., ResNet, MobileNet, SSD, etc.)
Key features for probability calculation:
1. Number of detected persons
2. Person positions and average distances
3. Person attributes (e.g., gender, age, height, etc.)
4. Timestamp of the video segment (if available).
5. Changes of detected bounding box sizes.
6. Detection persistency.
7. Location distribution in the video/frame.
Action recognition probability estimation
706
The probability of this segment to be recognized on target actions (e.g., fighting, riding, running, etc.)
700

Figure 7

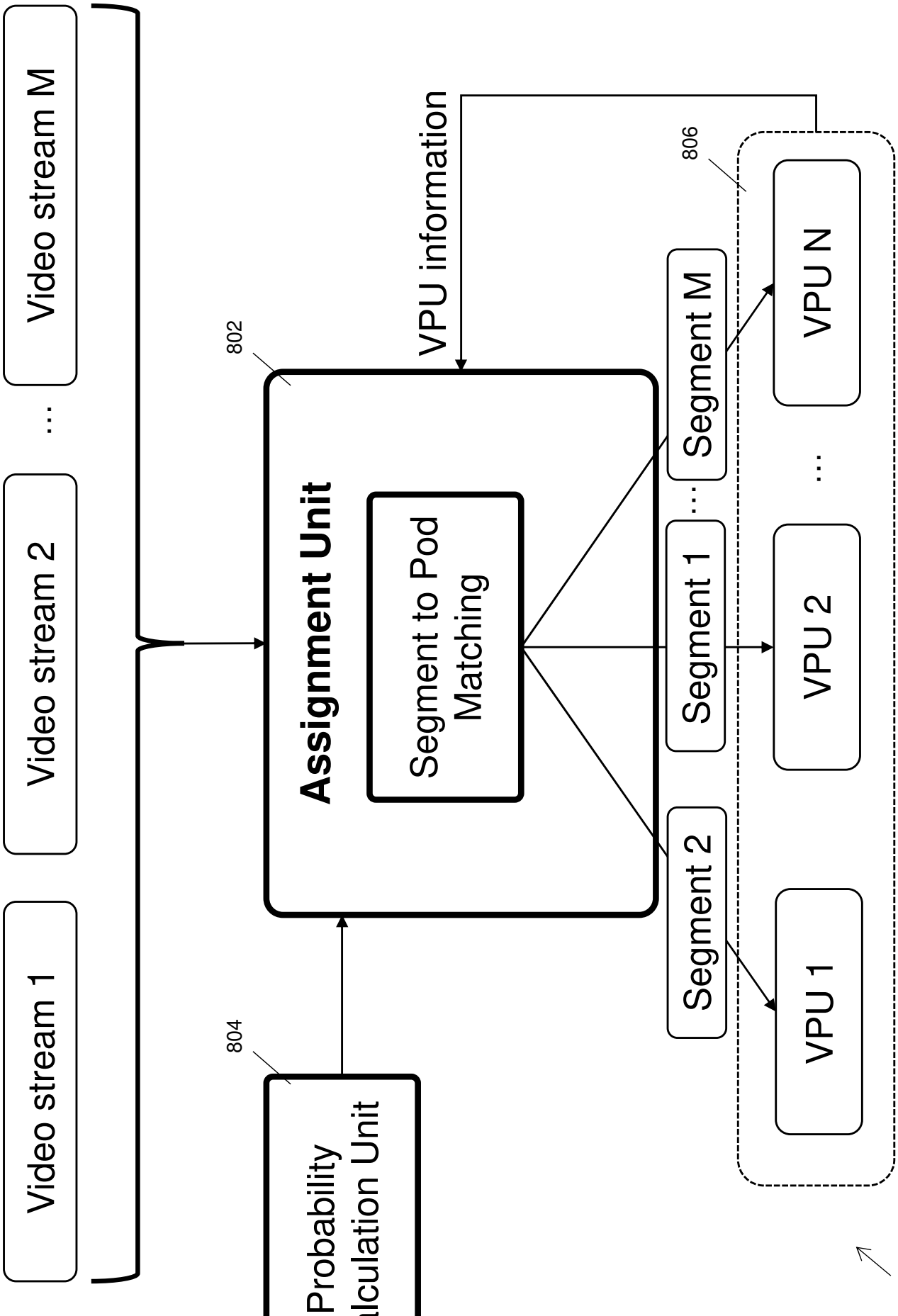

Video stream M
...
Video stream 2
Video stream 1
802
Assignment Unit
Segment to Pod Matching
VPU information
806
Segment M
...
Segment 1
Segment 2
VPU N
...
VPU 2
VPU 1
804
Probability Calculation Unit
800

Figure 8

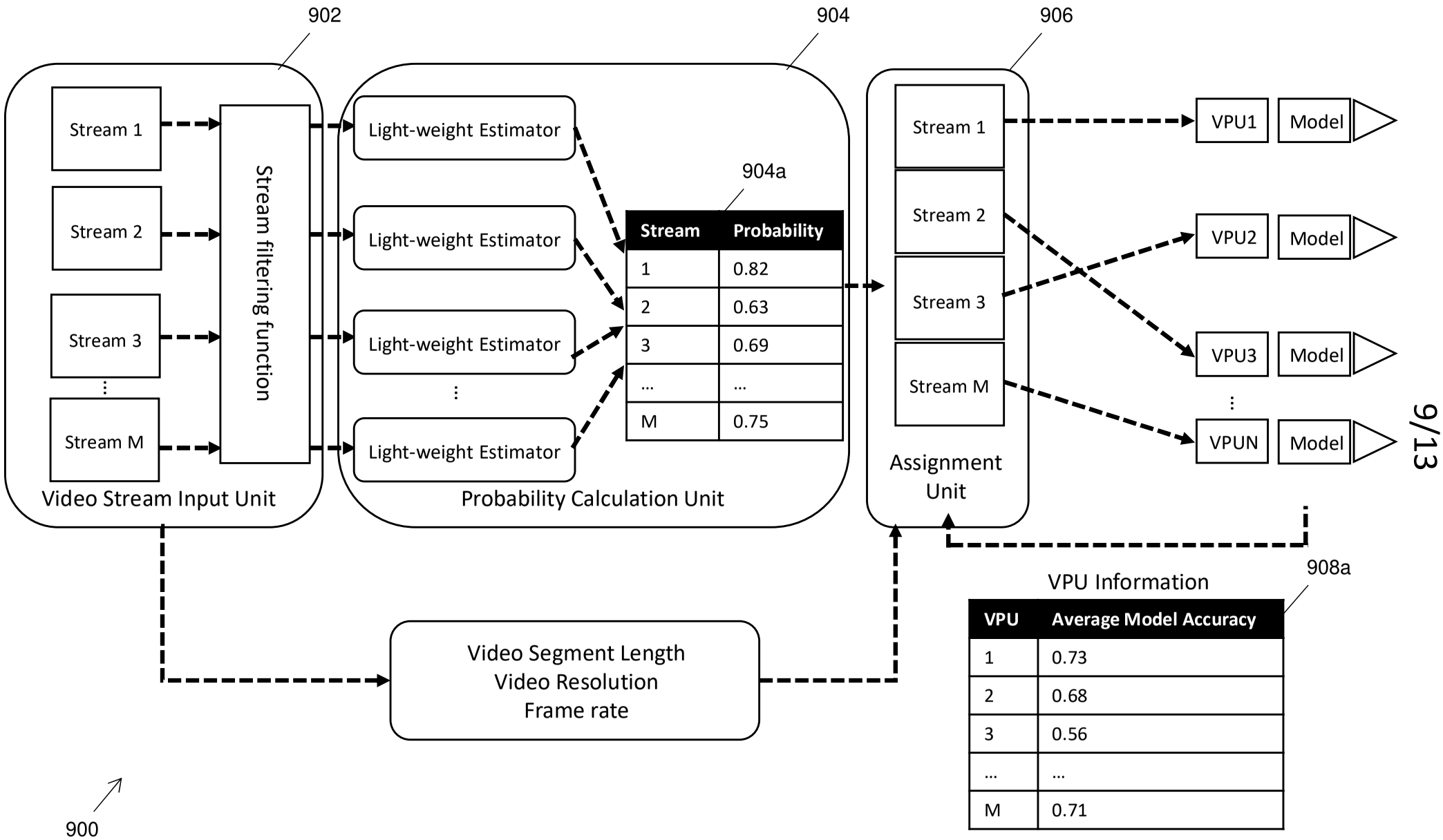

902
904
906
Stream 1
Stream 2
Stream 3
Stream M
Stream filtering function
Video Stream Input Unit
Light-weight Estimator
Light-weight Estimator
Light-weight Estimator
Light-weight Estimator
904a
Stream
Probability
1
0.82
2
0.63
3
0.69
...
...
M
0.75
Probability Calculation Unit
Stream 1
Stream 2
Stream 3
Stream M
Assignment Unit
VPU1
Model
VPU2
Model
VPU3
Model
VPUN
Model
9/13
Video Segment Length
Video Resolution
Frame rate
VPU Information
908a
VPU
Average Model Accuracy
1
0.73
2
0.68
3
0.56
...
...
M
0.71
900

Figure 9


VPU 1
VPU 2
VPU N
Markov Decision Process
Stream 1
Stream 2
Steam M
1000

Figure 10

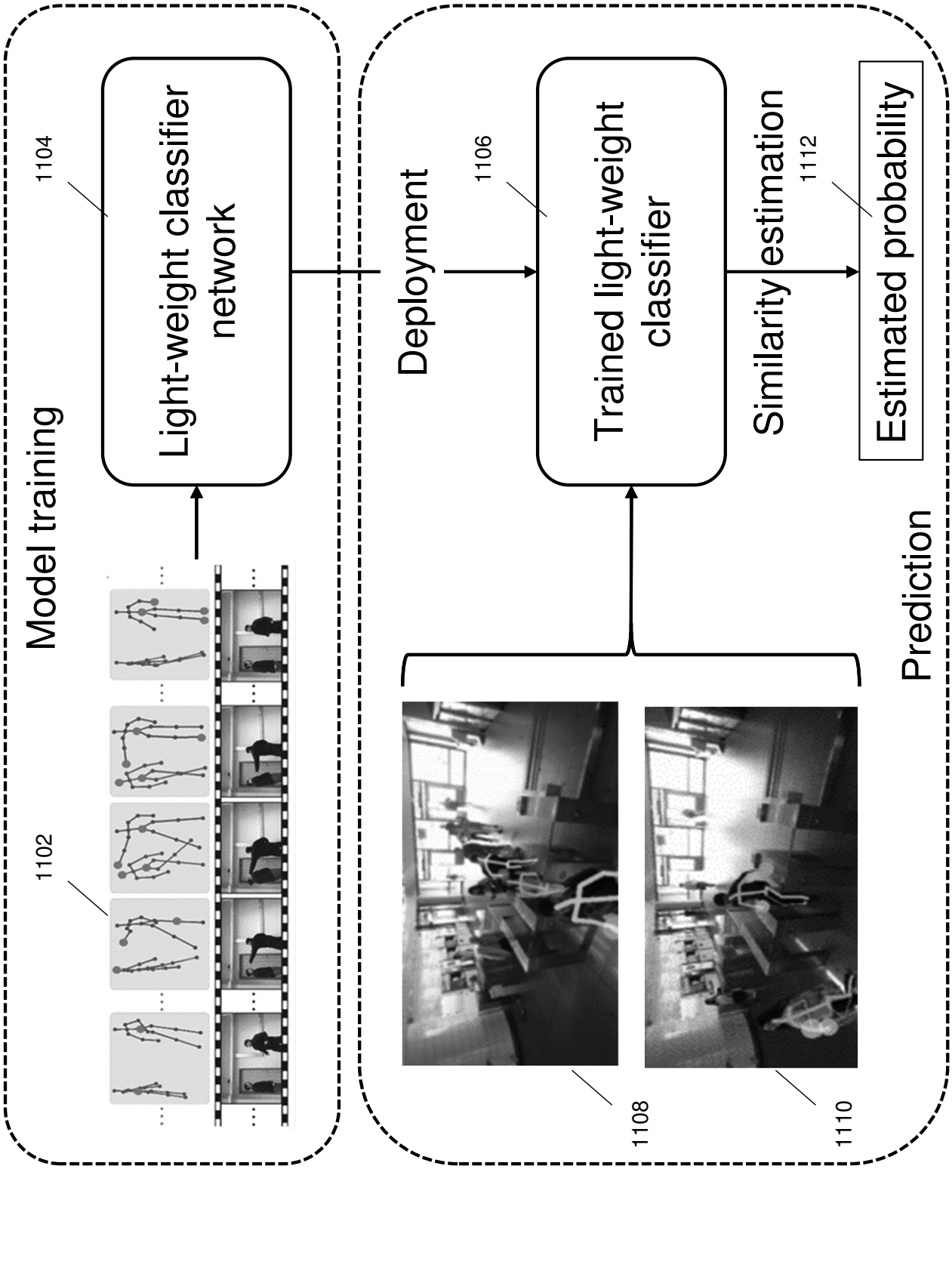

Model training
1104
Light-weight classifier network
1102
Deployment
1106
Trained light-weight classifier
Similarity estimation
1112
Estimated probability
Prediction
1108
1110
1100

Figure 11

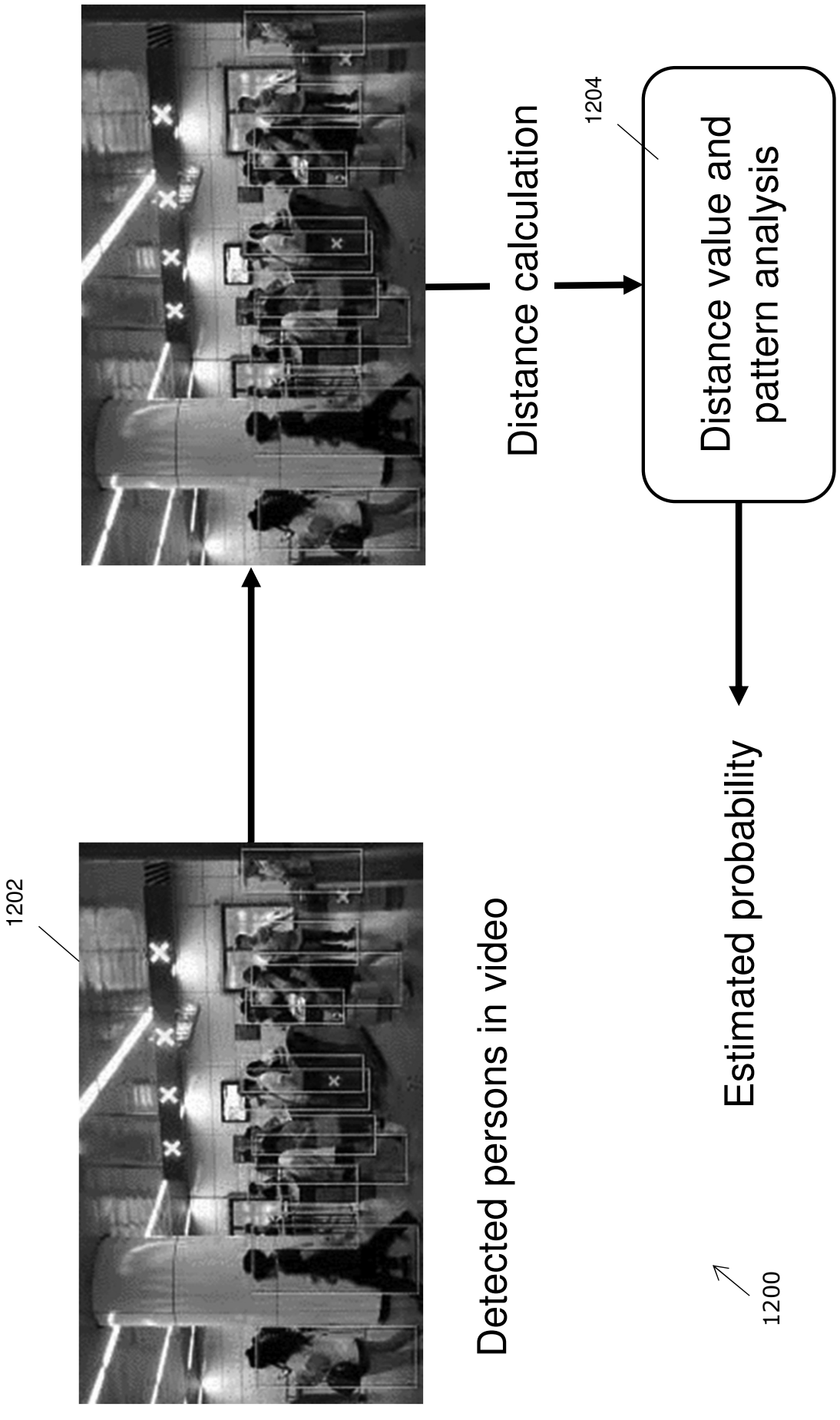

1202
Detected persons in video
Distance calculation
1204
Distance value and pattern analysis
Estimated probability
1200

Figure 12

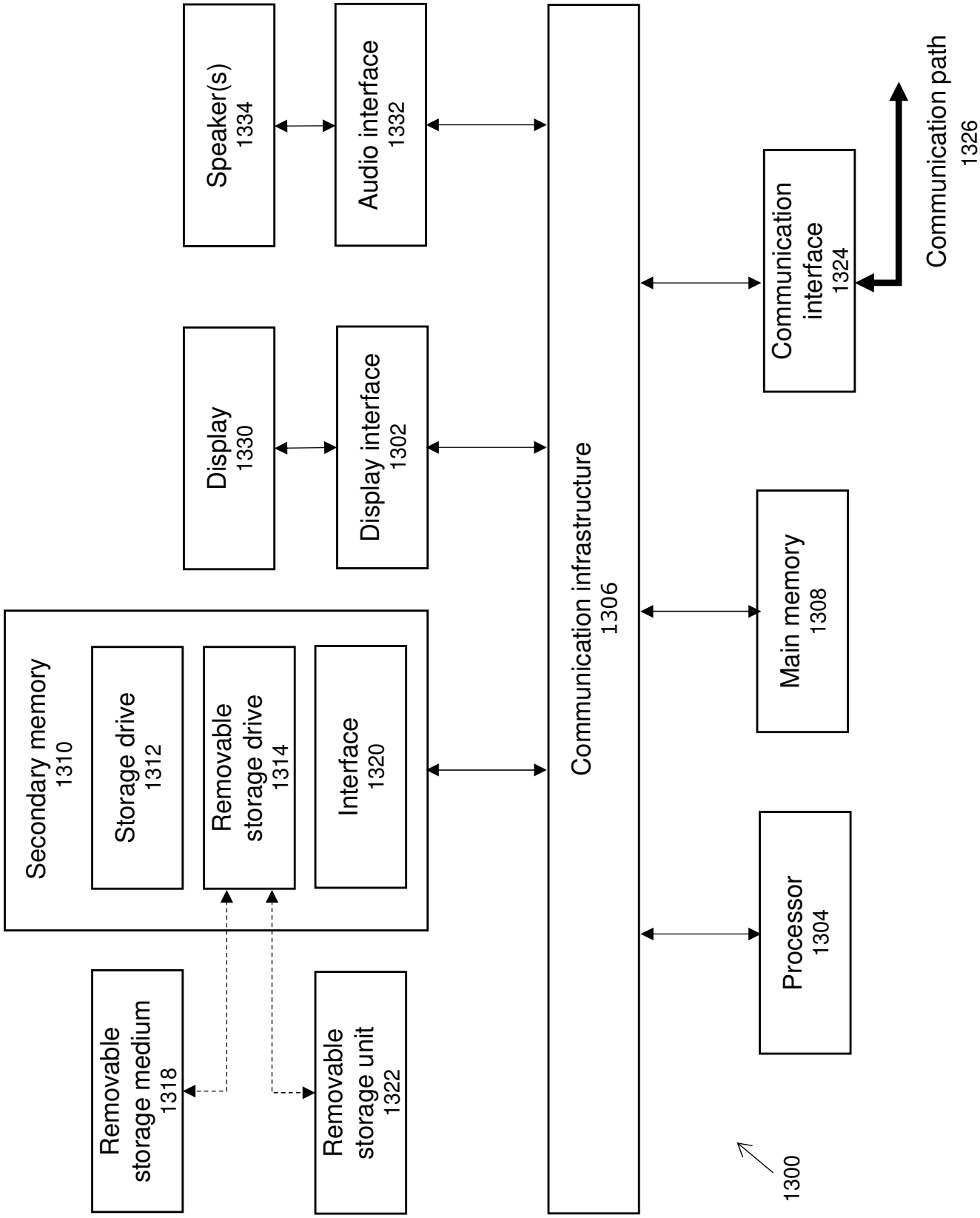

Speaker(s)
1334
Audio interface
1332
Display
1330
Display interface
1302
Secondary memory
1310
Storage drive
1312
Removable
storage drive
1314
Interface
1320
Communication infrastructure
1306
Communication
interface
1324
Communication path
1326
Main memory
1308
Removable
storage medium
1318
Removable
storage unit
1322
Processor
1304
1300

Figure 13