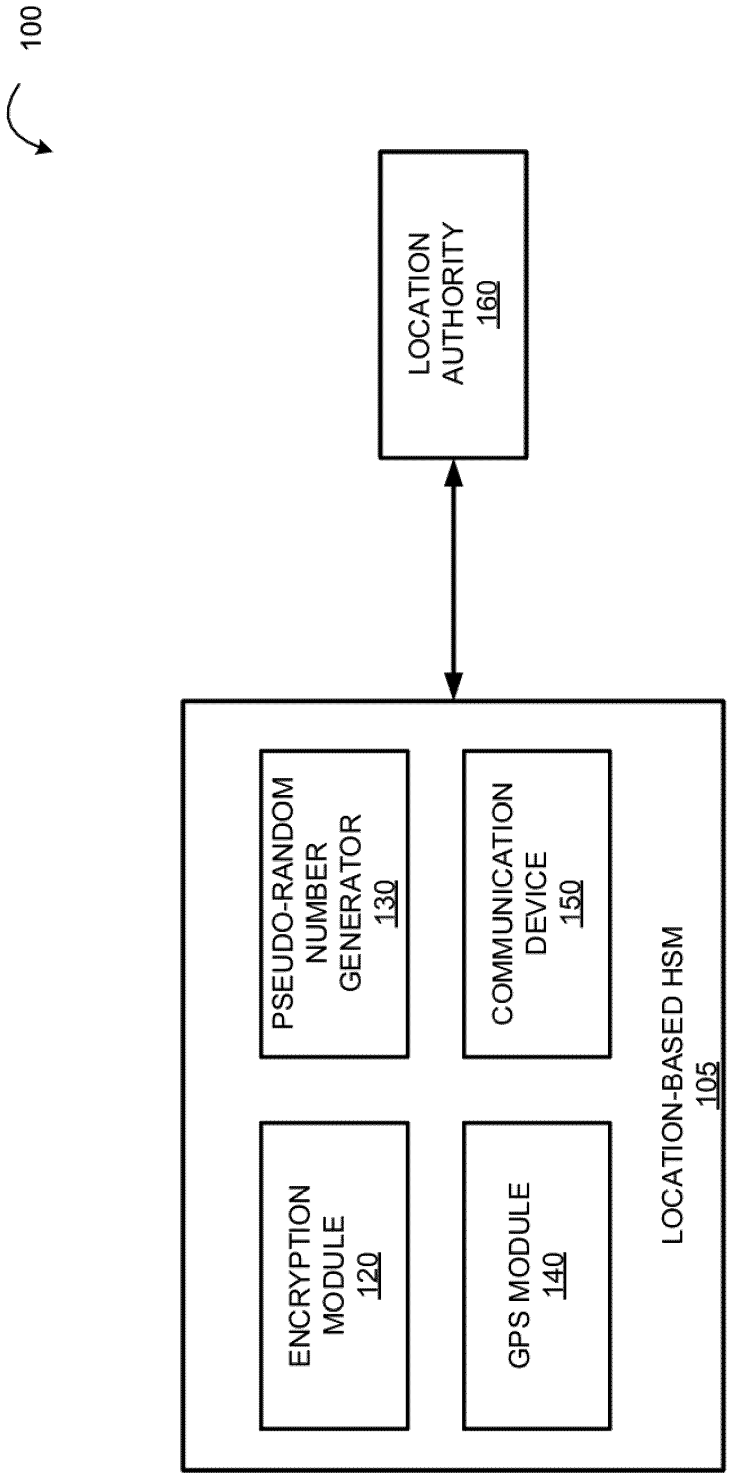
100
LOCATION AUTHORITY 160
PSEUDO-RANDOM NUMBER GENERATOR 130
COMMUNICATION DEVICE 150
ENCRYPTION MODULE 120
GPS MODULE 140
LOCATION-BASED HSM 105

FIG. 1

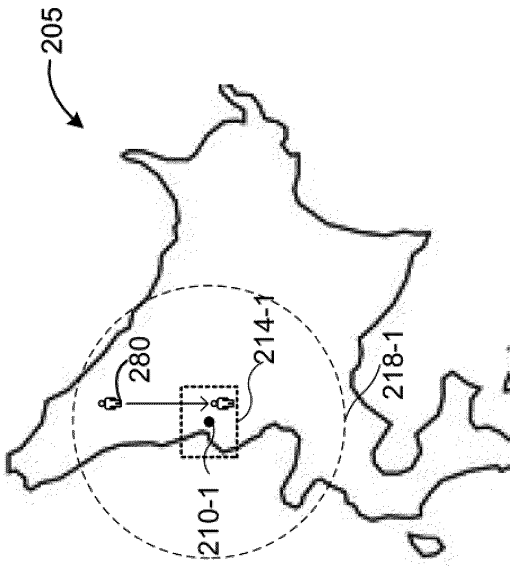
205
280
214-1
218-1
210-1

FIG. 2B

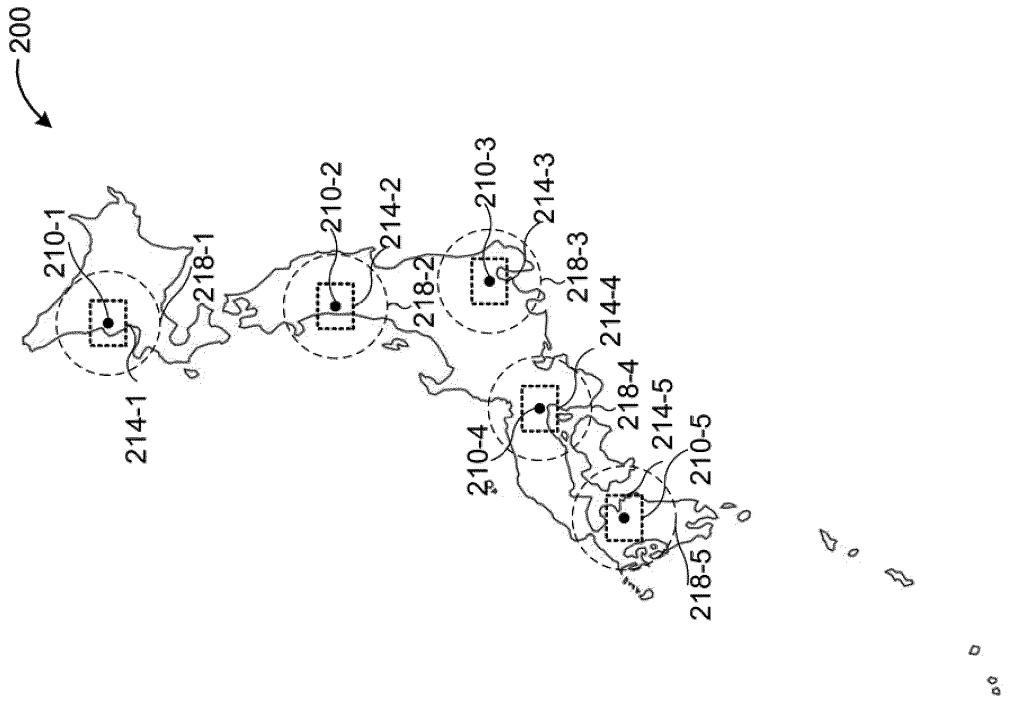
200
210-1
218-1
214-1
210-2
214-2
218-2
210-3
214-3
218-3
214-4
218-4
214-5
210-4
210-5
218-5

FIG. 2A

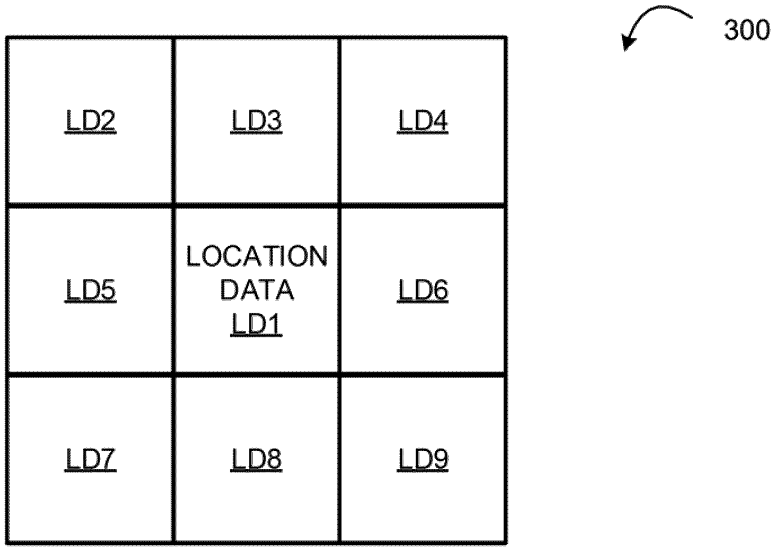

FIG. 3

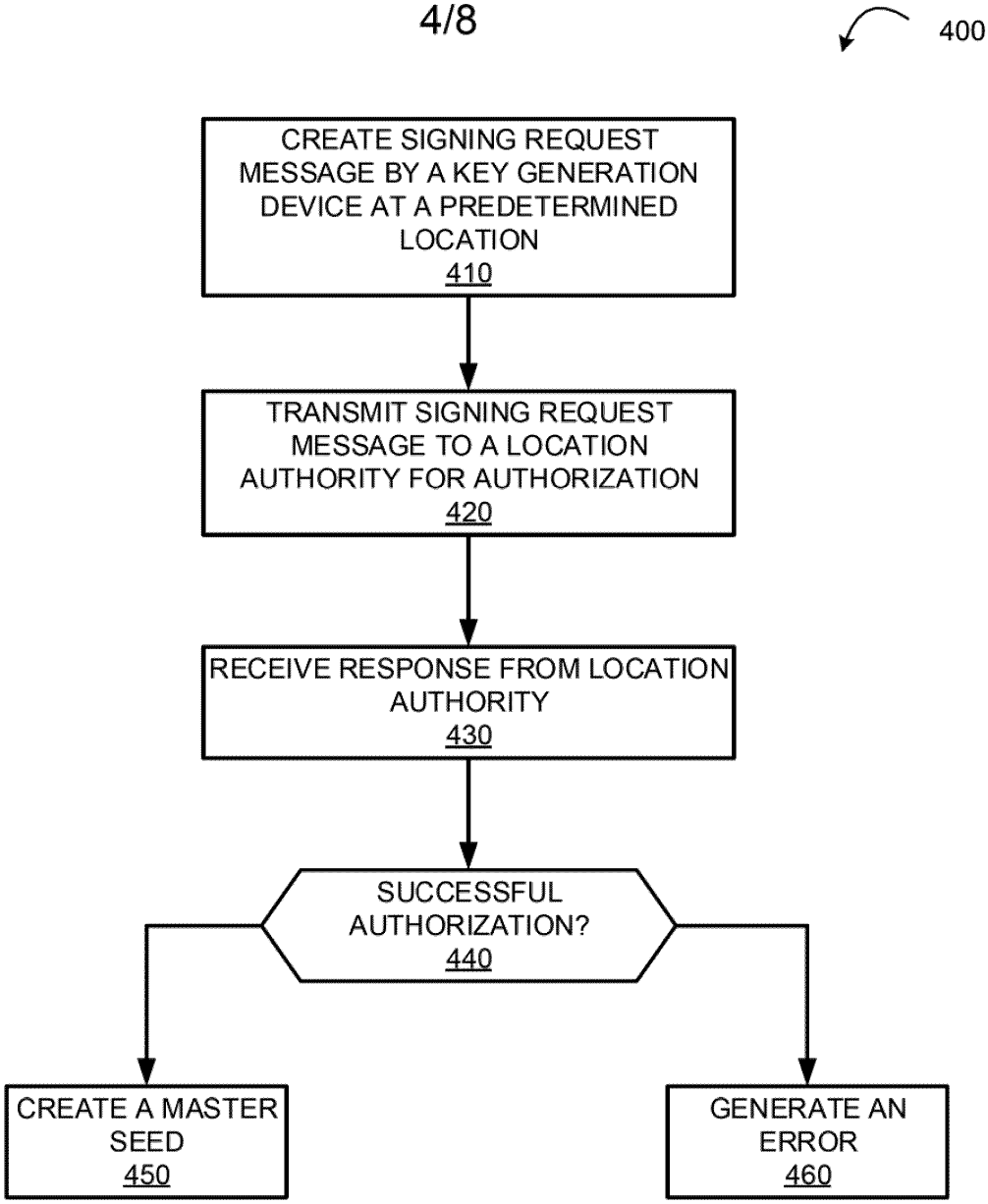
400
CREATE SIGNING REQUEST MESSAGE BY A KEY GENERATION DEVICE AT A PREDETERMINED LOCATION
410
TRANSMIT SIGNING REQUEST MESSAGE TO A LOCATION AUTHORITY FOR AUTHORIZATION
420
RECEIVE RESPONSE FROM LOCATION AUTHORITY
430
SUCCESSFUL AUTHORIZATION?
440
CREATE A MASTER SEED
450
GENERATE AN ERROR
460

FIG. 4

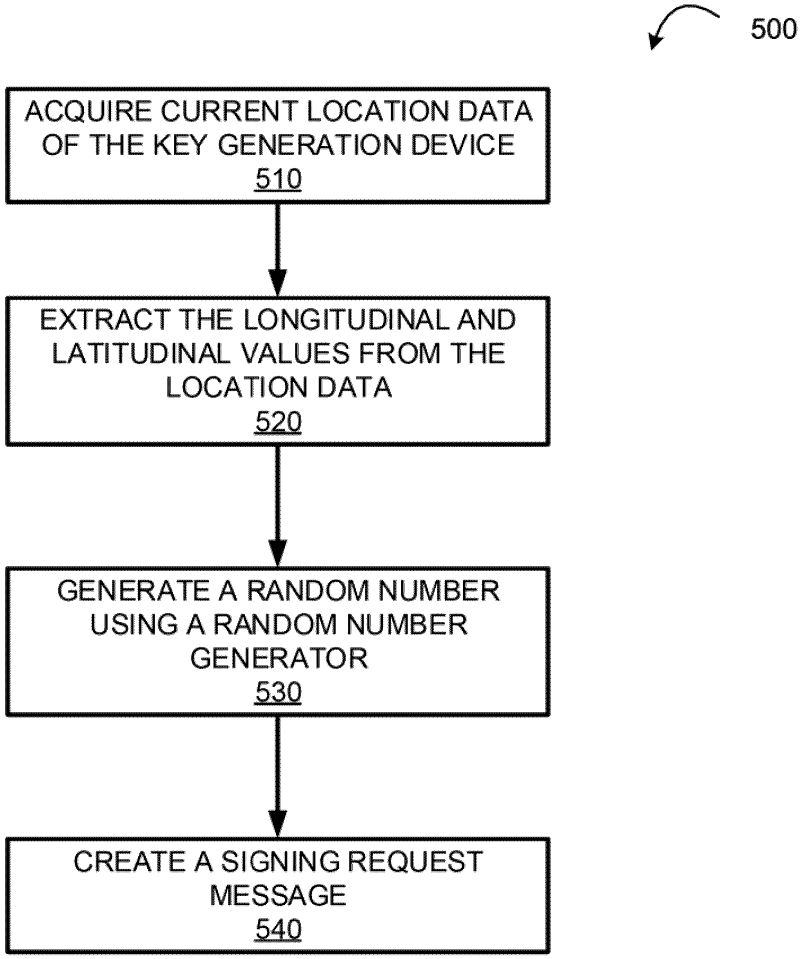
500
ACQUIRE CURRENT LOCATION DATA OF THE KEY GENERATION DEVICE
510
EXTRACT THE LONGITUDINAL AND LATITUDINAL VALUES FROM THE LOCATION DATA
520
GENERATE A RANDOM NUMBER USING A RANDOM NUMBER GENERATOR
530
CREATE A SIGNING REQUEST MESSAGE
540

FIG. 5

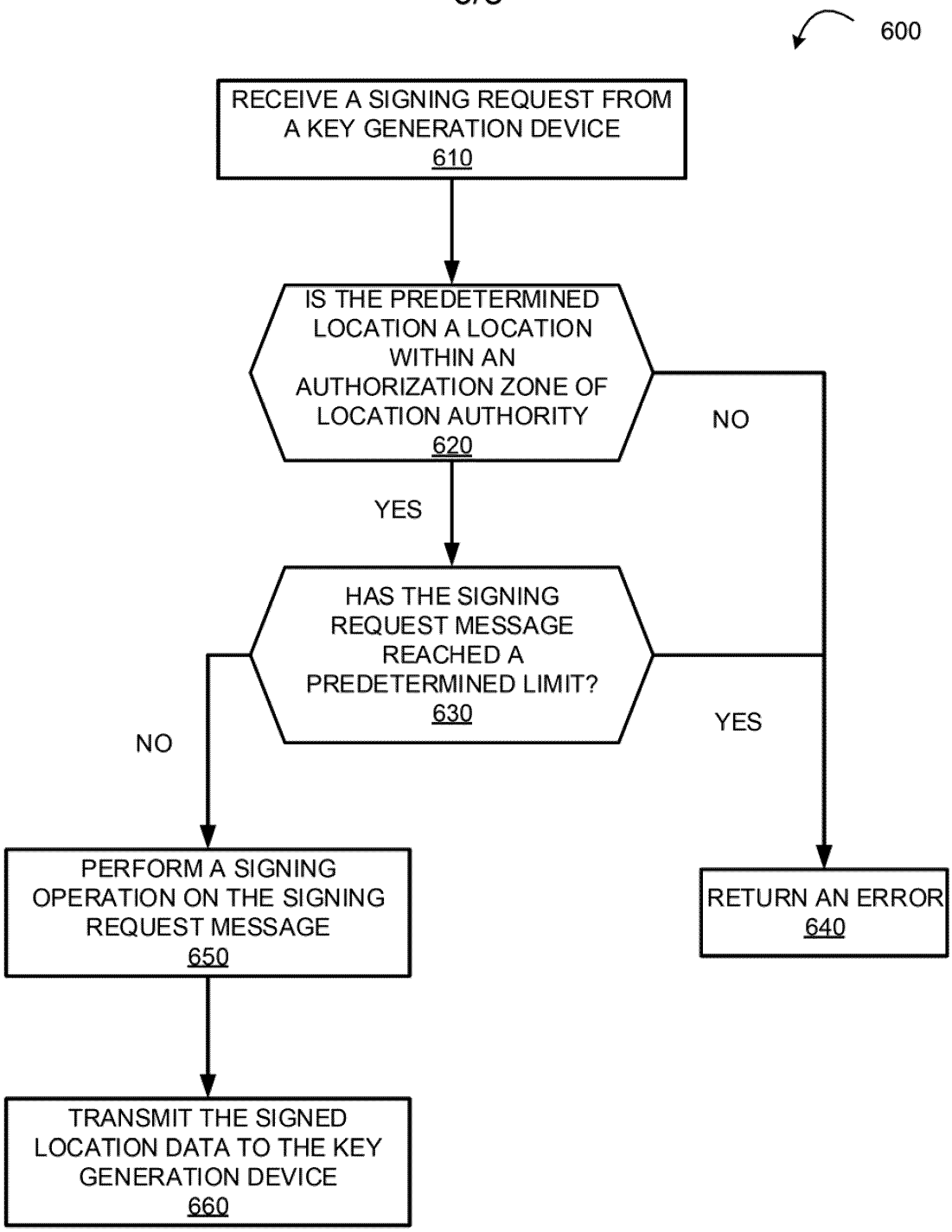
600
RECEIVE A SIGNING REQUEST FROM A KEY GENERATION DEVICE
610
IS THE PREDETERMINED LOCATION A LOCATION WITHIN AN AUTHORIZATION ZONE OF LOCATION AUTHORITY
620
NO
YES
HAS THE SIGNING REQUEST MESSAGE REACHED A PREDETERMINED LIMIT?
630
NO
YES
PERFORM A SIGNING OPERATION ON THE SIGNING REQUEST MESSAGE
650
RETURN AN ERROR
640
TRANSMIT THE SIGNED LOCATION DATA TO THE KEY GENERATION DEVICE
660

FIG. 6

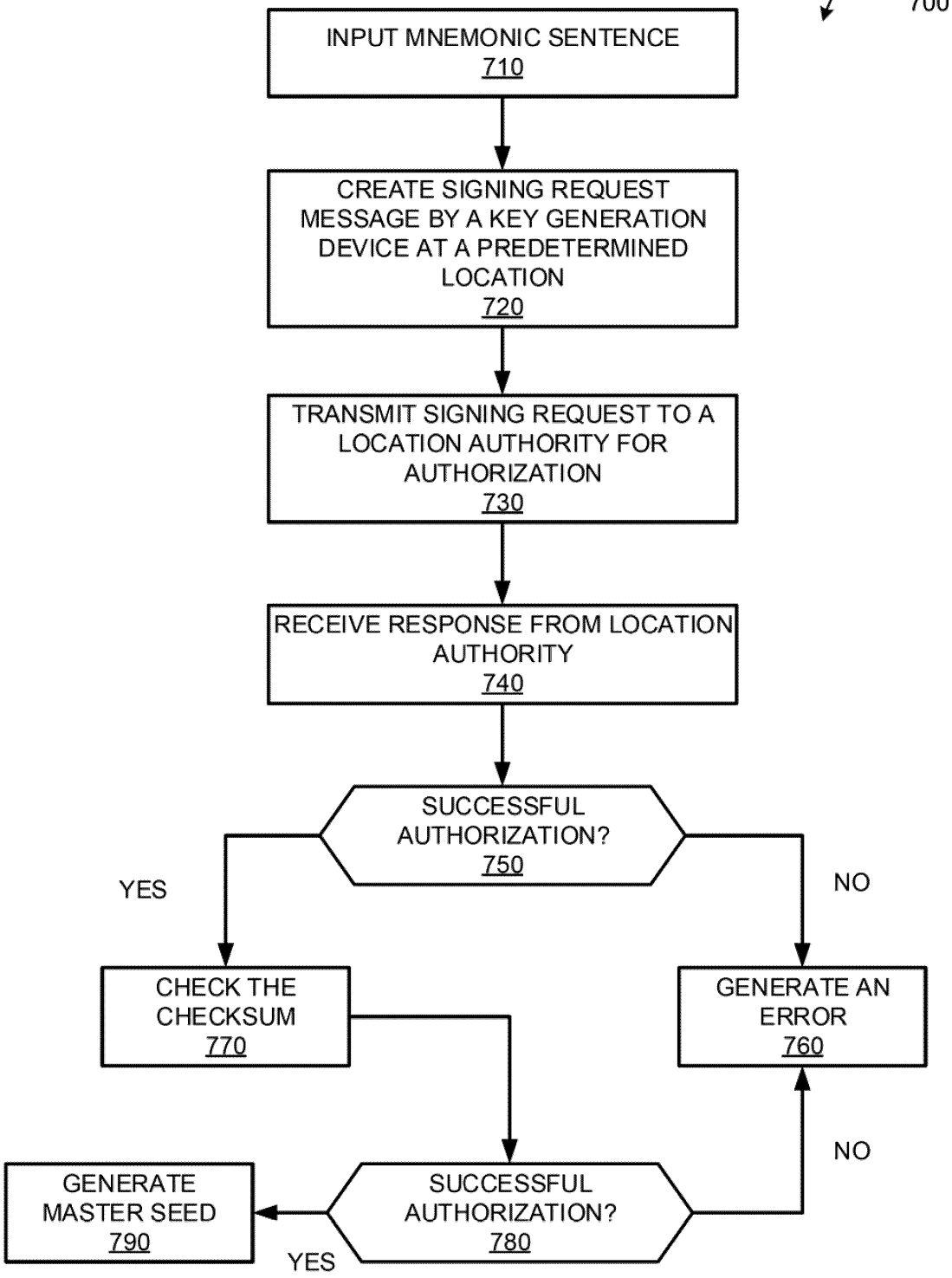
700
INPUT MNEMONIC SENTENCE
710
CREATE SIGNING REQUEST MESSAGE BY A KEY GENERATION DEVICE AT A PREDETERMINED LOCATION
720
TRANSMIT SIGNING REQUEST TO A LOCATION AUTHORITY FOR AUTHORIZATION
730
RECEIVE RESPONSE FROM LOCATION AUTHORITY
740
SUCCESSFUL AUTHORIZATION?
750
YES
NO
CHECK THE CHECKSUM
770
GENERATE AN ERROR
760
NO
GENERATE MASTER SEED
790
SUCCESSFUL AUTHORIZATION?
780
YES

FIG. 7

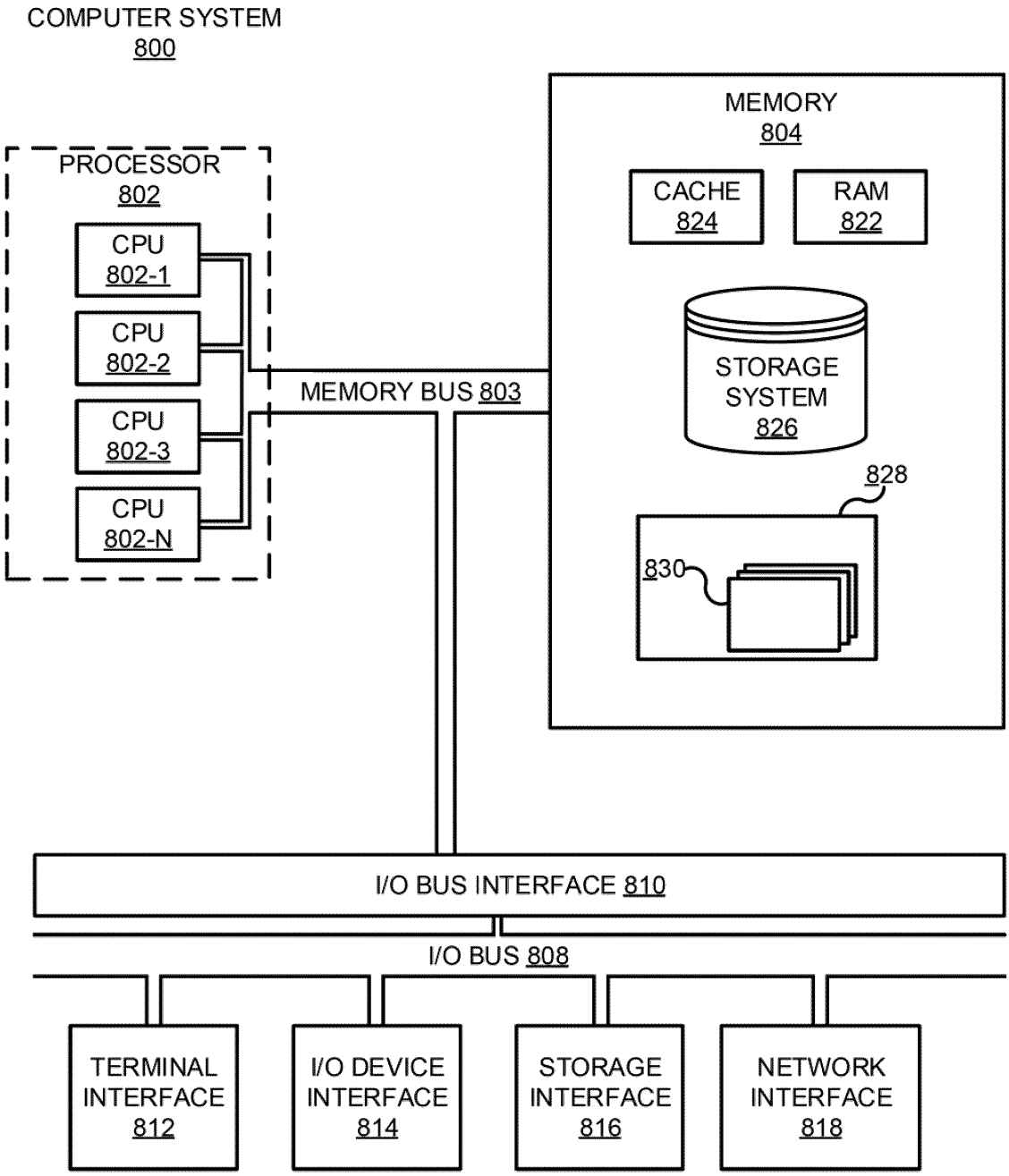
COMPUTER SYSTEM
800
PROCESSOR
802
CPU
802-1
CPU
802-2
CPU
802-3
CPU
802-N
MEMORY
804
CACHE
824
RAM
822
STORAGE
SYSTEM
826
828
830
MEMORY BUS 803
I/O BUS INTERFACE 810
I/O BUS 808
TERMINAL
INTERFACE
812
I/O DEVICE
INTERFACE
814
STORAGE
INTERFACE
816
NETWORK
INTERFACE
818

FIG. 8