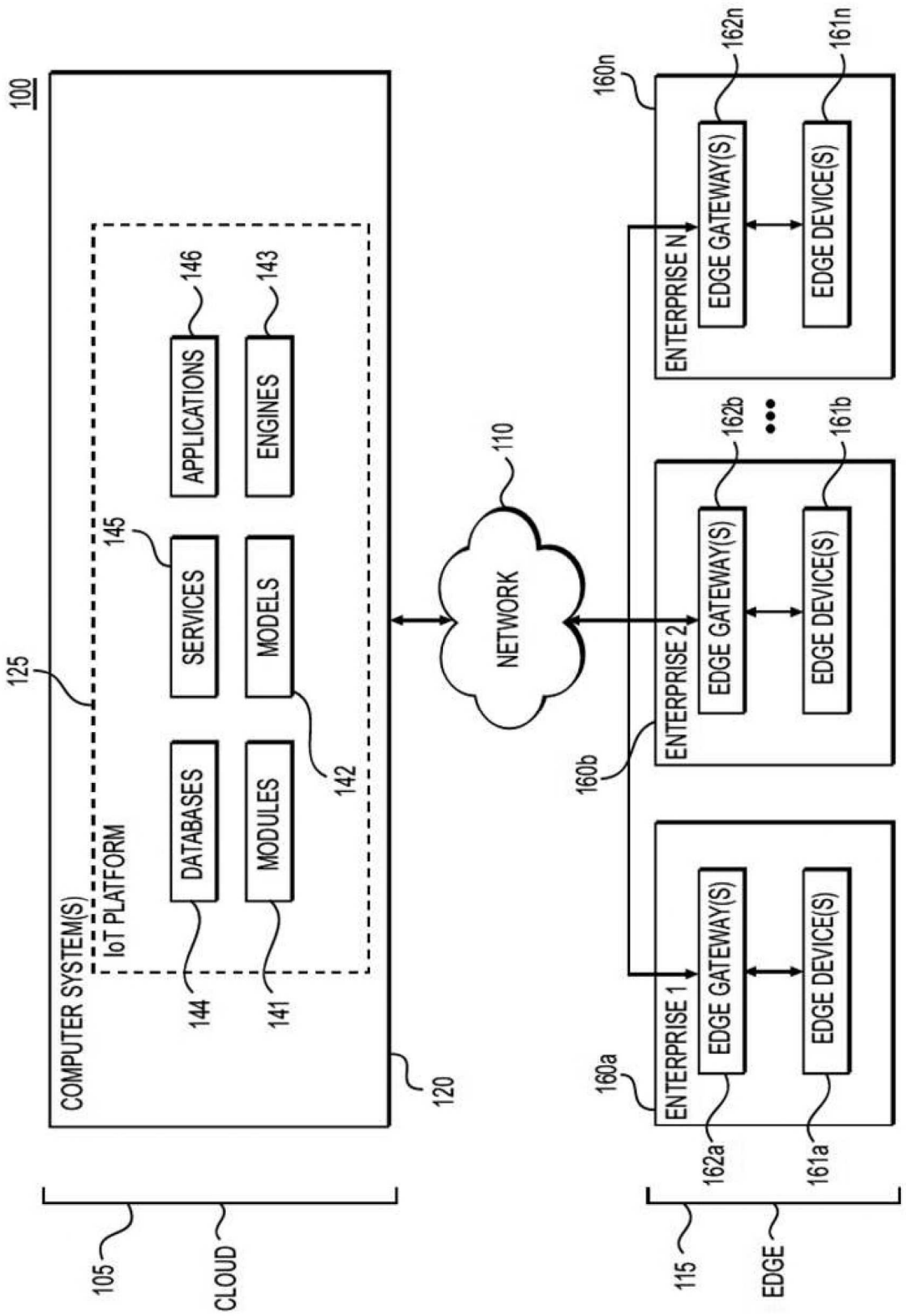

100
COMPUTER SYSTEM(S)
IoT PLATFORM
125
DATABASES
MODULES
SERVICES
MODELS
APPLICATIONS
ENGINES
144
141
145
142
146
143
120
NETWORK
110
105
CLOUD
115
EDGE
ENTERPRISE 1
EDGE GATEWAY(S)
EDGE DEVICE(S)
160a
162a
161a
ENTERPRISE 2
160b
162b
161b
ENTERPRISE N
160n
162n
161n

FIG. 1

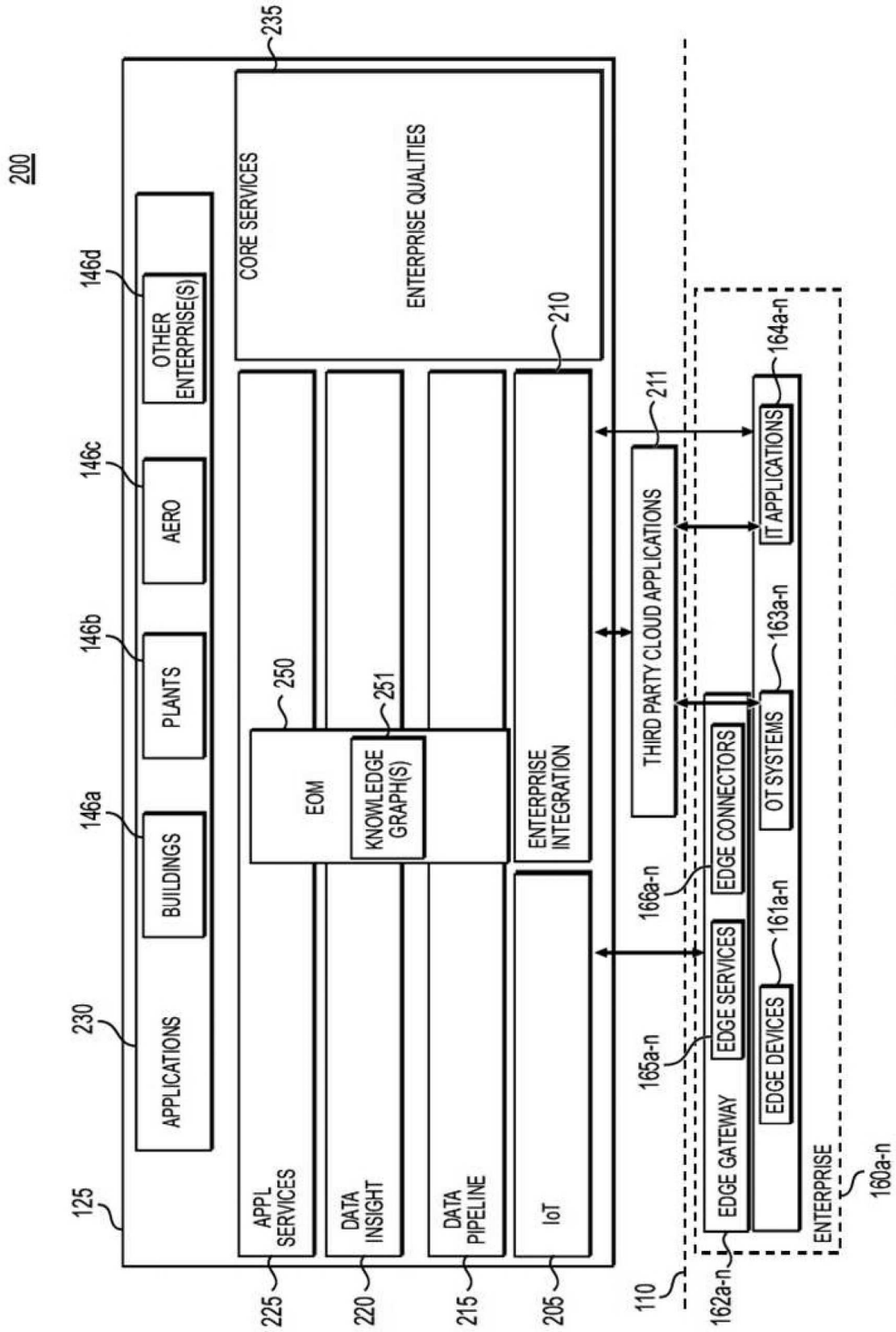

200
235
CORE SERVICES
ENTERPRISE QUALITIES
210
211
146d
OTHER ENTERPRISE(S)
146c
AERO
146b
PLANTS
146a
BUILDINGS
230
APPLICATIONS
125
250
EOM
251
KNOWLEDGE GRAPH(S)
ENTERPRISE INTEGRATION
THIRD PARTY CLOUD APPLICATIONS
166a-n
165a-n
APPL SERVICES
DATA INSIGHT
DATA PIPELINE
IoT
225
220
215
205
110
162a-n
EDGE GATEWAY
EDGE SERVICES
EDGE DEVICES
161a-n
EDGE CONNECTORS
OT SYSTEMS
163a-n
IT APPLICATIONS
164a-n
ENTERPRISE
160a-n

FIG. 2

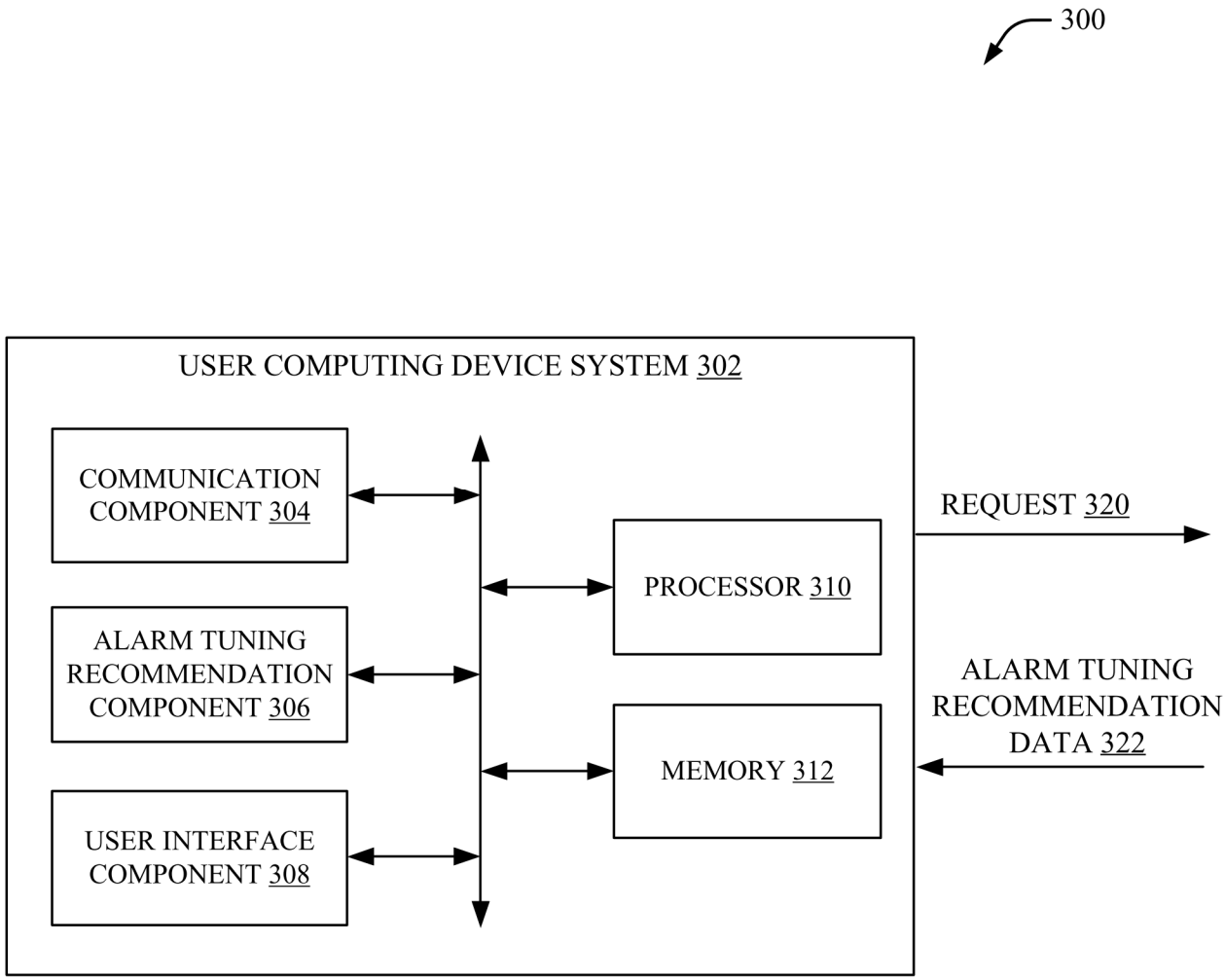

300
USER COMPUTING DEVICE SYSTEM 302
COMMUNICATION COMPONENT 304
ALARM TUNING RECOMMENDATION COMPONENT 306
USER INTERFACE COMPONENT 308
PROCESSOR 310
MEMORY 312
REQUEST 320
ALARM TUNING RECOMMENDATION DATA 322

FIG. 3

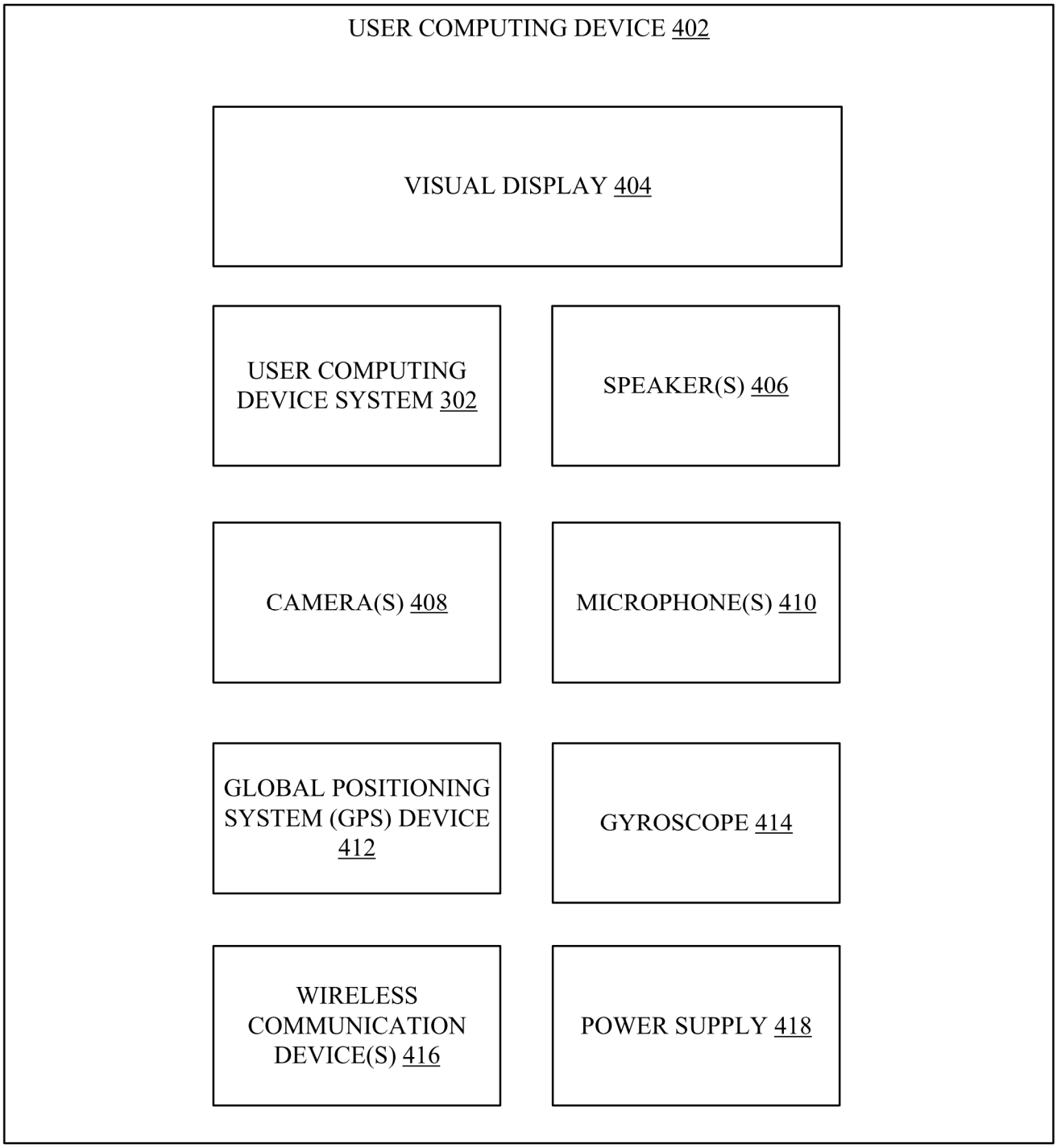

USER COMPUTING DEVICE 402
VISUAL DISPLAY 404
USER COMPUTING DEVICE SYSTEM 302
SPEAKER(S) 406
CAMERA(S) 408
MICROPHONE(S) 410
GLOBAL POSITIONING SYSTEM (GPS) DEVICE 412
GYROSCOPE 414
WIRELESS COMMUNICATION DEVICE(S) 416
POWER SUPPLY 418

FIG. 4

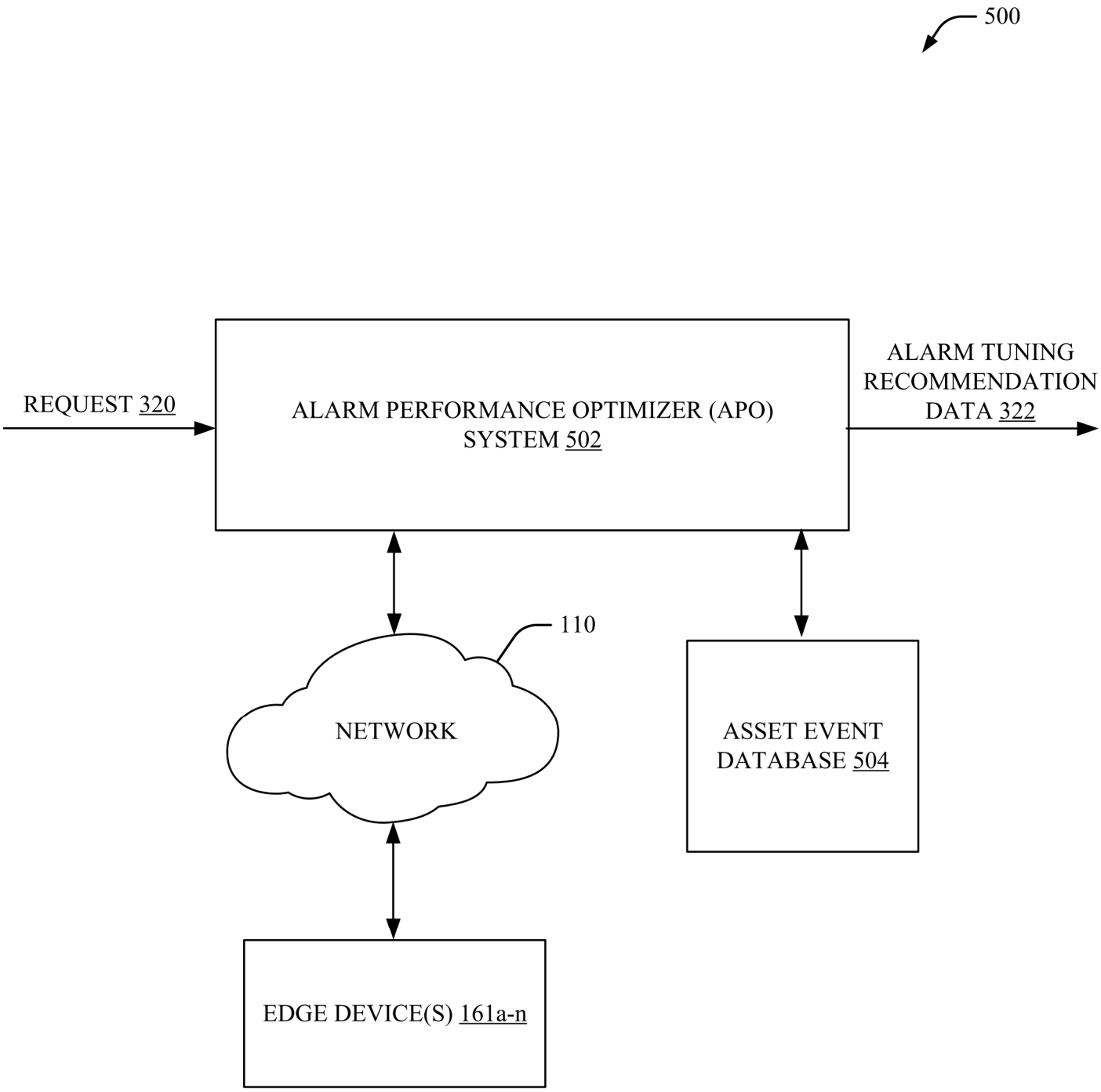

500
REQUEST 320
ALARM PERFORMANCE OPTIMIZER (APO) SYSTEM 502
ALARM TUNING RECOMMENDATION DATA 322
110
NETWORK
ASSET EVENT DATABASE 504
EDGE DEVICE(S) 161a-n

FIG. 5

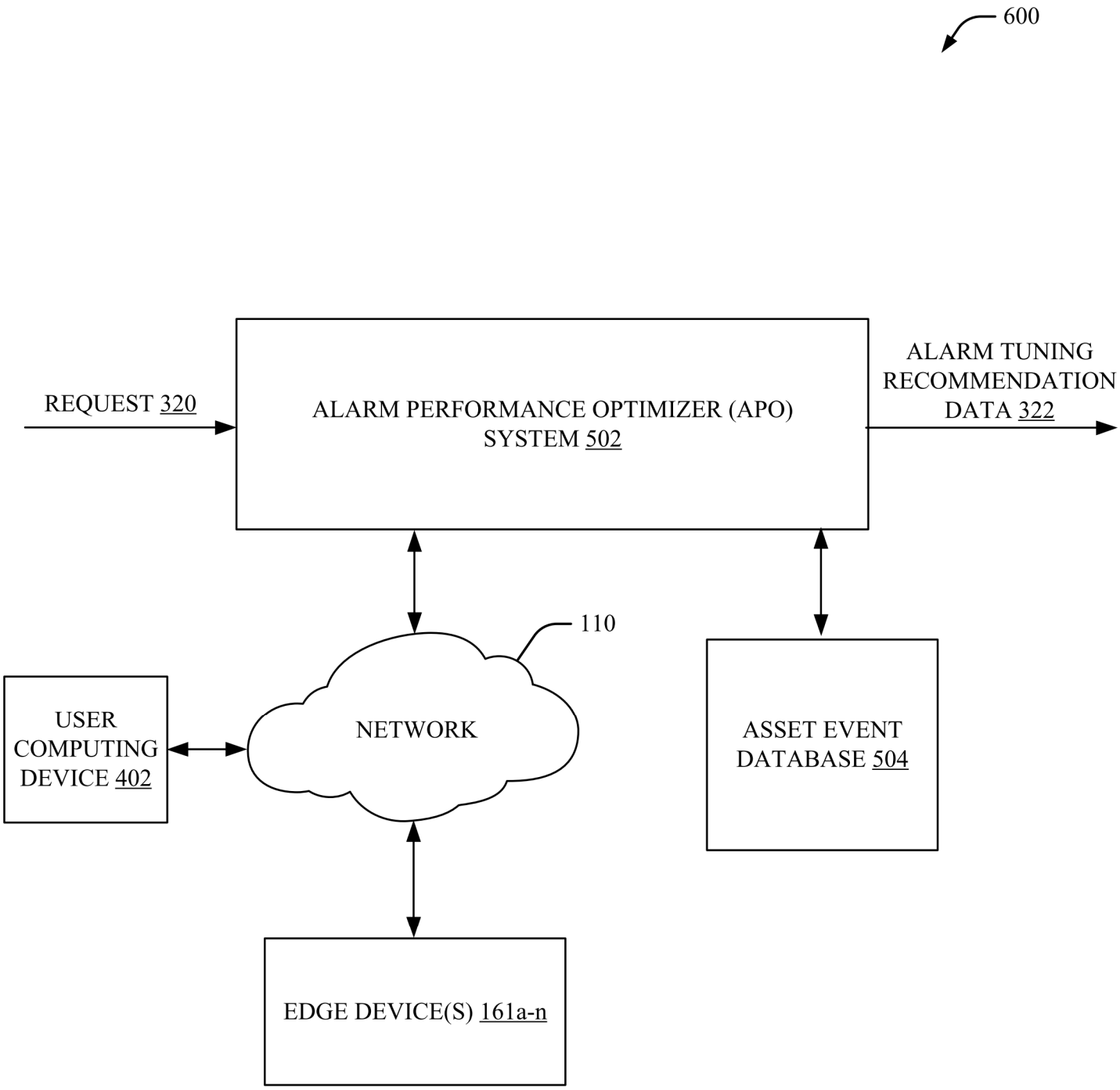

600
REQUEST 320
ALARM PERFORMANCE OPTIMIZER (APO) SYSTEM 502
ALARM TUNING RECOMMENDATION DATA 322
110
NETWORK
USER COMPUTING DEVICE 402
ASSET EVENT DATABASE 504
EDGE DEVICE(S) 161a-n

FIG. 6

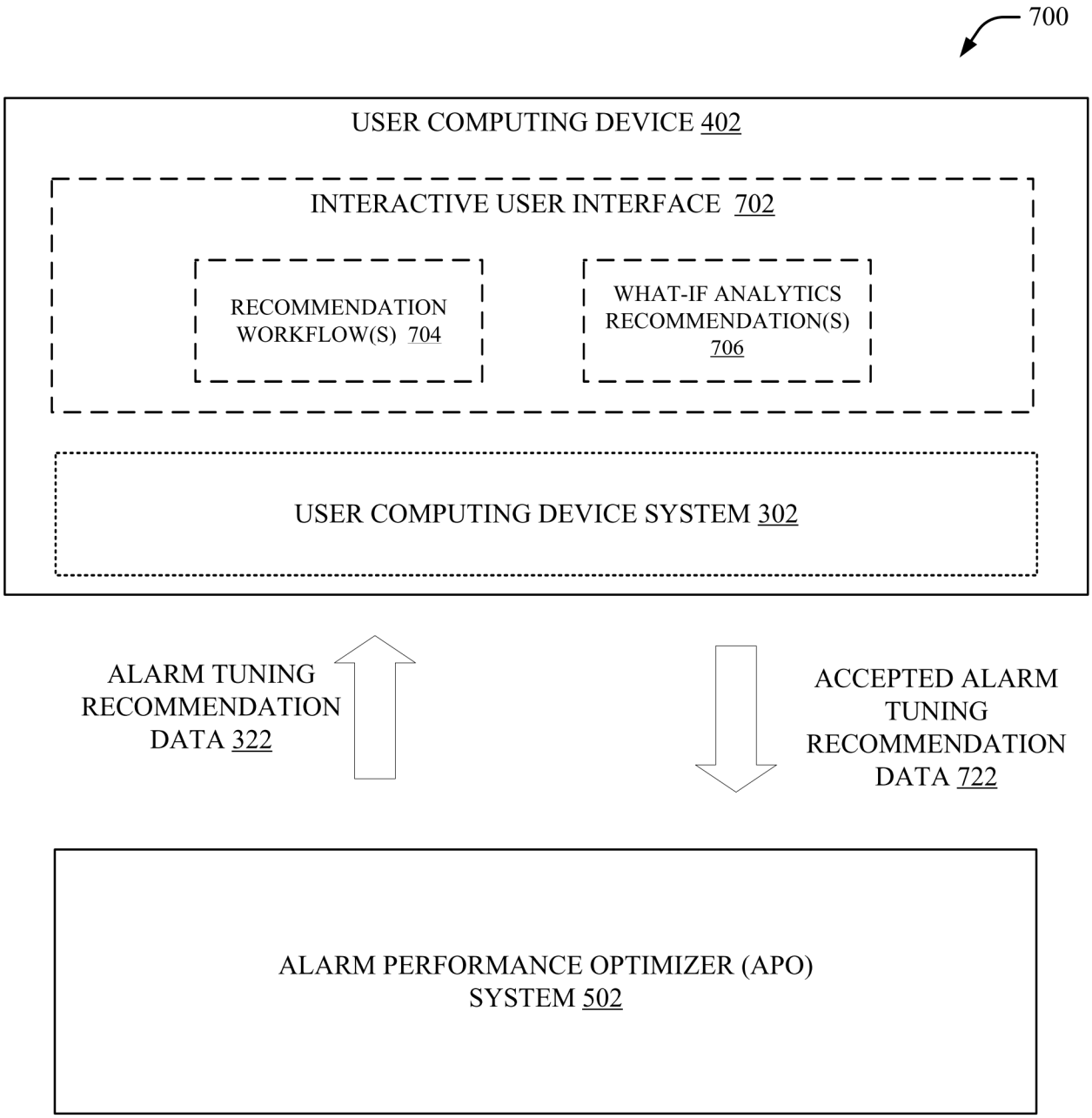

700
USER COMPUTING DEVICE 402
INTERACTIVE USER INTERFACE 702
RECOMMENDATION WORKFLOW(S) 704
WHAT-IF ANALYTICS RECOMMENDATION(S) 706
USER COMPUTING DEVICE SYSTEM 302
ALARM TUNING RECOMMENDATION DATA 322
ACCEPTED ALARM TUNING RECOMMENDATION DATA 722
ALARM PERFORMANCE OPTIMIZER (APO) SYSTEM 502

FIG. 7

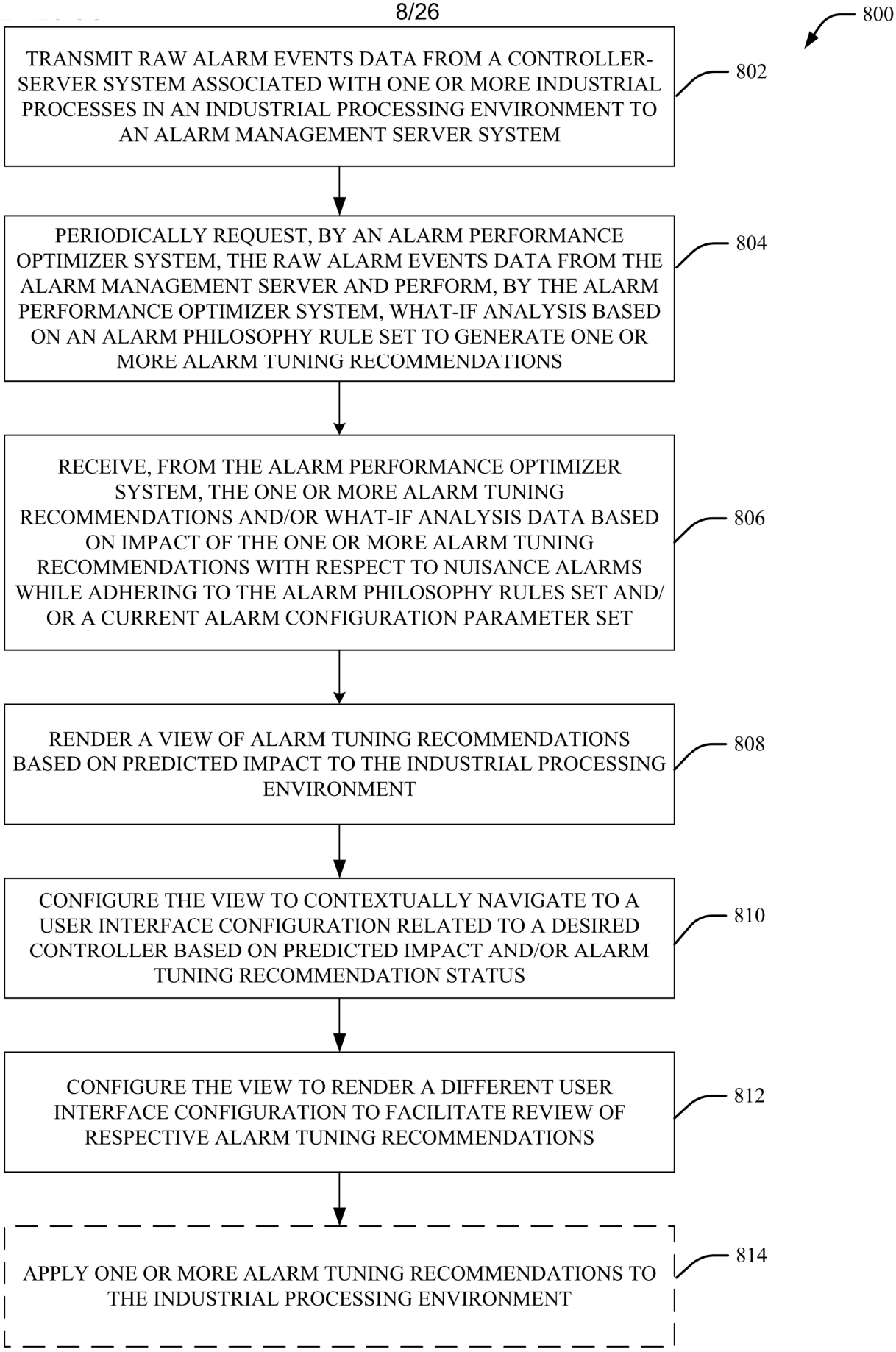

800
TRANSMIT RAW ALARM EVENTS DATA FROM A CONTROLLER-SERVER SYSTEM ASSOCIATED WITH ONE OR MORE INDUSTRIAL PROCESSES IN AN INDUSTRIAL PROCESSING ENVIRONMENT TO AN ALARM MANAGEMENT SERVER SYSTEM
802
PERIODICALLY REQUEST, BY AN ALARM PERFORMANCE OPTIMIZER SYSTEM, THE RAW ALARM EVENTS DATA FROM THE ALARM MANAGEMENT SERVER AND PERFORM, BY THE ALARM PERFORMANCE OPTIMIZER SYSTEM, WHAT-IF ANALYSIS BASED ON AN ALARM PHILOSOPHY RULE SET TO GENERATE ONE OR MORE ALARM TUNING RECOMMENDATIONS
804
RECEIVE, FROM THE ALARM PERFORMANCE OPTIMIZER SYSTEM, THE ONE OR MORE ALARM TUNING RECOMMENDATIONS AND/OR WHAT-IF ANALYSIS DATA BASED ON IMPACT OF THE ONE OR MORE ALARM TUNING RECOMMENDATIONS WITH RESPECT TO NUISANCE ALARMS WHILE ADHERING TO THE ALARM PHILOSOPHY RULES SET AND/OR A CURRENT ALARM CONFIGURATION PARAMETER SET
806
RENDER A VIEW OF ALARM TUNING RECOMMENDATIONS BASED ON PREDICTED IMPACT TO THE INDUSTRIAL PROCESSING ENVIRONMENT
808
CONFIGURE THE VIEW TO CONTEXTUALLY NAVIGATE TO A USER INTERFACE CONFIGURATION RELATED TO A DESIRED CONTROLLER BASED ON PREDICTED IMPACT AND/OR ALARM TUNING RECOMMENDATION STATUS
810
CONFIGURE THE VIEW TO RENDER A DIFFERENT USER INTERFACE CONFIGURATION TO FACILITATE REVIEW OF RESPECTIVE ALARM TUNING RECOMMENDATIONS
812
APPLY ONE OR MORE ALARM TUNING RECOMMENDATIONS TO THE INDUSTRIAL PROCESSING ENVIRONMENT
814

FIG. 8

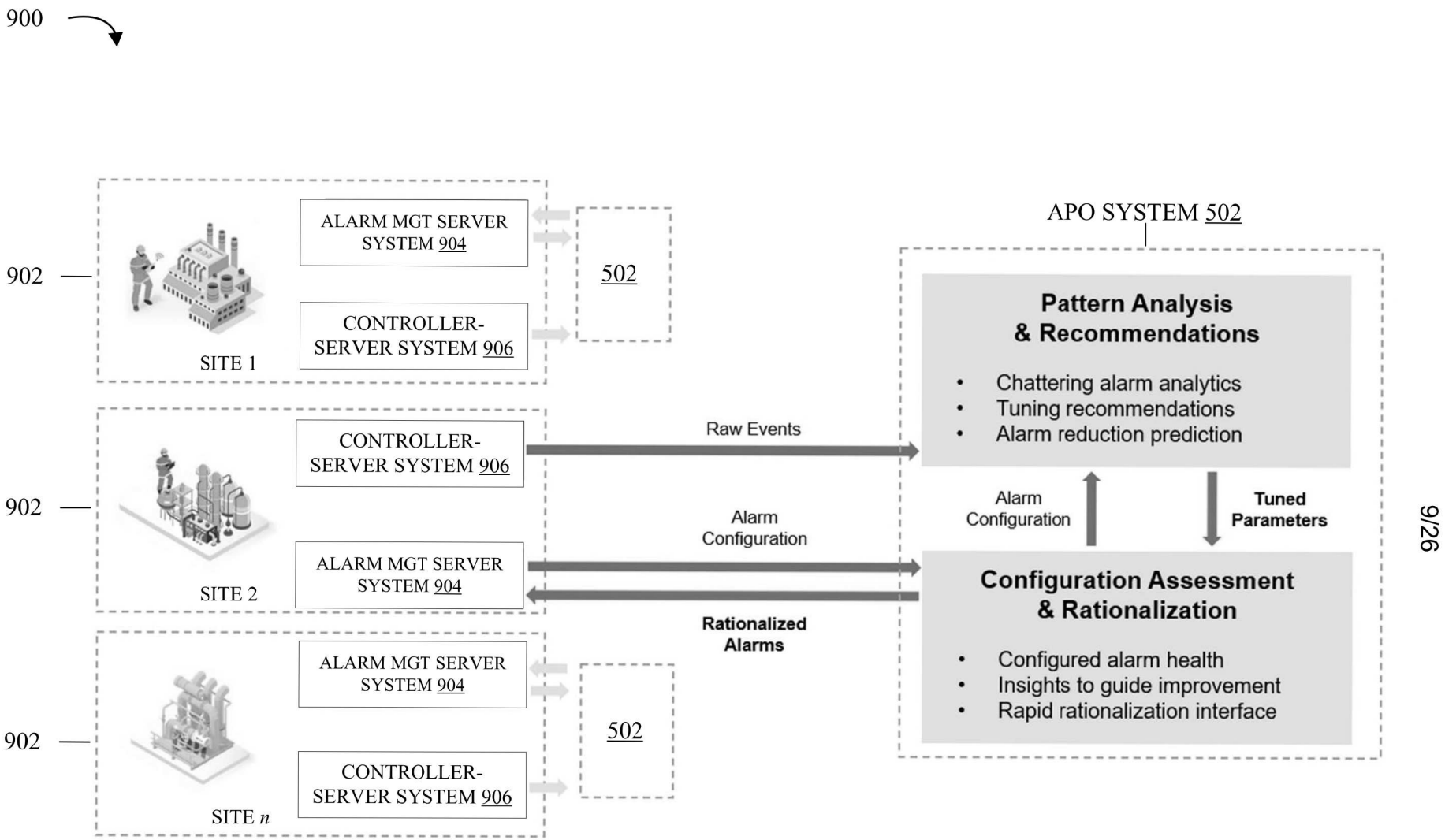

900
902
902
902
SITE 1
SITE 2
SITE n
ALARM MGT SERVER SYSTEM 904
CONTROLLER-SERVER SYSTEM 906
502
ALARM MGT SERVER SYSTEM 904
CONTROLLER-SERVER SYSTEM 906
ALARM MGT SERVER SYSTEM 904
CONTROLLER-SERVER SYSTEM 906
502
Raw Events
Alarm Configuration
Rationalized Alarms
APO SYSTEM 502
Pattern Analysis & Recommendations
• Chattering alarm analytics
• Tuning recommendations
• Alarm reduction prediction
Alarm Configuration
Tuned Parameters
Configuration Assessment & Rationalization
• Configured alarm health
• Insights to guide improvement
• Rapid rationalization interface

FIG. 9

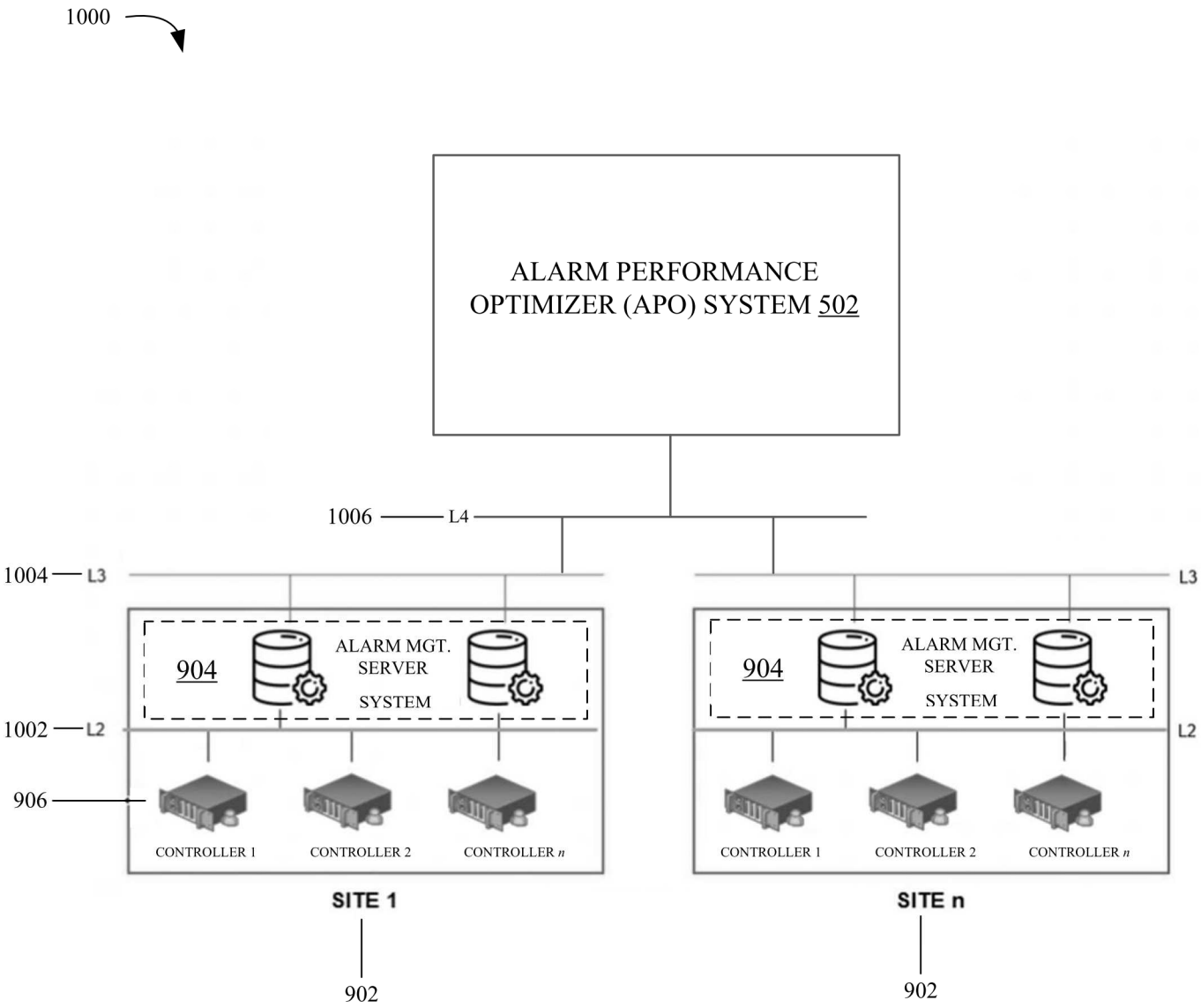

1000
ALARM PERFORMANCE OPTIMIZER (APO) SYSTEM 502
1006
L4
1004
L3
L3
904
ALARM MGT. SERVER SYSTEM
904
ALARM MGT. SERVER SYSTEM
1002
L2
L2
906
CONTROLLER 1
CONTROLLER 2
CONTROLLER n
CONTROLLER 1
CONTROLLER 2
CONTROLLER n
SITE 1
SITE n
902
902

FIG. 10

1100

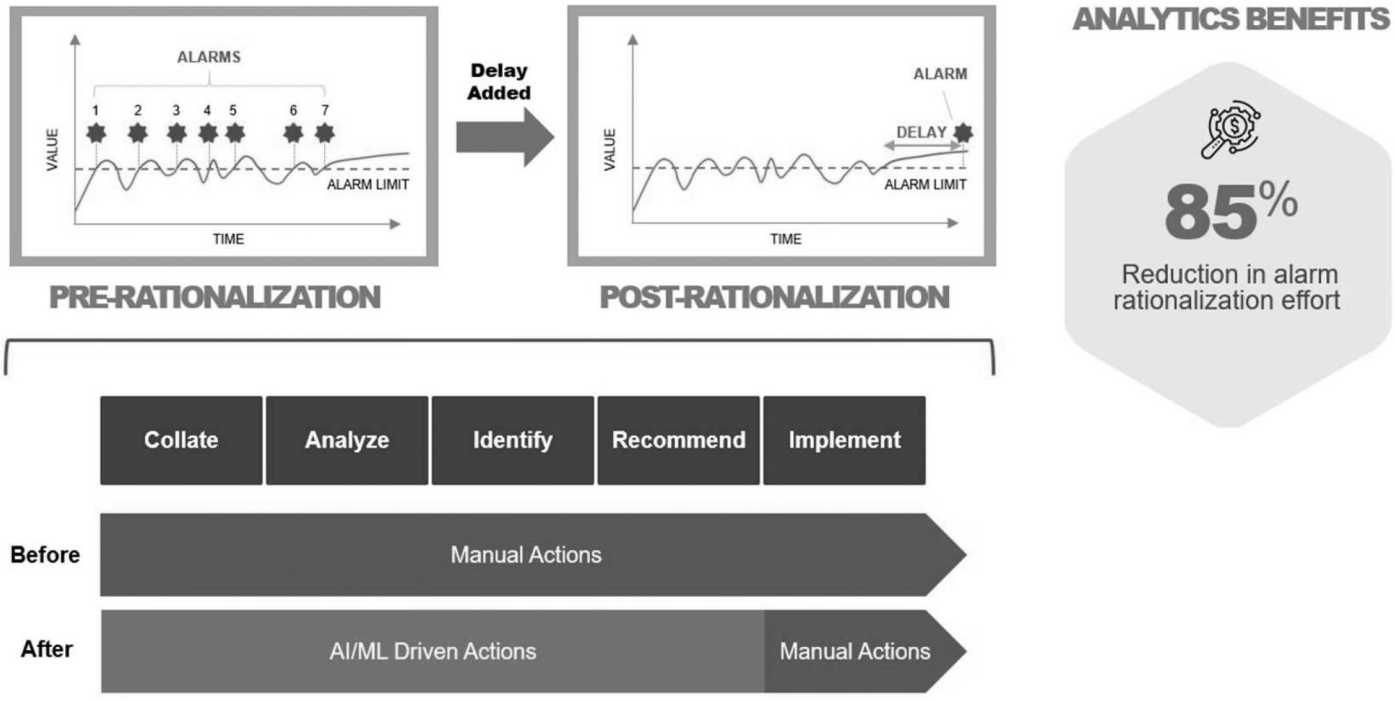

ALARMS
1
2
3
4
5
6
7
VALUE
ALARM LIMIT
TIME
PRE-RATIONALIZATION
Delay Added
ALARM
DELAY
VALUE
ALARM LIMIT
TIME
POST-RATIONALIZATION
ANALYTICS BENEFITS
85%
Reduction in alarm rationalization effort
Collate
Analyze
Identify
Recommend
Implement
Before
Manual Actions
After
AI/ML Driven Actions
Manual Actions

FIG. 11

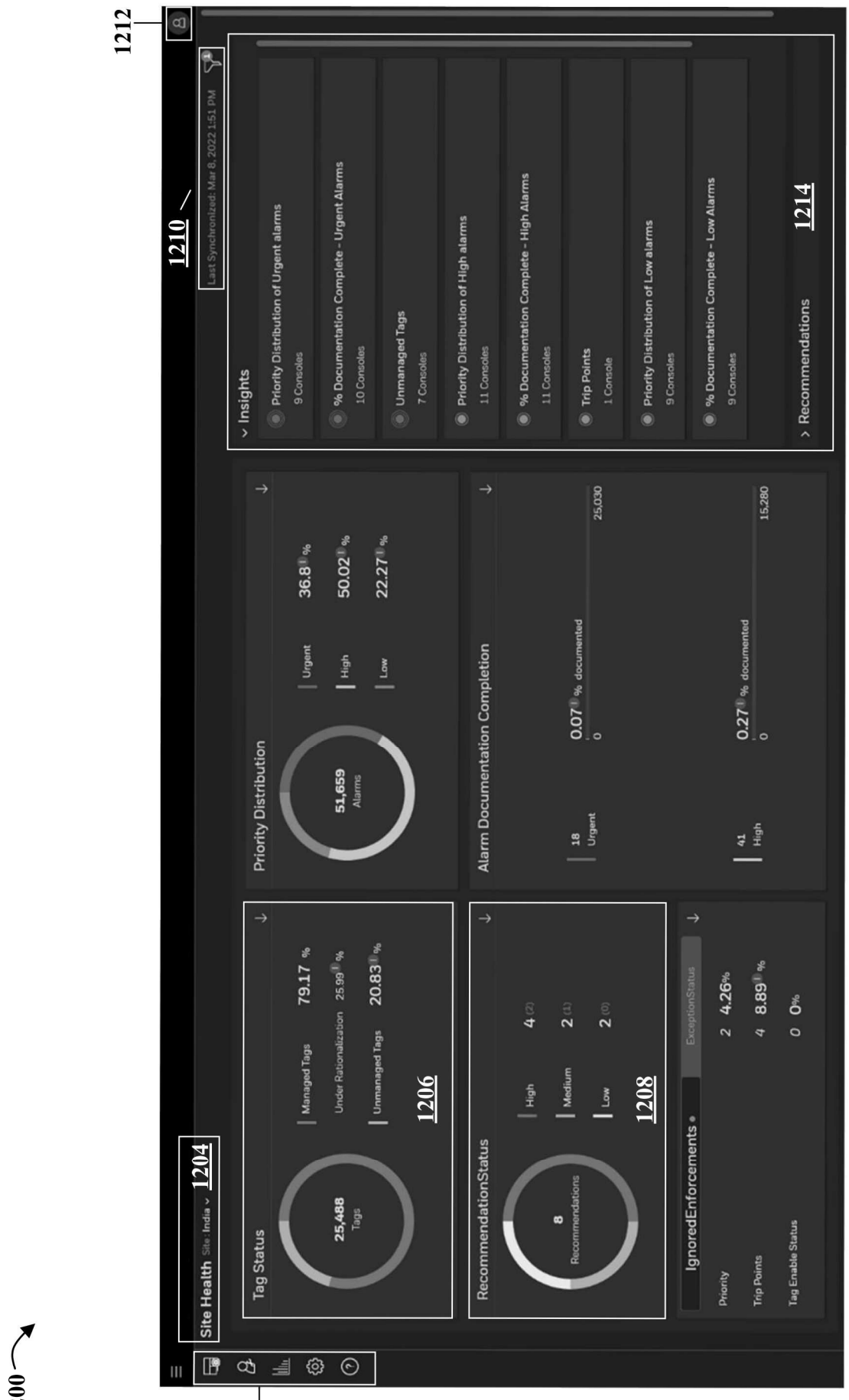

1200
1202
1212
1210
1204
1206
1208
1214
Site Health
Site: India
Last Synchronized: Mar 8, 2022 1:51 PM
Insights
Priority Distribution of Urgent alarms
9 Consoles
% Documentation Complete - Urgent Alarms
10 Consoles
Unmanaged Tags
7 Consoles
Priority Distribution of High alarms
11 Consoles
% Documentation Complete - High Alarms
11 Consoles
Trip Points
1 Console
Priority Distribution of Low alarms
9 Consoles
% Documentation Complete - Low Alarms
9 Consoles
Recommendations
Tag Status
25,488
Tags
Managed Tags 79.17 %
Under Rationalization 25.99 %
Unmanaged Tags 20.83 %
Priority Distribution
51,659
Alarms
Urgent 36.8 %
High 50.02 %
Low 22.27 %
RecommendationStatus
8
Recommendations
High 4 (2)
Medium 2 (1)
Low 2 (0)
Alarm Documentation Completion
18
Urgent
0.07 % documented
0
25,030
41
High
0.27 % documented
0
15,280
IgnoredEnforcements
Priority
Trip Points
Tag Enable Status
ExceptionStatus
2 4.26%
4 8.89 %
0 0%

FIG. 12

1300

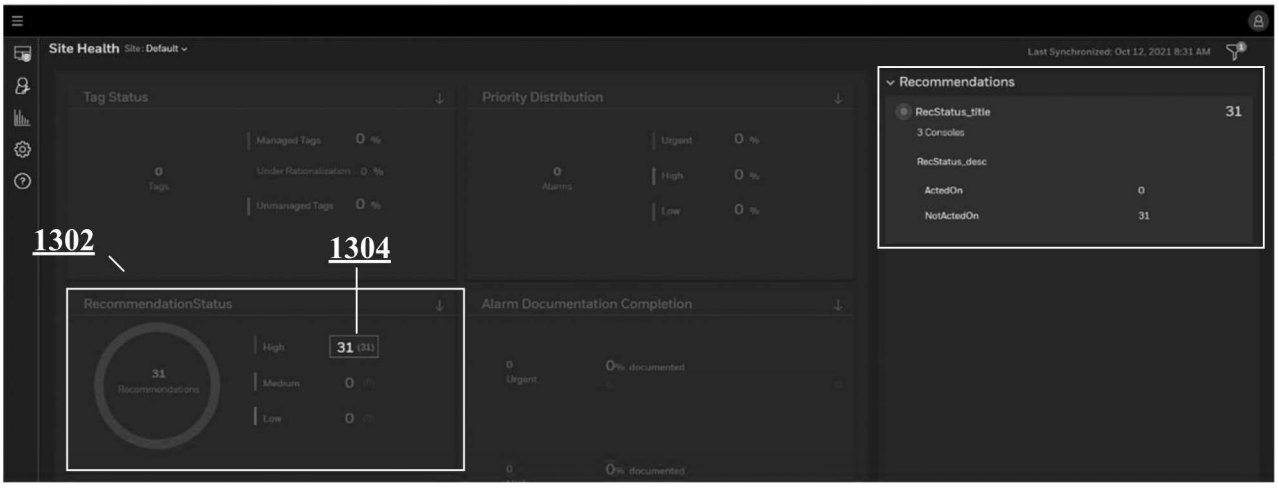

Site Health
Site: Default
Last Synchronized: Oct 12, 2021 8:31 AM
Tag Status
Managed Tags 0 %
Under Rationalization 0 %
Unmanaged Tags 0 %
Priority Distribution
Urgent 0 %
High 0 %
Low 0 %
Recommendations
RecStatus_title 31
3 Consoles
RecStatus_desc
ActedOn 0
NotActedOn 31
1306
1302
1304
RecommendationStatus
High 31 (31)
Medium 0
Low 0
Alarm Documentation Completion

FIG. 13

1400

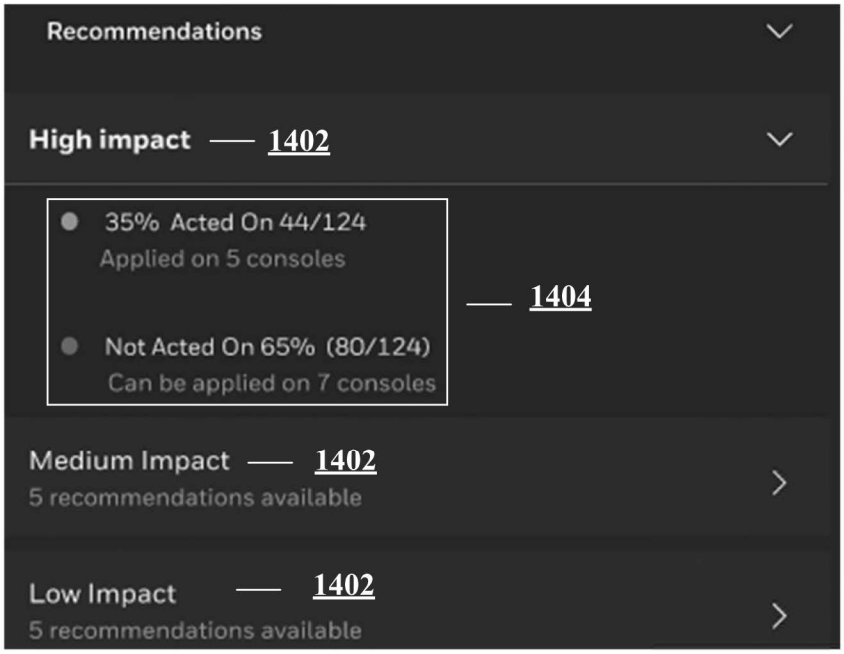

Recommendations
High impact
1402
35% Acted On 44/124
Applied on 5 consoles
Not Acted On 65% (80/124)
Can be applied on 7 consoles
1404
Medium Impact
1402
5 recommendations available
Low Impact
1402
5 recommendations available

FIG. 14

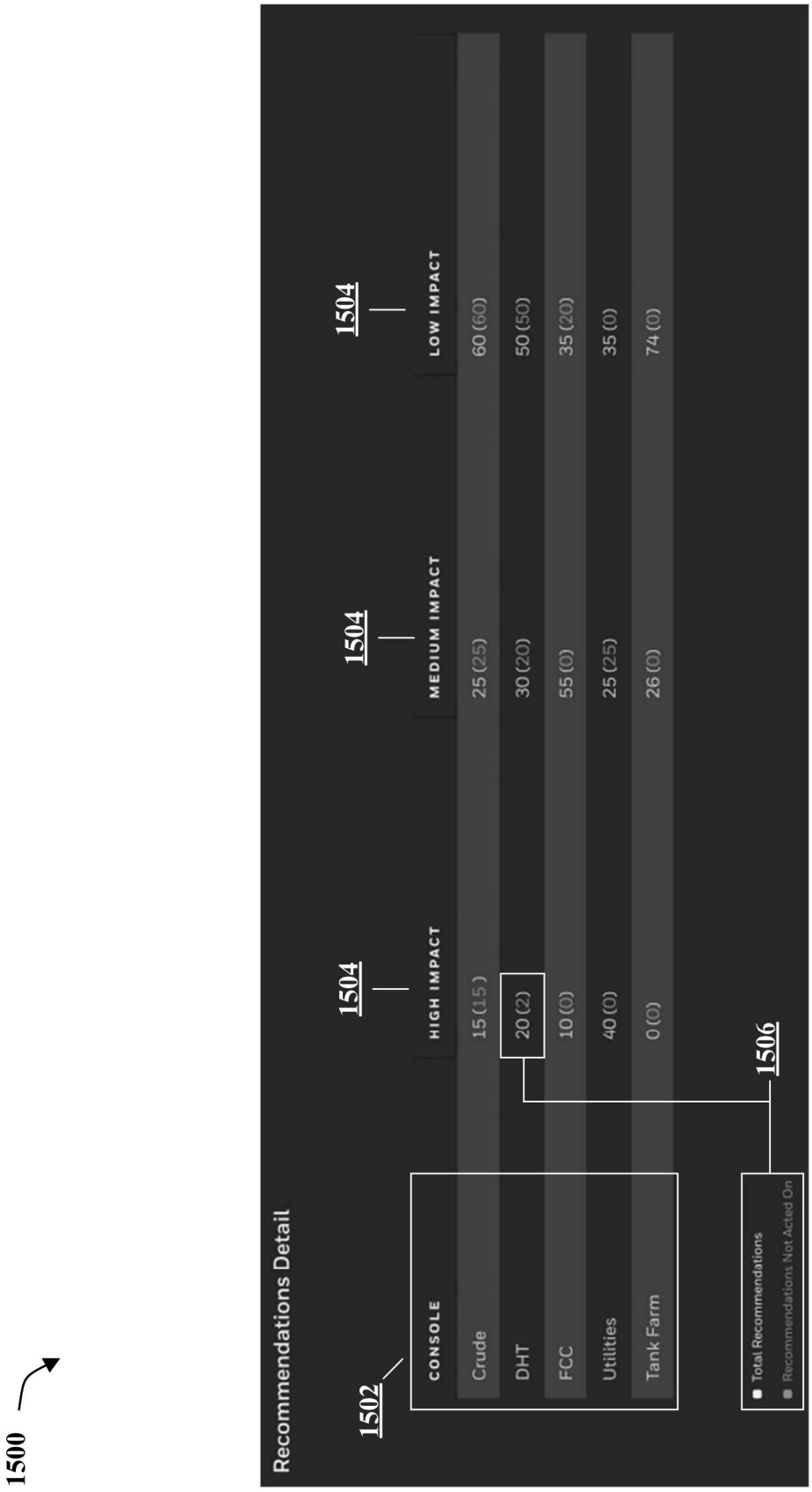

1500
Recommendations Detail
1502
CONSOLE
Crude
DHT
FCC
Utilities
Tank Farm
1504
HIGH IMPACT
15 (15)
20 (2)
10 (0)
40 (0)
0 (0)
1504
MEDIUM IMPACT
25 (25)
30 (20)
55 (0)
25 (25)
26 (0)
1504
LOW IMPACT
60 (60)
50 (50)
35 (20)
35 (0)
74 (0)
1506
Total Recommendations
Recommendations Not Acted On

FIG. 15

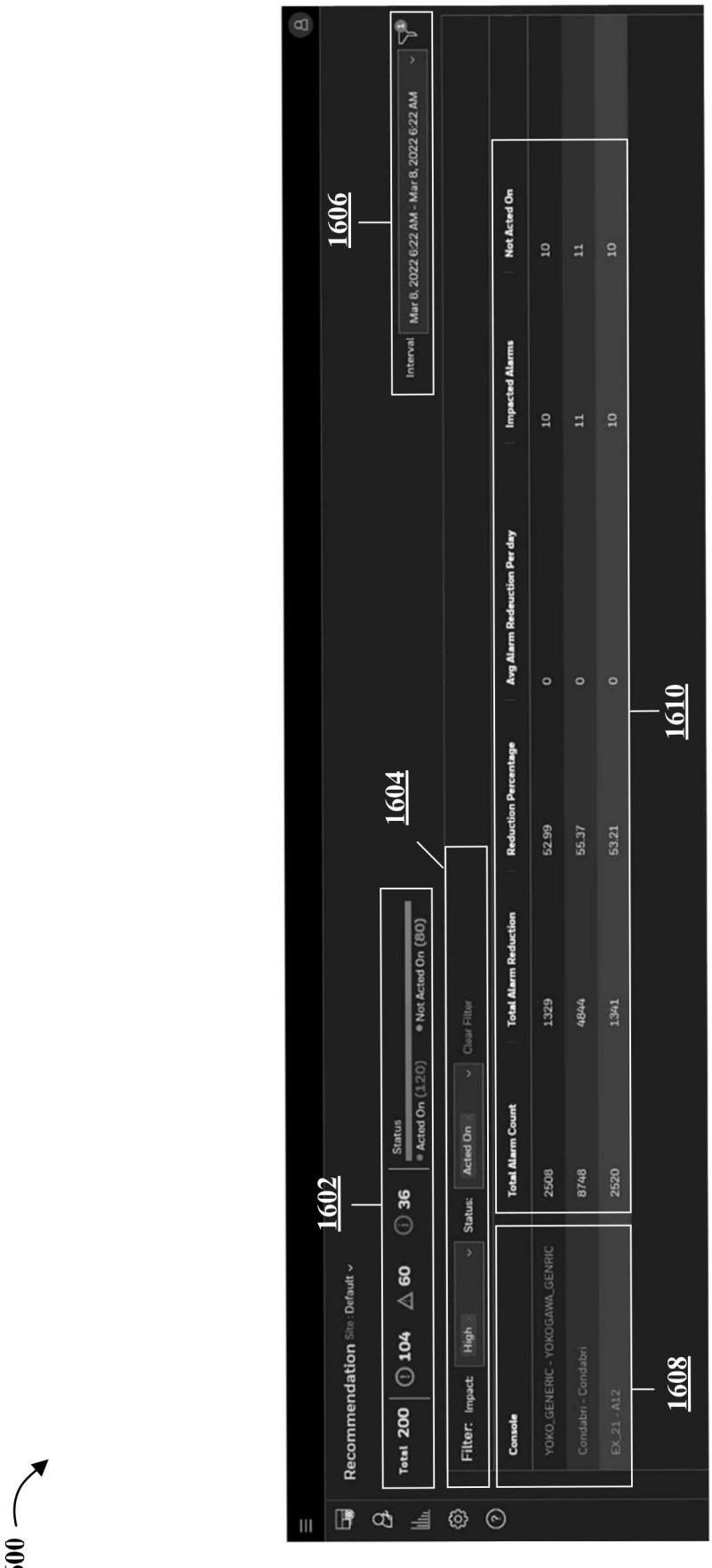

1600
Recommendation Site: Default
Total 200
104
60
36
Status
Acted On (120)
Not Acted On (80)
1602
1604
1606
Interval
Mar 8, 2022 6:22 AM - Mar 8, 2022 6:22 AM
Filter: Impact: High Status: Acted On Clear Filter
Console
Total Alarm Count
Total Alarm Reduction
Reduction Percentage
Avg Alarm Redeuction Per day
Impacted Alarms
Not Acted On
YOKO_GENERIC - YOKOGAWA_GENRIC
2508
1329
52.99
0
10
10
Condabri - Condabri
8748
4844
55.37
0
11
11
EX_21 - A12
2520
1341
53.21
0
10
10
1608
1610

FIG. 16

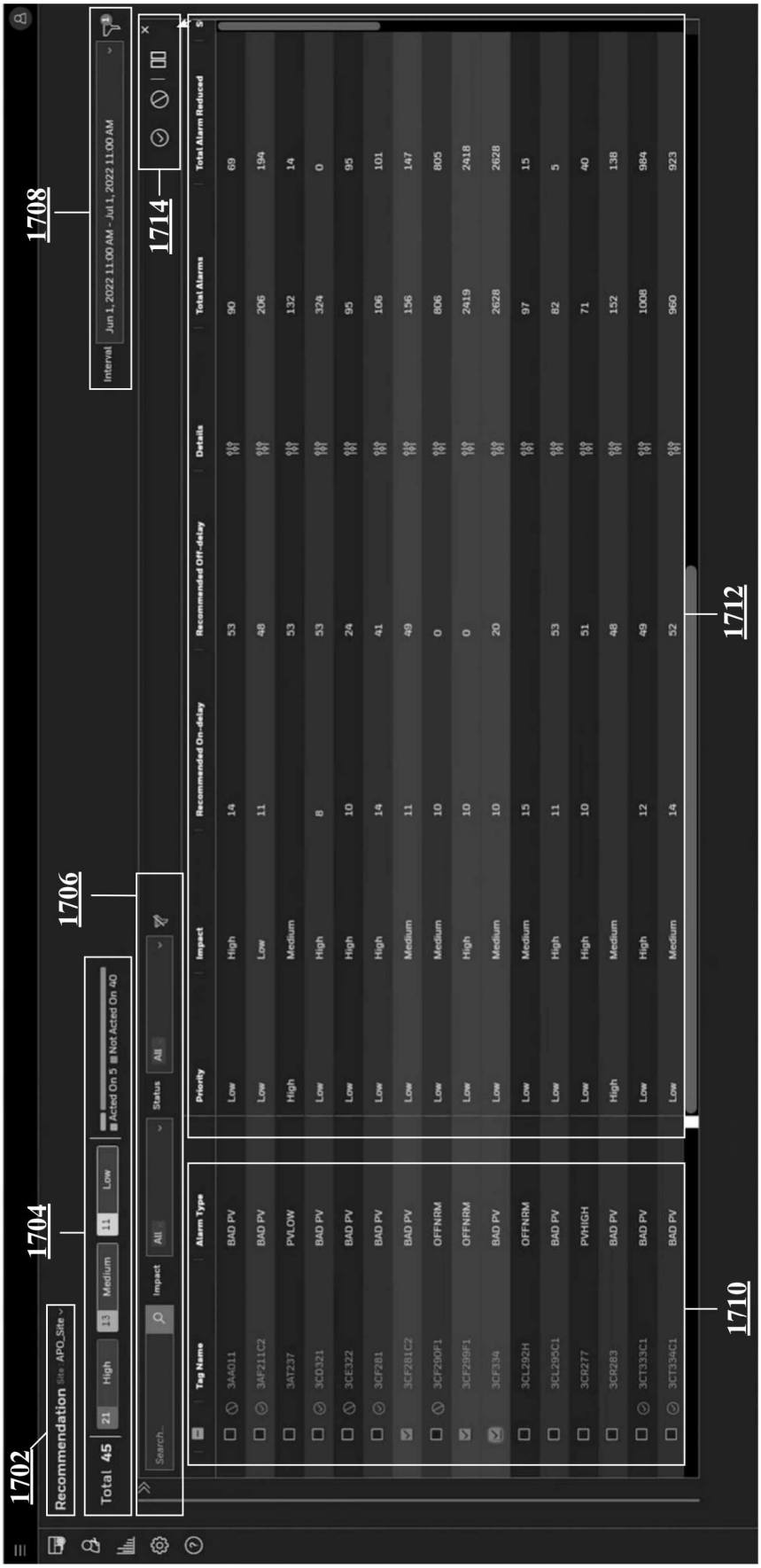

1700
1702
1704
1706
1708
1710
1712
1714
Recommendation
Site: APO_Site
Total 45
21 High
13 Medium
11 Low
Acted On 5
Not Acted On 40
Search...
Impact
Status
All
Interval
Jun 1, 2022 11:00 AM - Jul 1, 2022 11:00 AM
Tag Name
Alarm Type
Priority
Impact
Recommended On-delay
Recommended Off-delay
Details
Total Alarms
Total Alarm Reduced
3AA011 BAD PV Low High 14 53 90 69
3AF211C2 BAD PV Low Low 11 48 206 194
3AT237 PVLOW High Medium 53 132 14
3CD321 BAD PV Low High 8 53 324 0
3CE322 BAD PV Low High 10 24 95 95
3CF281 BAD PV Low High 14 41 106 101
3CF281C2 BAD PV Low Medium 11 49 156 147
3CF290F1 OFFNRM Low Medium 10 0 806 805
3CF298F1 OFFNRM Low High 10 0 2419 2418
3CF334 BAD PV Low Medium 10 20 2628 2628
3CL292H OFFNRM Low Medium 15 97 15
3CL295C1 BAD PV Low High 11 53 82 5
3CR277 PVHIGH Low High 10 51 71 40
3CR283 BAD PV High Medium 48 152 138
3CT333C1 BAD PV Low High 12 49 1008 984
3CT334C1 BAD PV Low Medium 14 52 960 923

FIG. 17

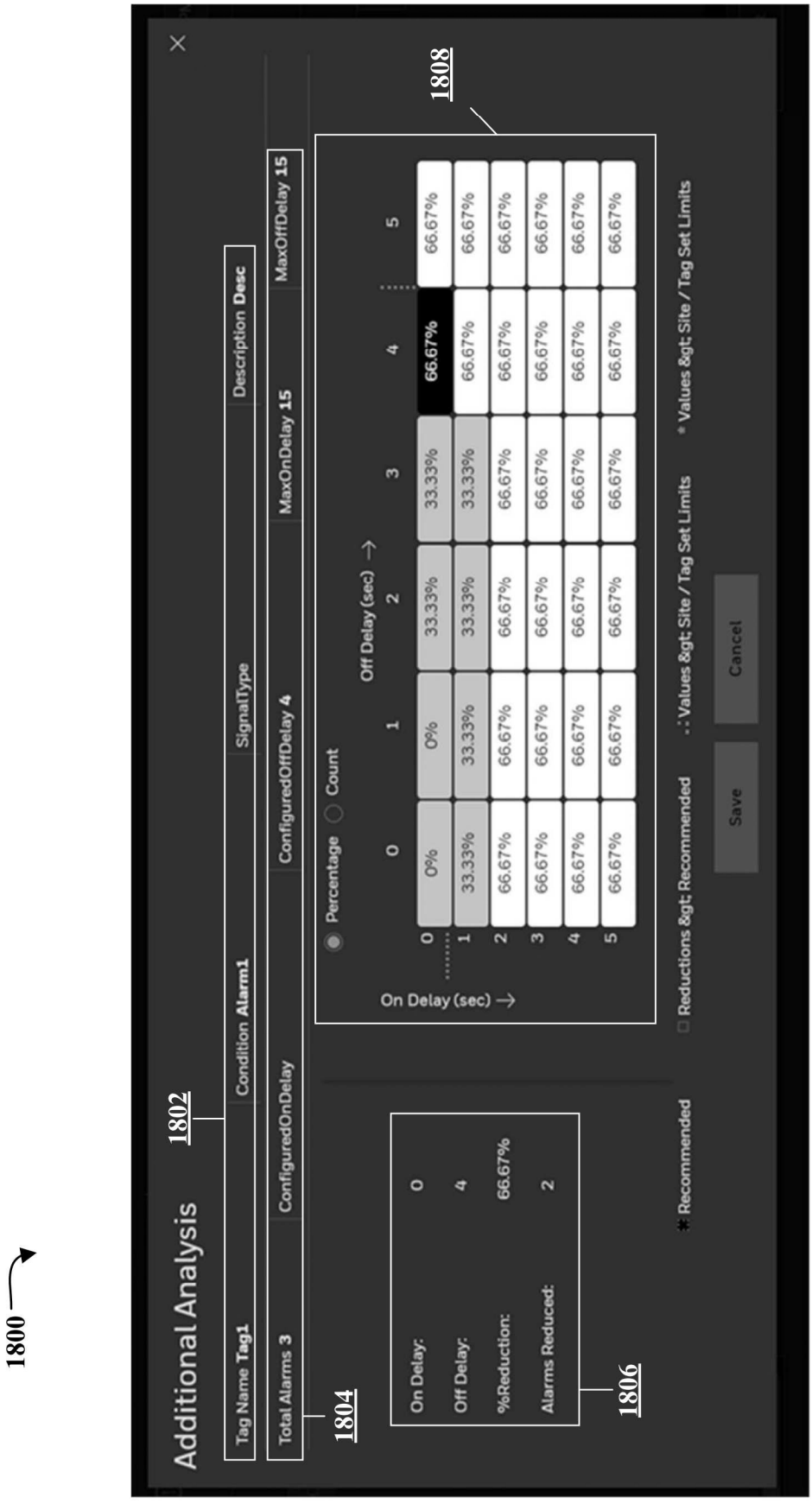

1800
Additional Analysis
1802
Tag Name Tag1
Condition Alarm1
SignalType
Description Desc
Total Alarms 3
ConfiguredOnDelay
ConfiguredOffDelay 4
MaxOnDelay 15
MaxOffDelay 15
1804
On Delay: 0
Off Delay: 4
%Reduction: 66.67%
Alarms Reduced: 2
1806
Percentage
Count
Off Delay (sec) →
On Delay (sec) →
1808
* Recommended
Reductions > Recommended
Values > Site / Tag Set Limits
* Values > Site / Tag Set Limits
Save
Cancel

FIG. 18

1900

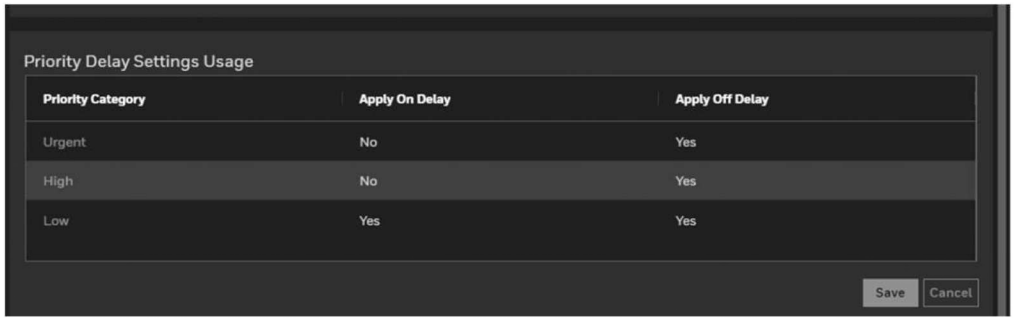

Priority Delay Settings Usage
Priority Category
Apply On Delay
Apply Off Delay
Urgent
No
Yes
High
No
Yes
Low
Yes
Yes
Save
Cancel

FIG. 19

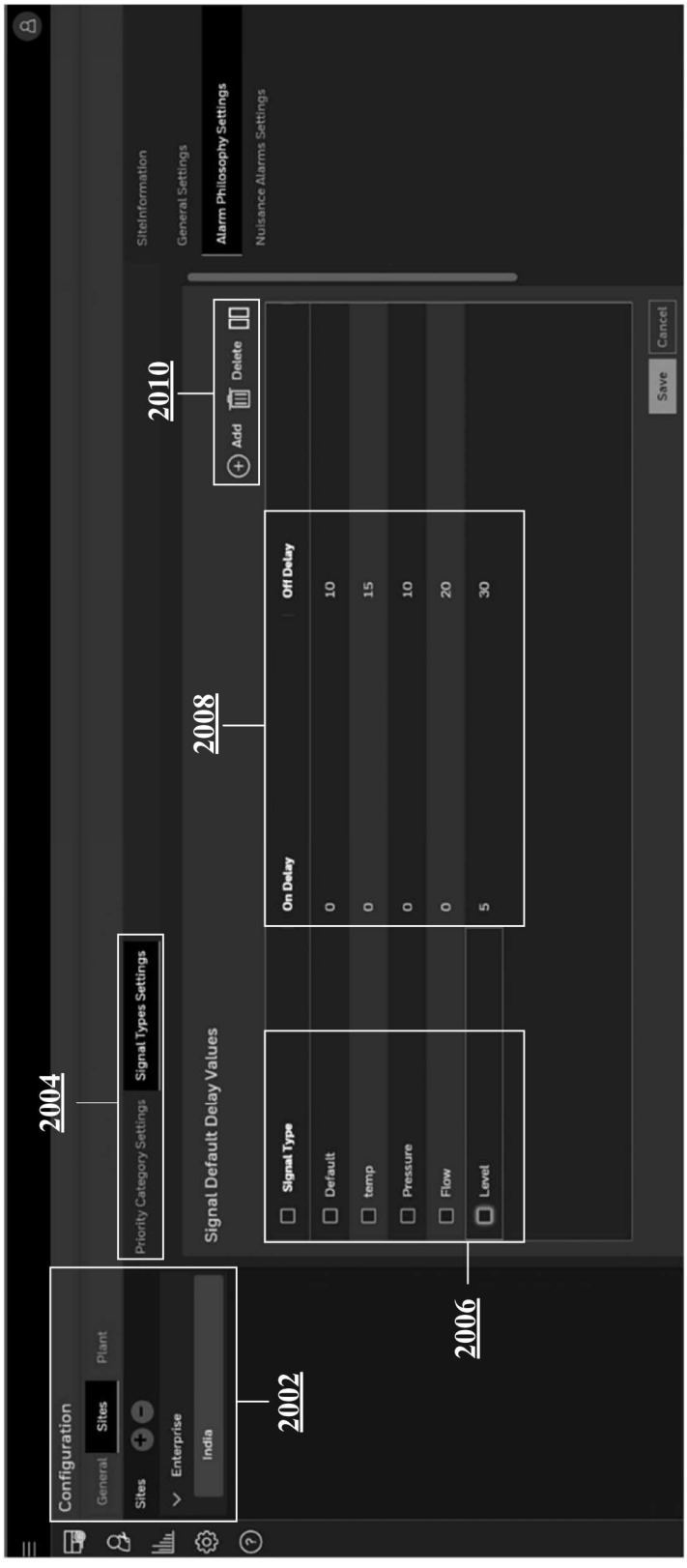

2000
2002
2004
2006
2008
2010
Configuration
General
Sites
Plant
Sites
Enterprise
India
Priority Category Settings
Signal Types Settings
SiteInformation
General Settings
Alarm Philosophy Settings
Nuisance Alarms Settings
Signal Default Delay Values
Add
Delete
Signal Type
On Delay
Off Delay
Default 0 10
temp 0 15
Pressure 0 10
Flow 0 20
Level 5 30
Save
Cancel

FIG. 20

2100

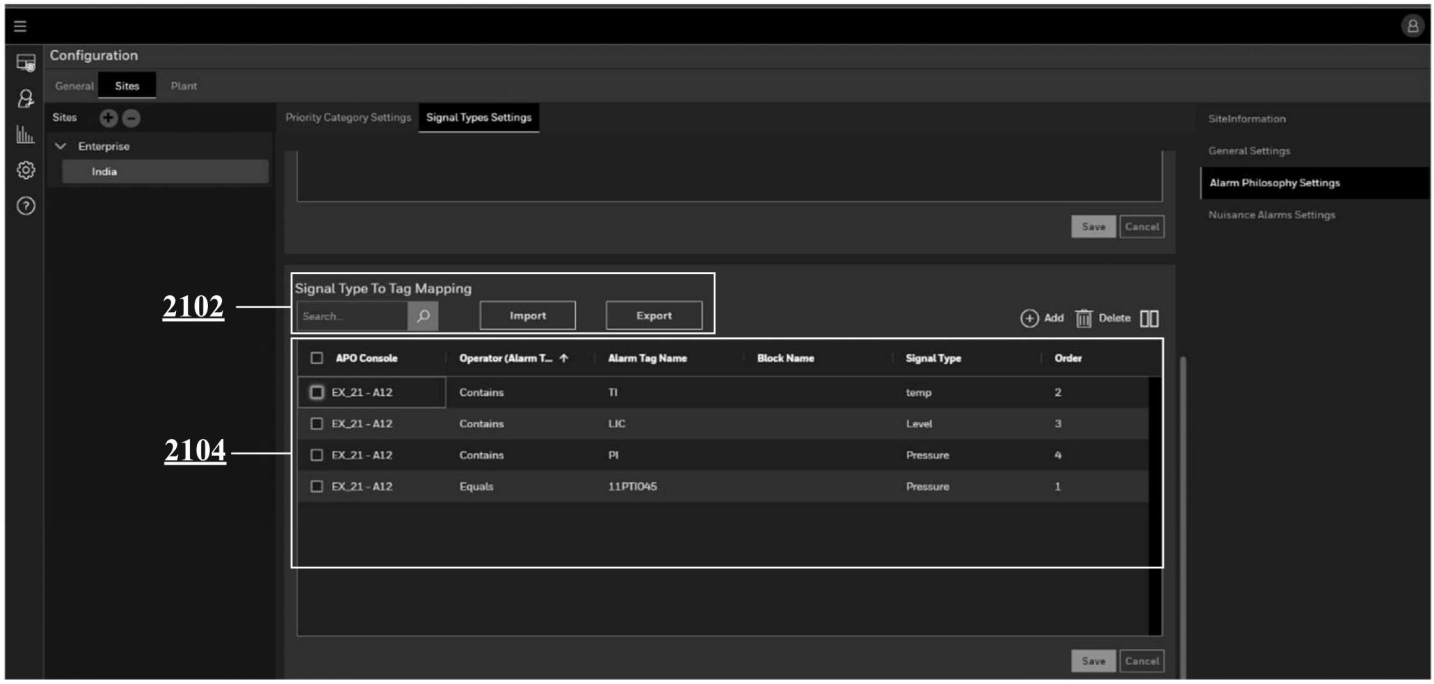

Configuration
General
Sites
Plant
Sites
Enterprise
India
Priority Category Settings
Signal Types Settings
SiteInformation
General Settings
Alarm Philosophy Settings
Nuisance Alarms Settings
Save
Cancel
2102
Signal Type To Tag Mapping
Search...
Import
Export
Add
Delete
2104
APO Console
Operator (Alarm T...
Alarm Tag Name
Block Name
Signal Type
Order
EX_21 - A12
Contains
TI
temp
2
EX_21 - A12
Contains
LIC
Level
3
EX_21 - A12
Contains
PI
Pressure
4
EX_21 - A12
Equals
11PT1045
Pressure
1
Save
Cancel

FIG. 21

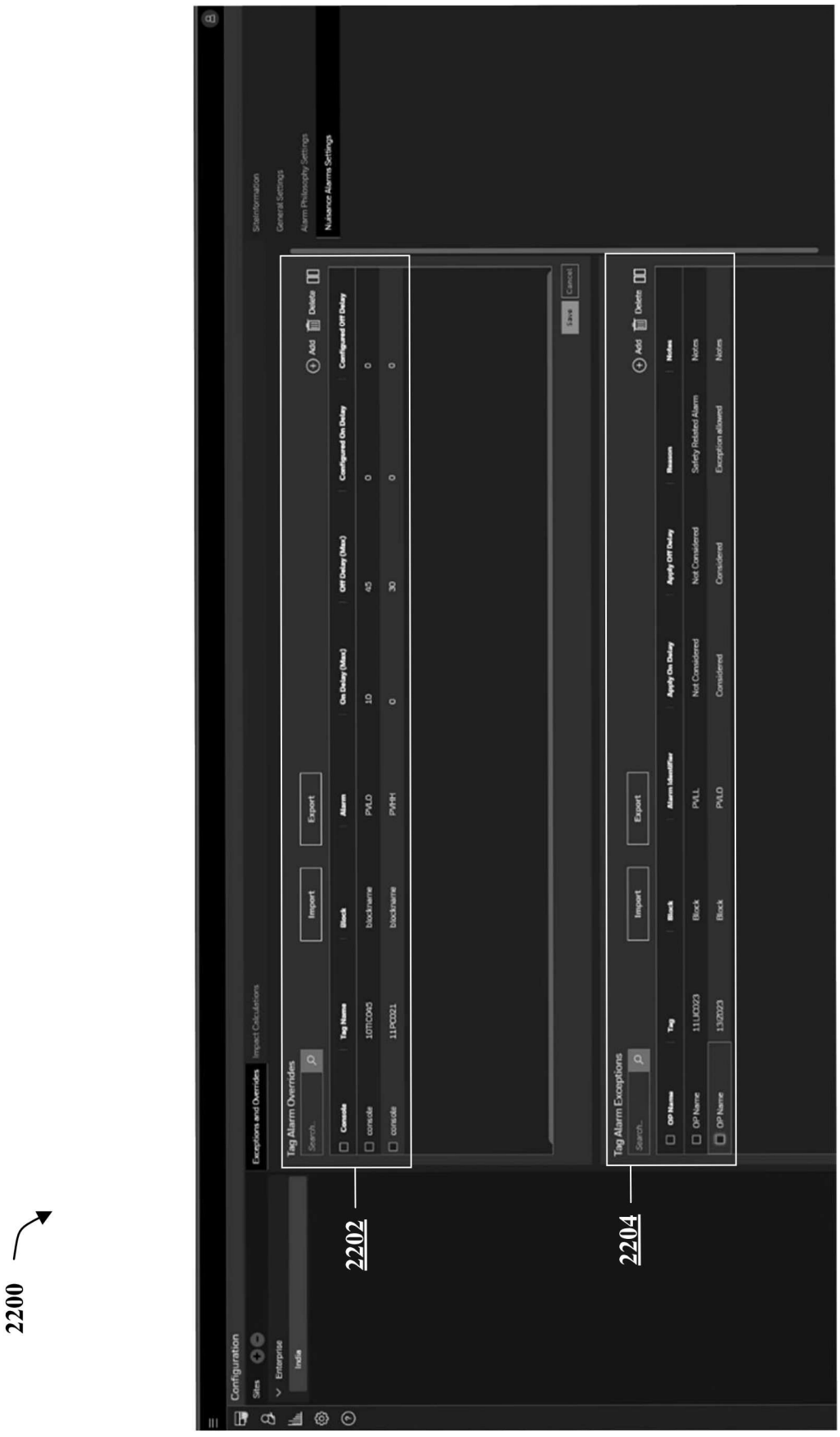

2200
2202
2204
Configuration
Sites
Enterprise
India
Exceptions and Overrides
Impact Calculations
Tag Alarm Overrides
Search...
Import
Export
Add
Delete
Console
Tag Name
Block
Alarm
On Delay (Max)
Off Delay (Max)
Configured On Delay
Configured Off Delay
console
10TIC045
blockname
PVLO
10
45
0
0
console
11PC021
blockname
PVHH
0
30
0
0
Save
Cancel
Tag Alarm Exceptions
Search...
Import
Export
Add
Delete
OP Name
Tag
Block
Alarm Identifier
Apply On Delay
Apply Off Delay
Reason
Notes
OP Name
11UA023
Block
PVLL
Not Considered
Not Considered
Safety Related Alarm
Notes
OP Name
1320223
Block
PVLO
Considered
Considered
Exception allowed
Notes
Shaninformation
General Settings
Alarm Philosophy Settings
Nuisance Alarms Settings

FIG. 22

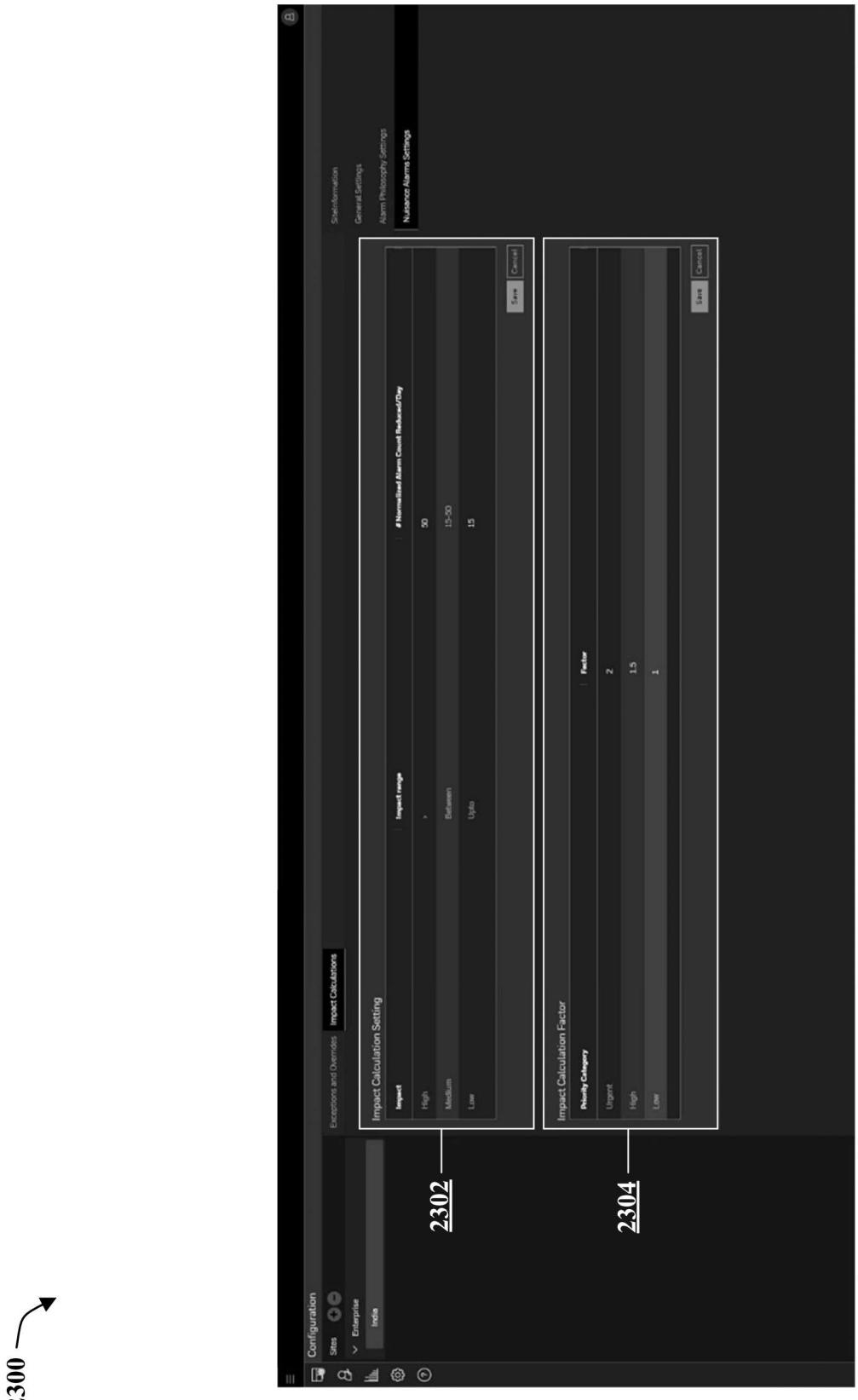

2300
Configuration
Sites
Enterprise
India
Exceptions and Overrides
Impact Calculations
SiteInformation
General Settings
Alarm Philosophy Settings
Nuisance Alarms Settings
Impact Calculation Setting
Impact
Impact range
Normalised Alarm Count Reduced/Day
High
>
30
Medium
Between
15-30
Low
Upto
15
Save
Cancel
2302
Impact Calculation Factor
Priority Category
Factor
Urgent
2
High
1.5
Low
1
Save
Cancel
2304

FIG. 23

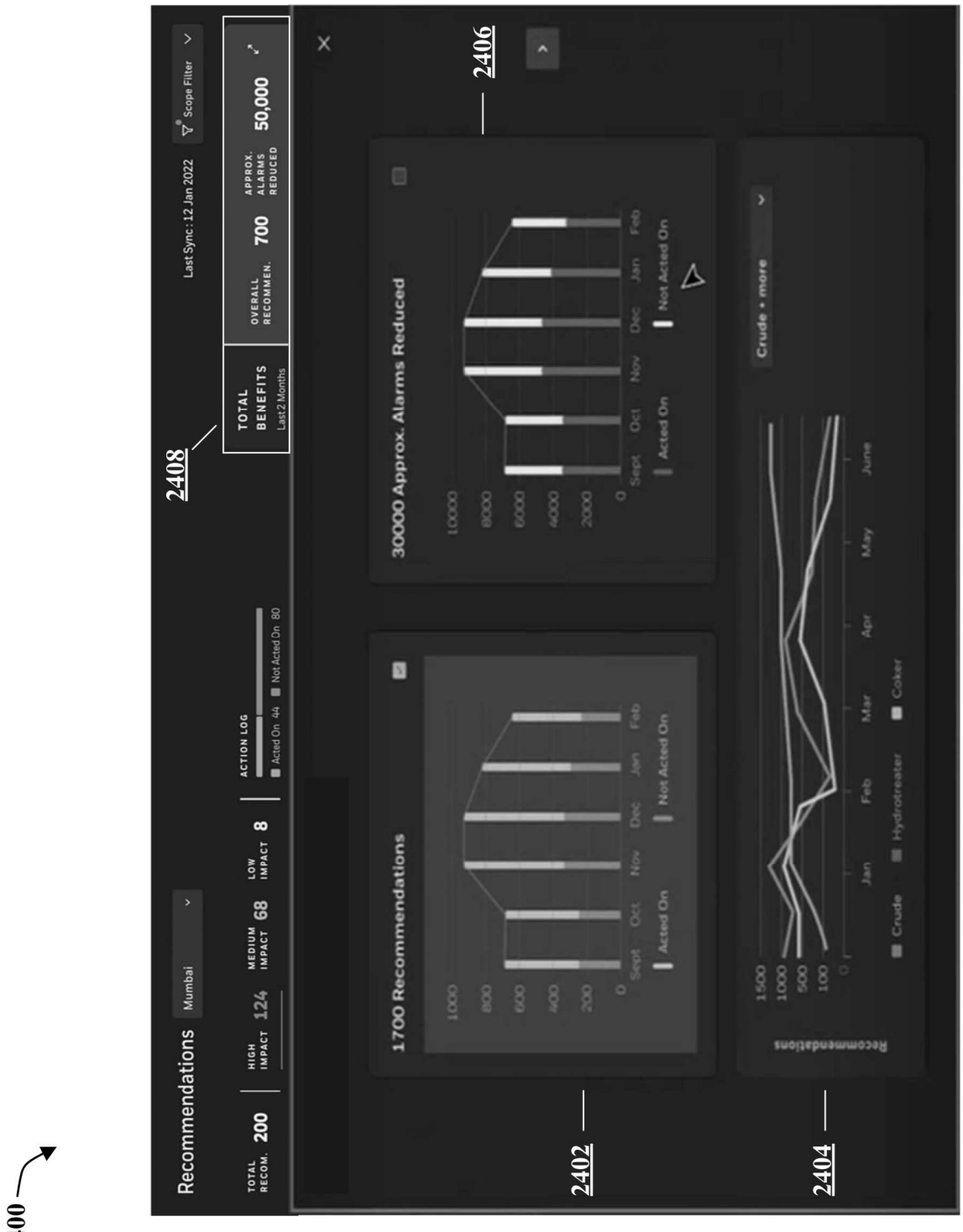

2400
Recommendations
Mumbai
TOTAL RECOM. 200
HIGH IMPACT 124
MEDIUM IMPACT 68
LOW IMPACT 8
ACTION LOG
Acted On 44
Not Acted On 80
Last Sync : 12 Jan 2022
Scope Filter
2408
TOTAL BENEFITS
Last 2 Months
OVERALL RECOMMEN. 700
APPROX. ALARMS REDUCED 50,000
2406
30000 Approx. Alarms Reduced
Acted On
Not Acted On
Sept Oct Nov Dec Jan Feb
2402
1700 Recommendations
Acted On
Not Acted On
2404
Crude + more
Recommendations
Crude
Hydrotreater
Coker
Jan Feb Mar Apr May June

FIG. 24

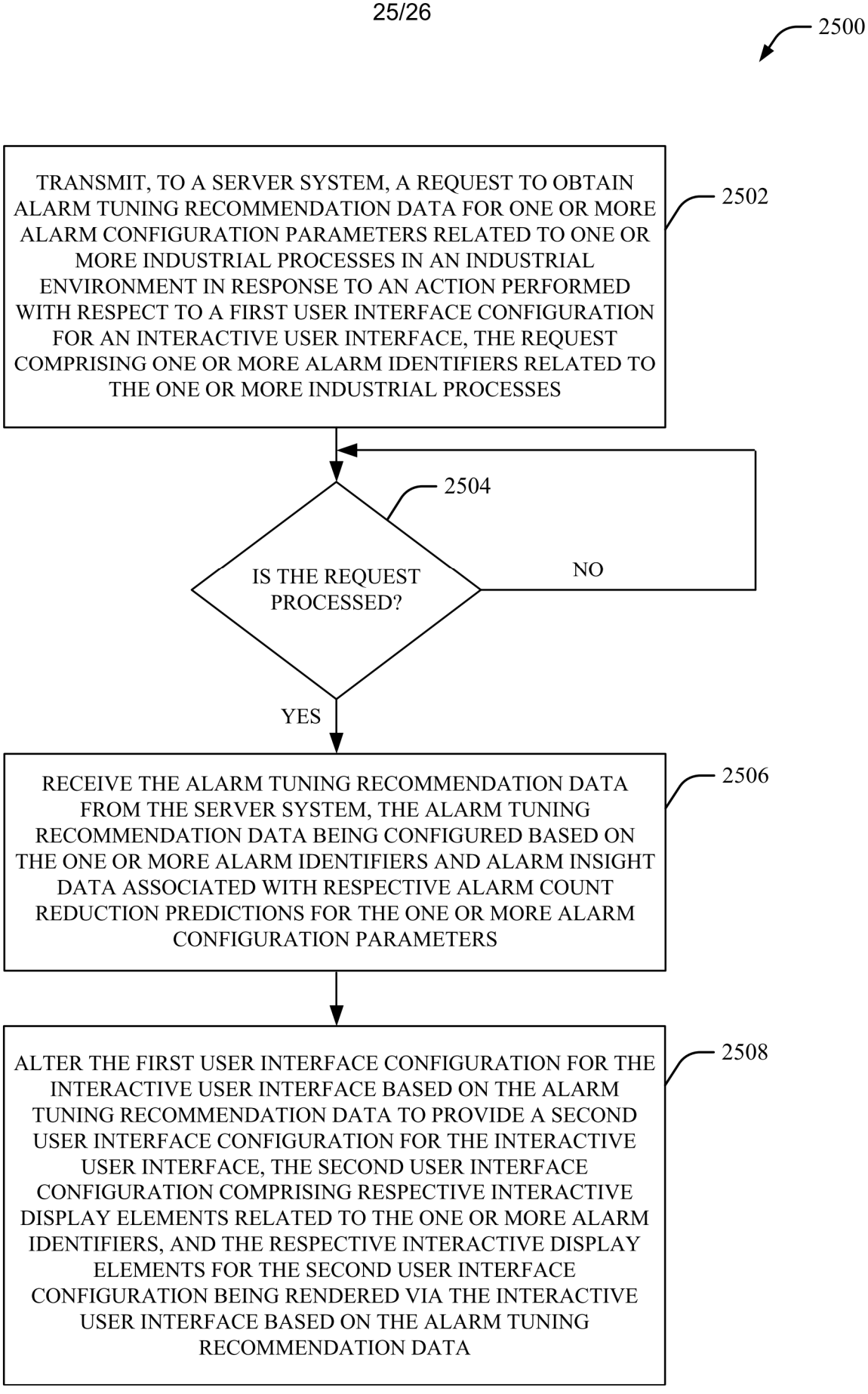

2500
TRANSMIT, TO A SERVER SYSTEM, A REQUEST TO OBTAIN ALARM TUNING RECOMMENDATION DATA FOR ONE OR MORE ALARM CONFIGURATION PARAMETERS RELATED TO ONE OR MORE INDUSTRIAL PROCESSES IN AN INDUSTRIAL ENVIRONMENT IN RESPONSE TO AN ACTION PERFORMED WITH RESPECT TO A FIRST USER INTERFACE CONFIGURATION FOR AN INTERACTIVE USER INTERFACE, THE REQUEST COMPRISING ONE OR MORE ALARM IDENTIFIERS RELATED TO THE ONE OR MORE INDUSTRIAL PROCESSES
2502
2504
IS THE REQUEST PROCESSED?
NO
YES
RECEIVE THE ALARM TUNING RECOMMENDATION DATA FROM THE SERVER SYSTEM, THE ALARM TUNING RECOMMENDATION DATA BEING CONFIGURED BASED ON THE ONE OR MORE ALARM IDENTIFIERS AND ALARM INSIGHT DATA ASSOCIATED WITH RESPECTIVE ALARM COUNT REDUCTION PREDICTIONS FOR THE ONE OR MORE ALARM CONFIGURATION PARAMETERS
2506
ALTER THE FIRST USER INTERFACE CONFIGURATION FOR THE INTERACTIVE USER INTERFACE BASED ON THE ALARM TUNING RECOMMENDATION DATA TO PROVIDE A SECOND USER INTERFACE CONFIGURATION FOR THE INTERACTIVE USER INTERFACE, THE SECOND USER INTERFACE CONFIGURATION COMPRISING RESPECTIVE INTERACTIVE DISPLAY ELEMENTS RELATED TO THE ONE OR MORE ALARM IDENTIFIERS, AND THE RESPECTIVE INTERACTIVE DISPLAY ELEMENTS FOR THE SECOND USER INTERFACE CONFIGURATION BEING RENDERED VIA THE INTERACTIVE USER INTERFACE BASED ON THE ALARM TUNING RECOMMENDATION DATA
2508

FIG. 25

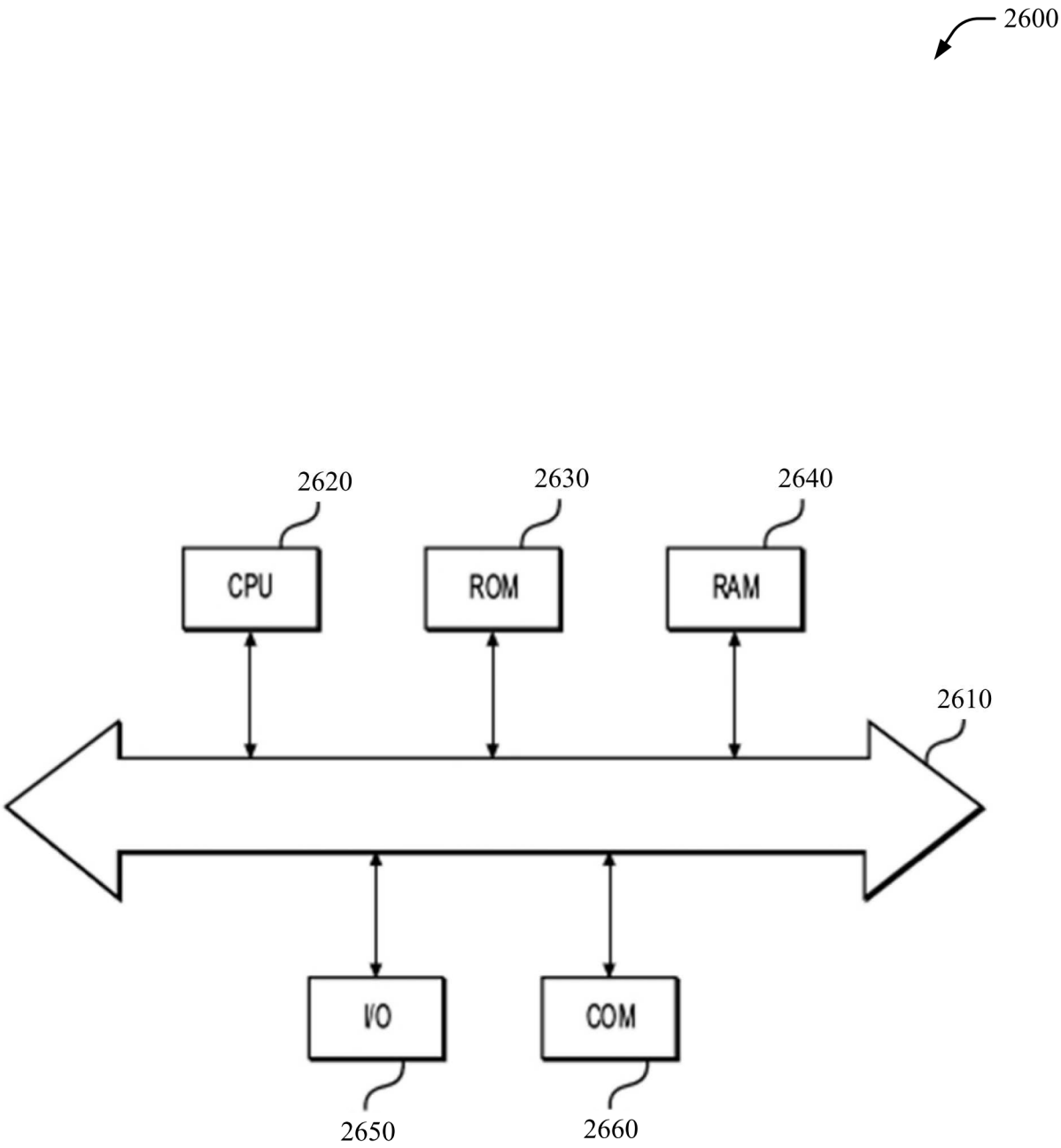


FIG. 26