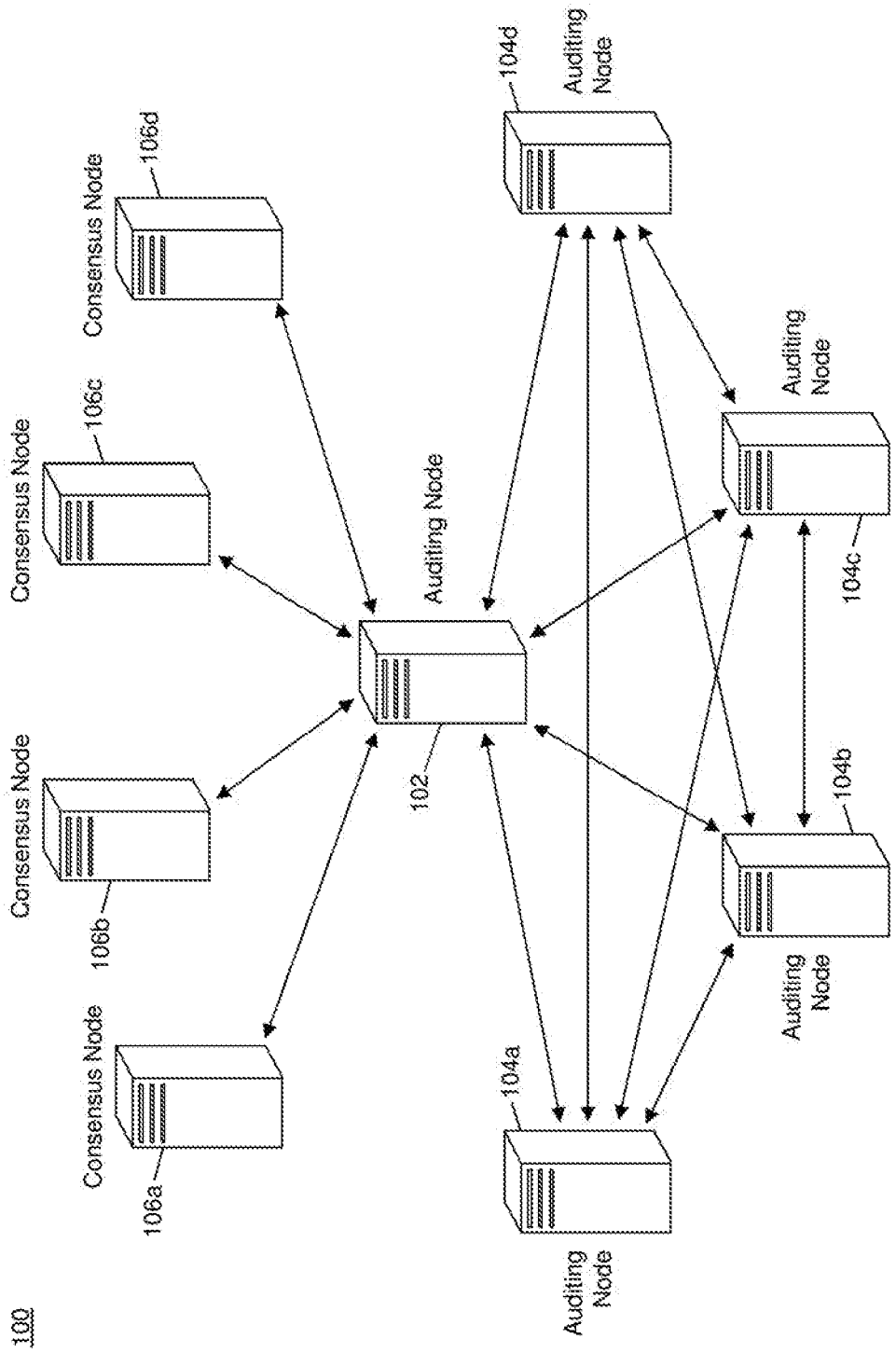

100
Consensus Node
106a
Consensus Node
106b
Consensus Node
106c
Consensus Node
106d
Auditing Node
102
Auditing Node
104a
Auditing Node
104b
Auditing Node
104c
Auditing Node
104d

FIG. 1

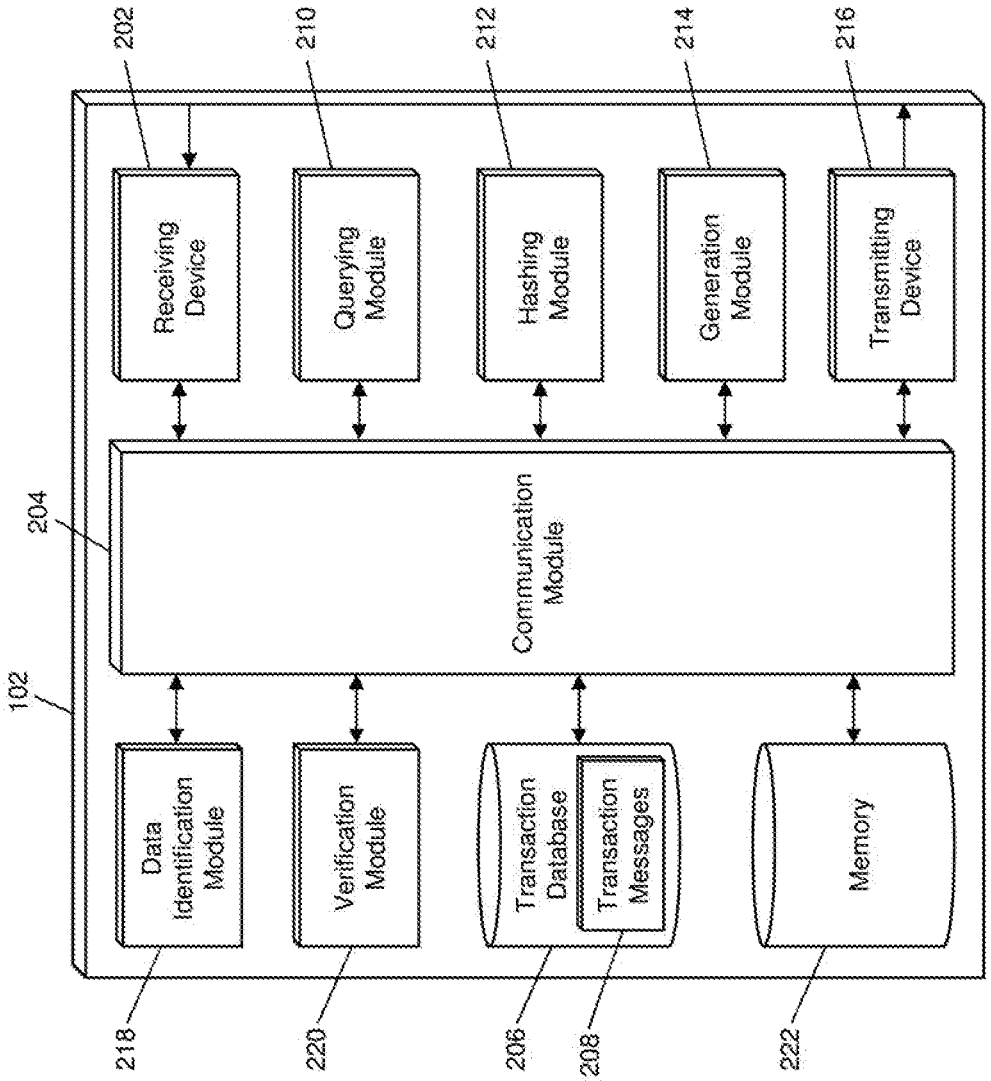

202
210
212
214
216
Receiving Device
Querying Module
Hashing Module
Generation Module
Transmitting Device
204
Communication Module
102
Data Identification Module
Verification Module
Transaction Database
Transaction Messages
Memory
218
220
206
208
222

FIG. 2

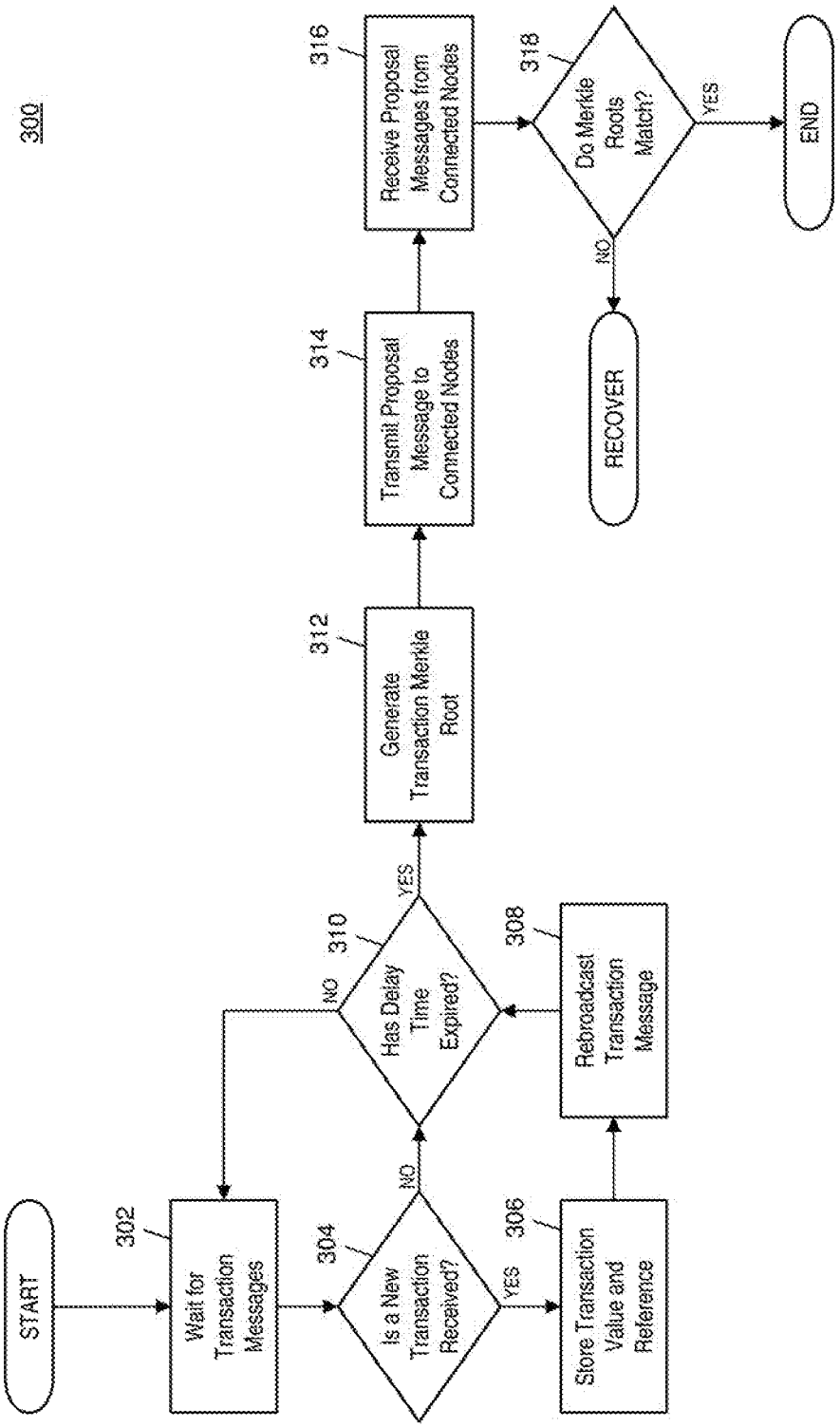

300
START
302
Wait for Transaction Messages
304
Is a New Transaction Received?
NO
YES
306
Store Transaction Value and Reference
308
Rebroadcast Transaction Message
310
Has Delay Time Expired?
NO
YES
312
Generate Transaction Merkle Root
314
Transmit Proposal Message to Connected Nodes
316
Receive Proposal Messages from Connected Nodes
318
Do Merkle Roots Match?
YES
NO
END
RECOVER

FIG. 3

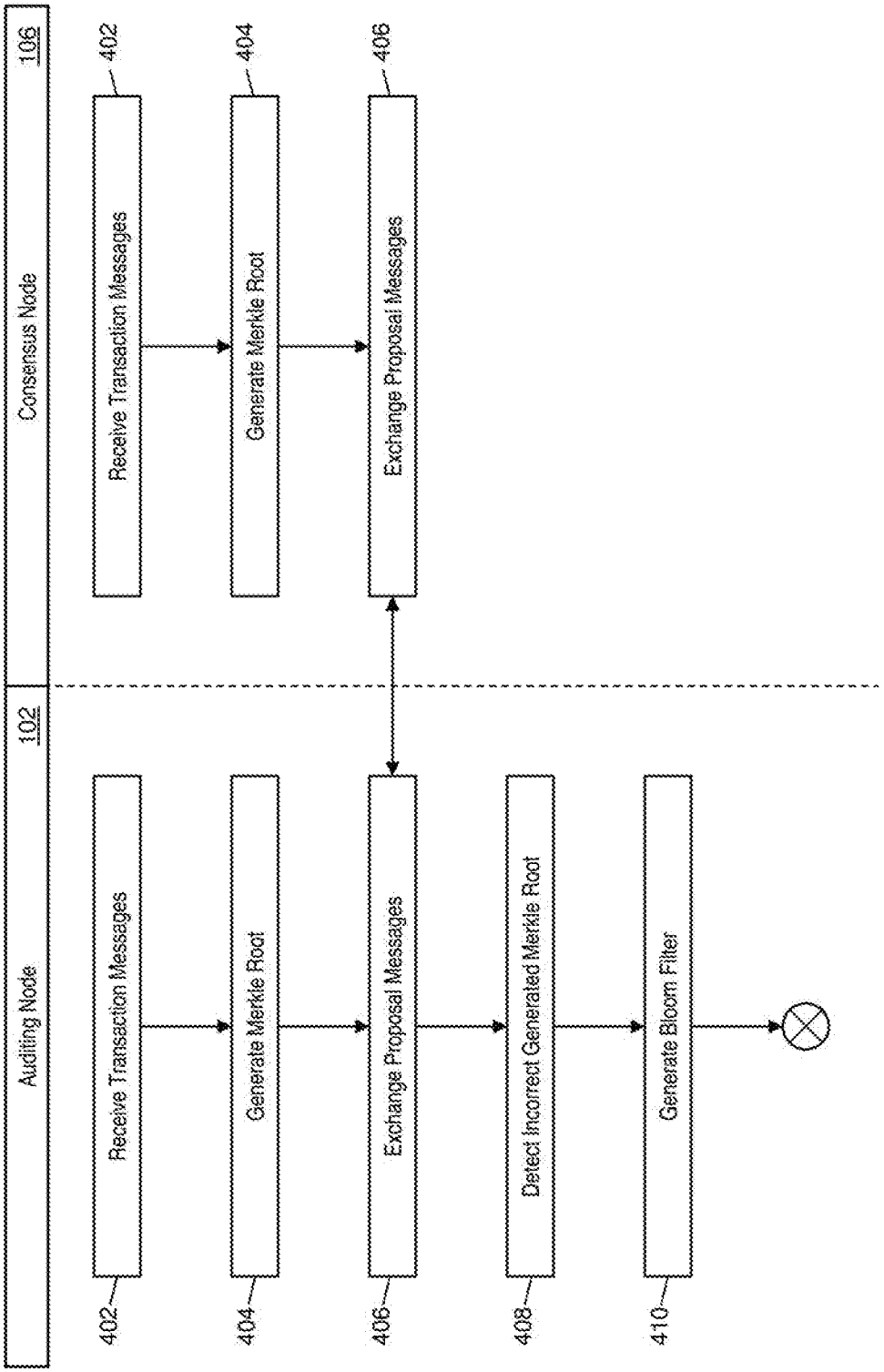

Auditing Node
102
Consensus Node
106
Receive Transaction Messages
Generate Merkle Root
Exchange Proposal Messages
Detect Incorrect Generated Merkle Root
Generate Bloom Filter
402
404
406
408
410

FIG. 4A

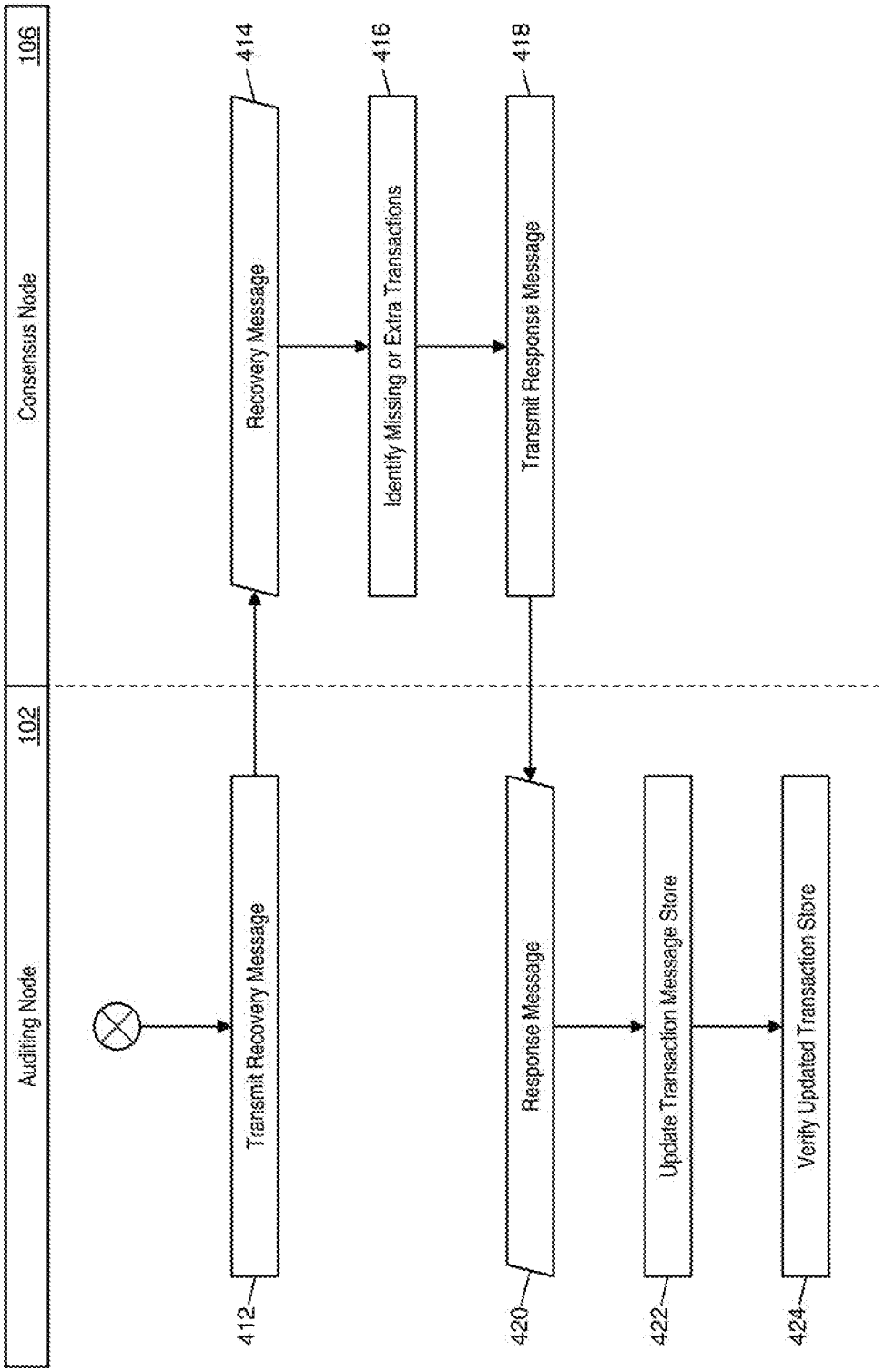

Auditing Node
102
Consensus Node
106
Transmit Recovery Message
412
Recovery Message
414
Identify Missing or Extra Transactions
416
Transmit Response Message
418
Response Message
420
Update Transaction Message Store
422
Verify Updated Transaction Store
424

FIG. 4B

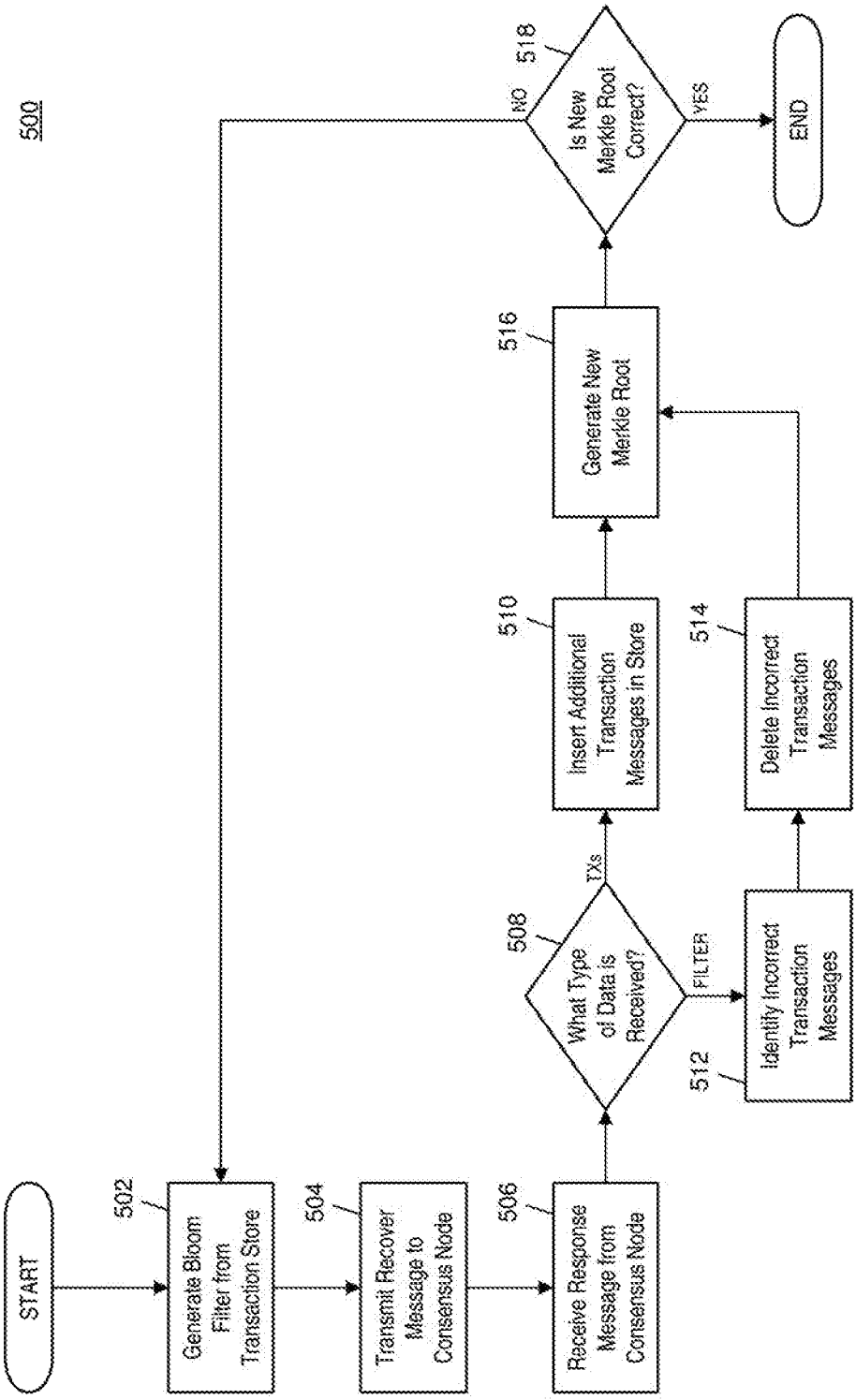

500
START
502
Generate Bloom Filter from Transaction Store
504
Transmit Recover Message to Consensus Node
506
Receive Response Message from Consensus Node
508
What Type of Data is Received?
TXs
FILTER
510
Insert Additional Transaction Messages in Store
512
Identify Incorrect Transaction Messages
514
Delete Incorrect Transaction Messages
516
Generate New Merkle Root
518
Is New Merkle Root Correct?
NO
YES
END

FIG. 5

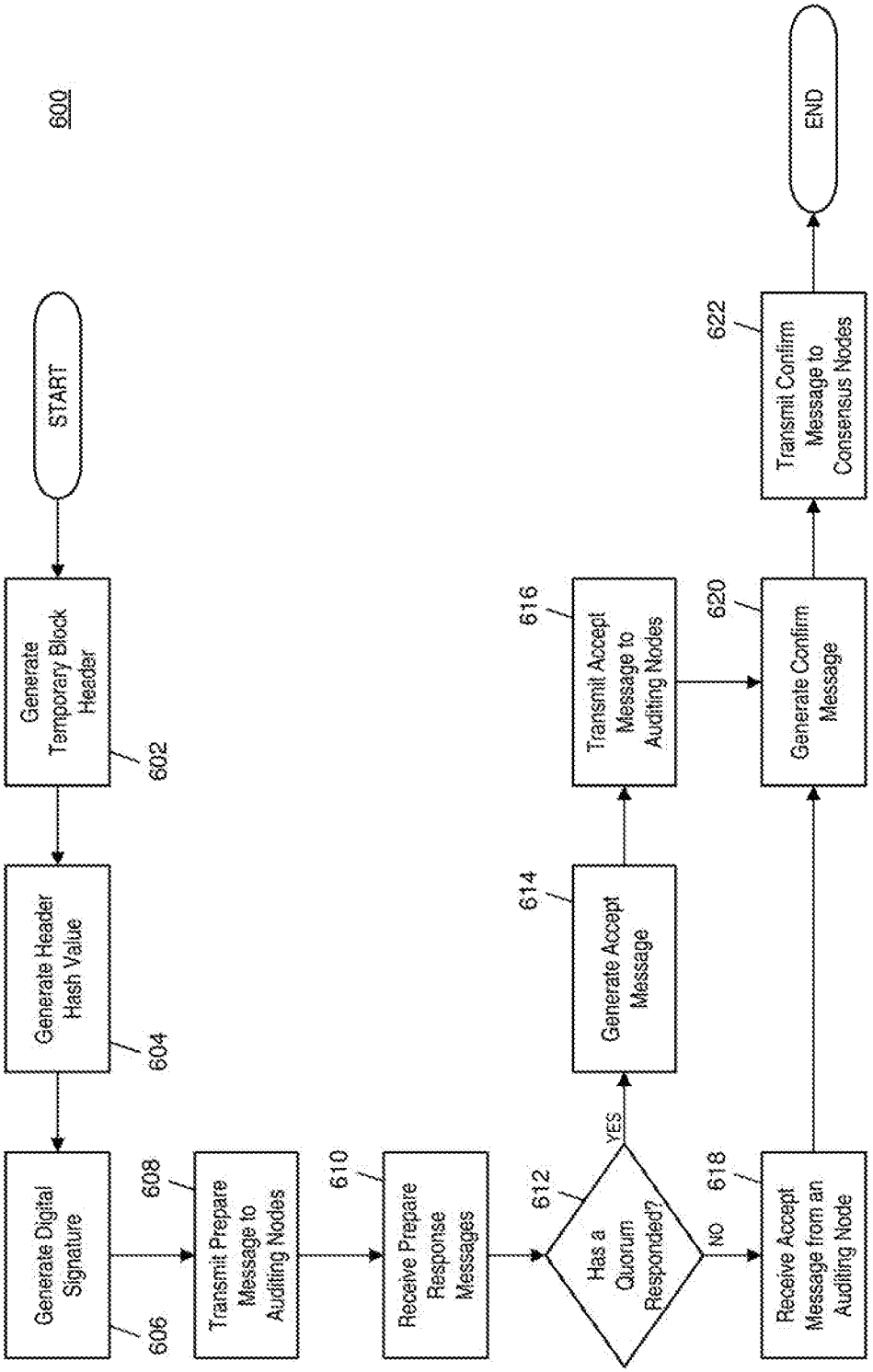

600
START
Generate Temporary Block Header
602
Generate Header Hash Value
604
Generate Digital Signature
606
608
Transmit Prepare Message to Auditing Nodes
610
Receive Prepare Response Messages
612
Has a Quorum Responded?
YES
NO
614
Generate Accept Message
616
Transmit Accept Message to Auditing Nodes
618
Receive Accept Message from an Auditing Node
620
Generate Confirm Message
622
Transmit Confirm Message to Consensus Nodes
END

FIG. 6

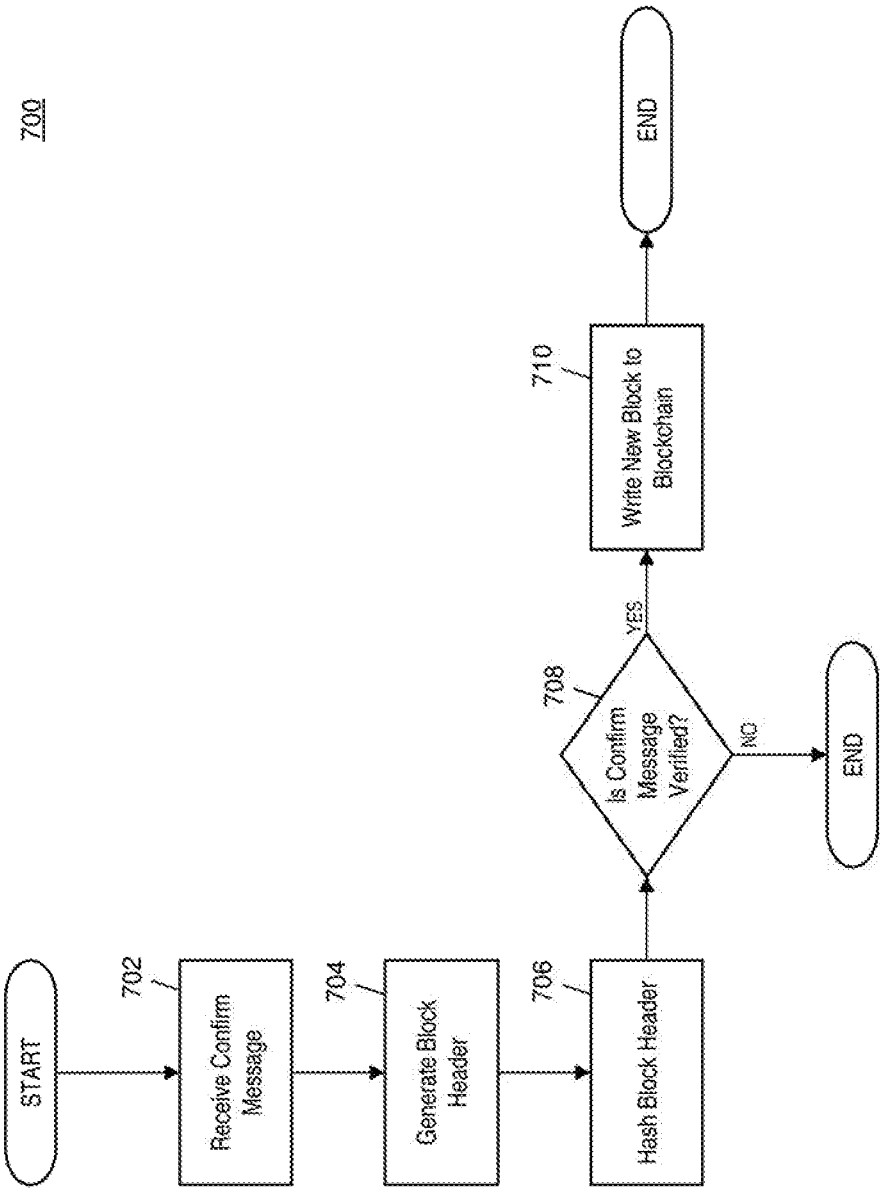

700
START
702
Receive Confirm Message
704
Generate Block Header
706
Hash Block Header
708
Is Confirm Message Verified?
YES
NO
END
710
Write New Block to Blockchain
END

FIG. 7

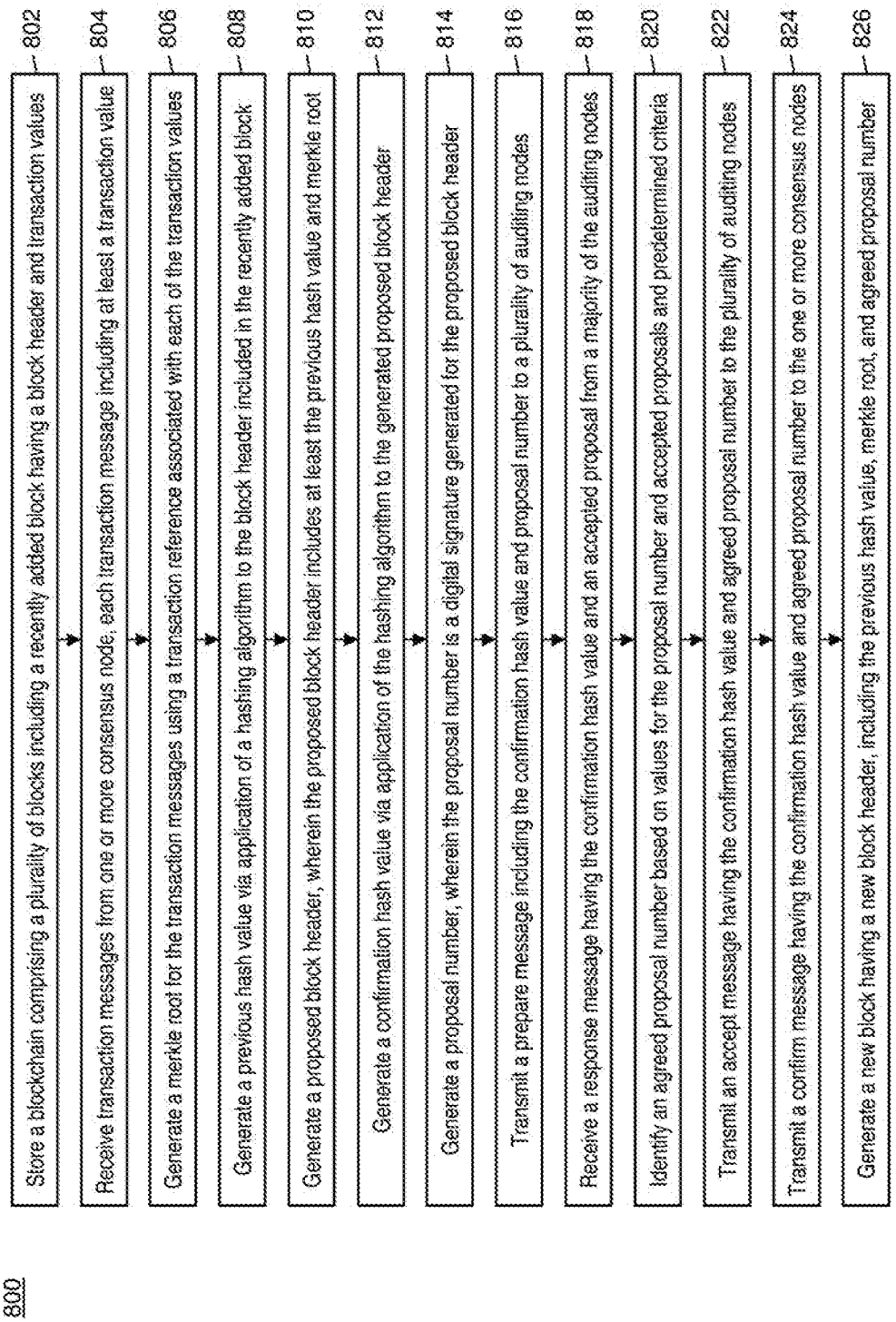

800
Store a blockchain comprising a plurality of blocks including a recently added block having a block header and transaction values
802
Receive transaction messages from one or more consensus node, each transaction message including at least a transaction value
804
Generate a merkle root for the transaction messages using a transaction reference associated with each of the transaction values
806
Generate a previous hash value via application of a hashing algorithm to the block header included in the recently added block
808
Generate a proposed block header, wherein the proposed block header includes at least the previous hash value and merkle root
810
Generate a confirmation hash value via application of the hashing algorithm to the generated proposed block header
812
Generate a proposal number, wherein the proposal number is a digital signature generated for the proposed block header
814
Transmit a prepare message including the confirmation hash value and proposal number to a plurality of auditing nodes
816
Receive a response message having the confirmation hash value and an accepted proposal from a majority of the auditing nodes
818
Identify an agreed proposal number based on values for the proposal number and accepted proposals and predetermined criteria
820
Transmit an accept message having the confirmation hash value and agreed proposal number to the plurality of auditing nodes
822
Transmit a confirm message having the confirmation hash value and agreed proposal number to the one or more consensus nodes
824
Generate a new block having a new block header, including the previous hash value, merkle root, and agreed proposal number
826

FIG. 8

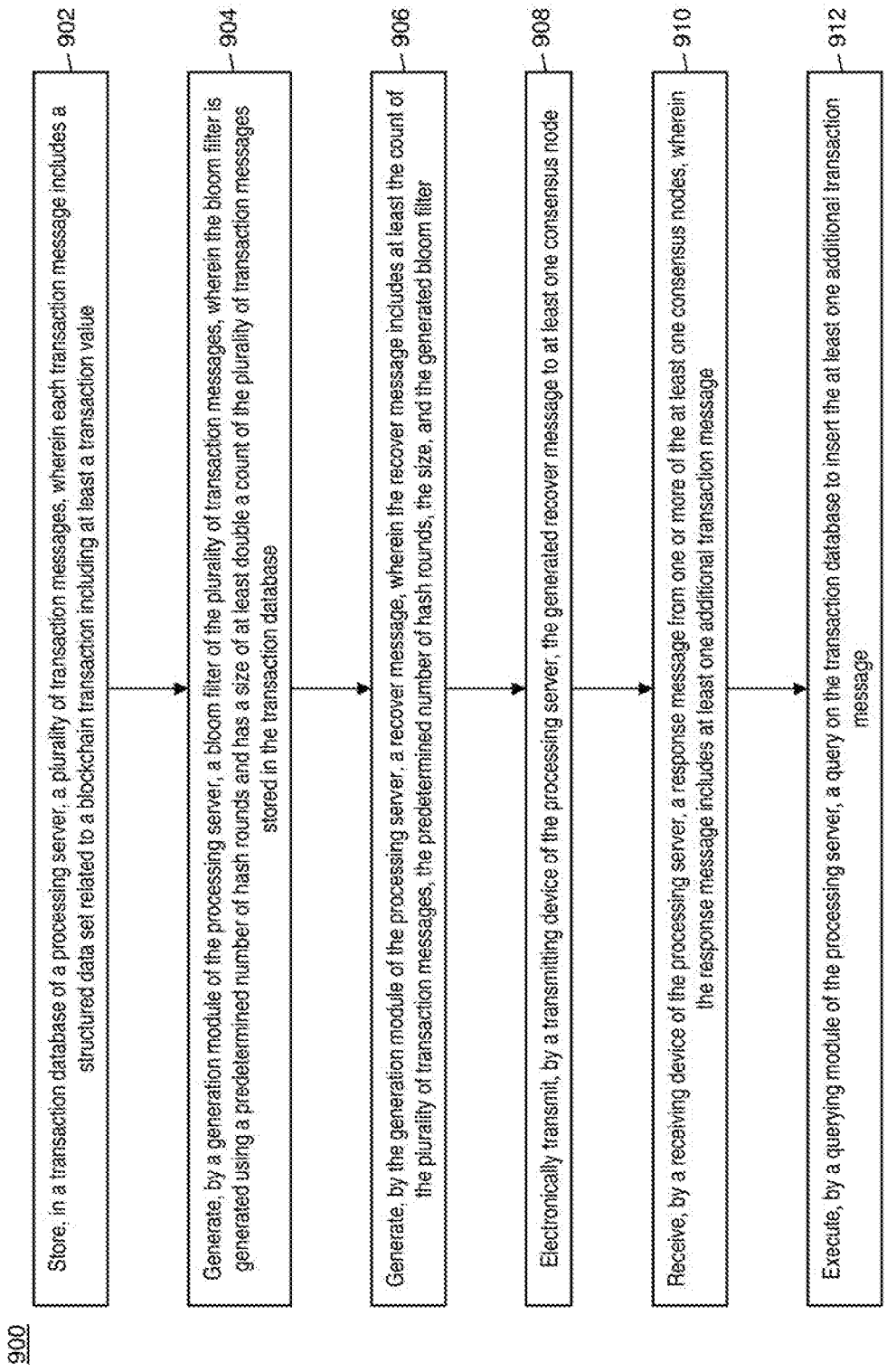

900
902
Store, in a transaction database of a processing server, a plurality of transaction messages, wherein each transaction message includes a structured data set related to a blockchain transaction including at least a transaction value
904
Generate, by a generation module of the processing server, a bloom filter of the plurality of transaction messages, wherein the bloom filter is generated using a predetermined number of hash rounds and has a size of at least double a count of the plurality of transaction messages stored in the transaction database
906
Generate, by the generation module of the processing server, a recover message, wherein the recover message includes at least the count of the plurality of transaction messages, the predetermined number of hash rounds, the size, and the generated bloom filter
908
Electronically transmit, by a transmitting device of the processing server, the generated recover message to at least one consensus node
910
Receive, by a receiving device of the processing server, a response message from one or more of the at least one consensus nodes, wherein the response message includes at least one additional transaction message
912
Execute, by a querying module of the processing server, a query on the transaction database to insert the at least one additional transaction message

FIG. 9

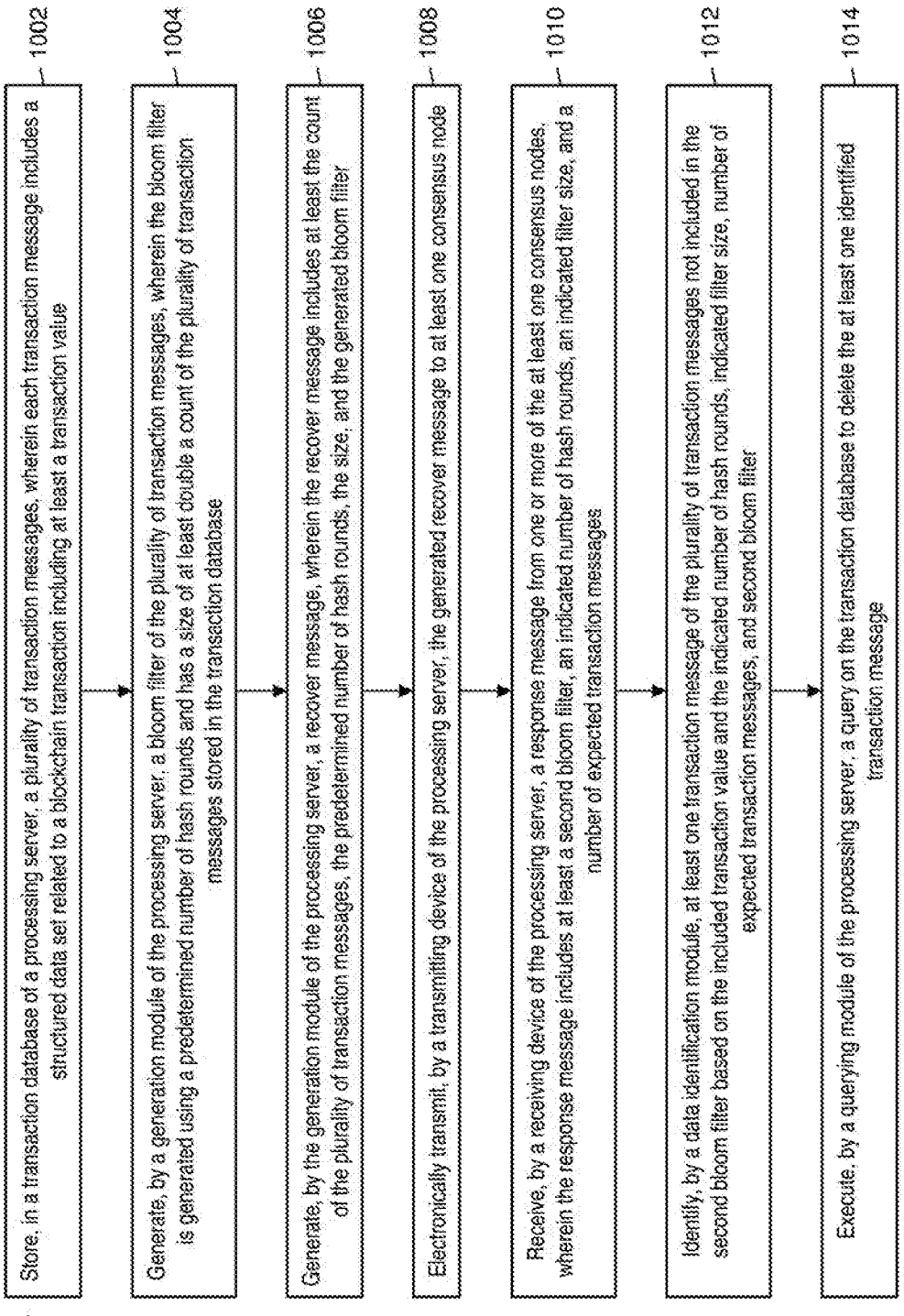

1000
Store, in a transaction database of a processing server, a plurality of transaction messages, wherein each transaction message includes a structured data set related to a blockchain transaction including at least a transaction value
1002
Generate, by a generation module of the processing server, a bloom filter of the plurality of transaction messages, wherein the bloom filter is generated using a predetermined number of hash rounds and has a size of at least double a count of the plurality of transaction messages stored in the transaction database
1004
Generate, by the generation module of the processing server, a recover message, wherein the recover message includes at least the count of the plurality of transaction messages, the predetermined number of hash rounds, the size, and the generated bloom filter
1006
Electronically transmit, by a transmitting device of the processing server, the generated recover message to at least one consensus node
1008
Receive, by a receiving device of the processing server, a response message from one or more of the at least one consensus nodes, wherein the response message includes at least a second bloom filter, an indicated number of hash rounds, an indicated filter size, and a number of expected transaction messages
1010
Identify, by a data identification module, at least one transaction message of the plurality of transaction messages not included in the second bloom filter based on the included transaction value and the indicated number of hash rounds, indicated filter size, number of expected transaction messages, and second bloom filter
1012
Execute, by a querying module of the processing server, a query on the transaction database to delete the at least one identified transaction message
1014

FIG. 10

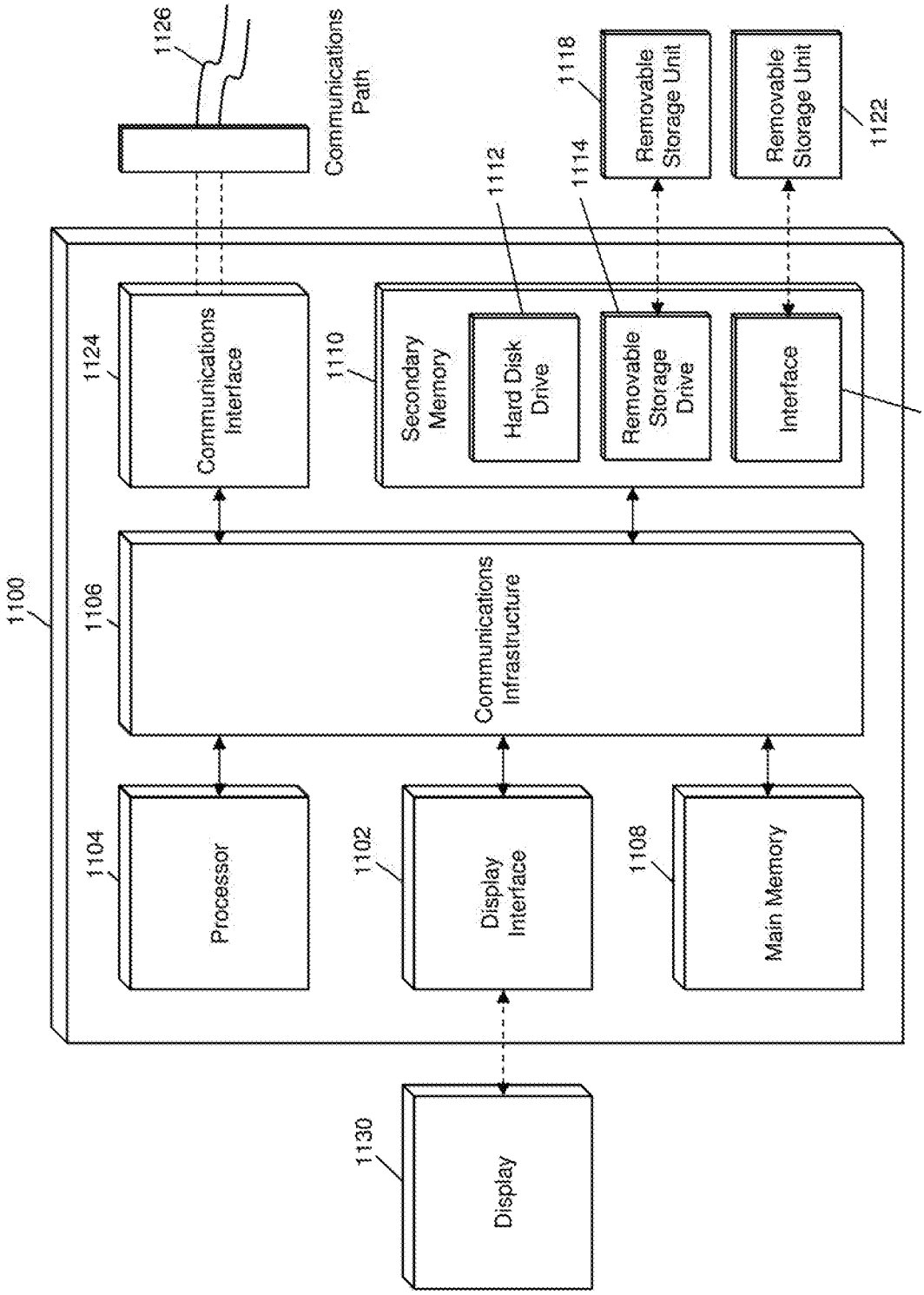

1126
Communications Path
1118
Removable Storage Unit
1122
Removable Storage Unit
1112
1114
1124
Communications Interface
1110
Secondary Memory
Hard Disk Drive
Removable Storage Drive
Interface
1120
1100
1106
Communications Infrastructure
1104
Processor
1102
Display Interface
1108
Main Memory
1130
Display

FIG. 11