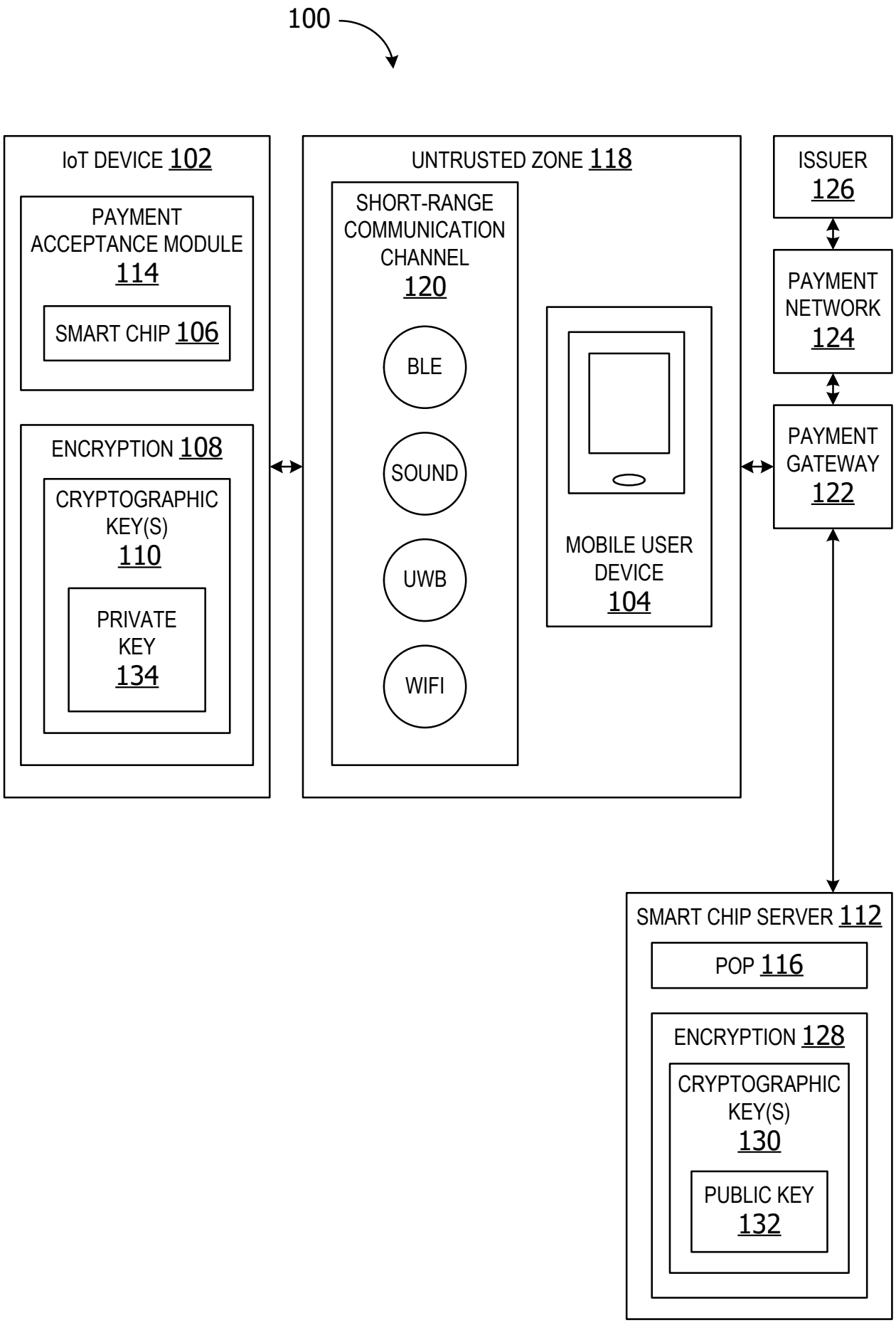

100
IoT DEVICE 102
PAYMENT ACCEPTANCE MODULE 114
SMART CHIP 106
ENCRYPTION 108
CRYPTOGRAPHIC KEY(S) 110
PRIVATE KEY 134
UNTRUSTED ZONE 118
SHORT-RANGE COMMUNICATION CHANNEL 120
BLE
SOUND
UWB
WIFI
MOBILE USER DEVICE 104
ISSUER 126
PAYMENT NETWORK 124
PAYMENT GATEWAY 122
SMART CHIP SERVER 112
POP 116
ENCRYPTION 128
CRYPTOGRAPHIC KEY(S) 130
PUBLIC KEY 132

FIG. 1

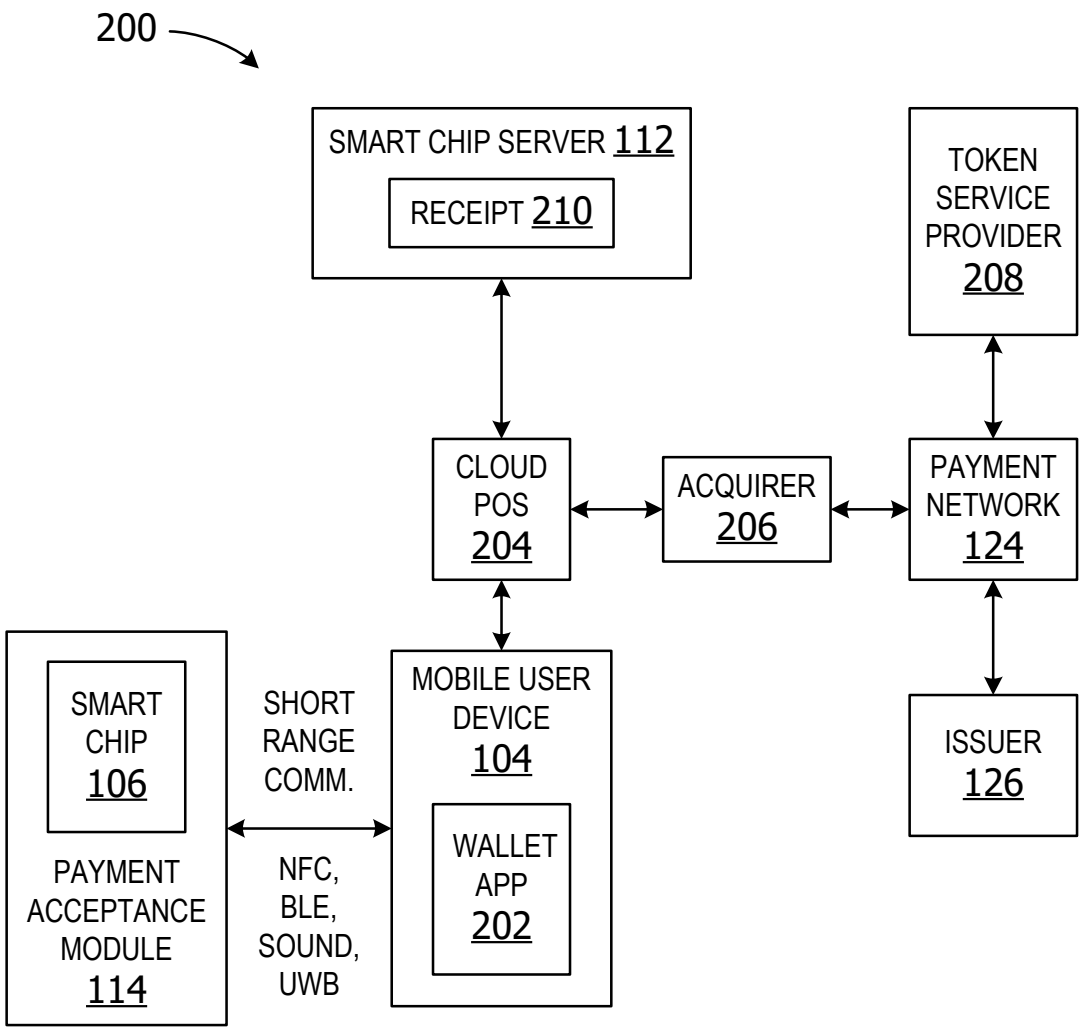

200
SMART CHIP SERVER 112
RECEIPT 210
TOKEN SERVICE PROVIDER 208
CLOUD POS 204
ACQUIRER 206
PAYMENT NETWORK 124
SMART CHIP 106
PAYMENT ACCEPTANCE MODULE 114
SHORT RANGE COMM.
NFC, BLE, SOUND, UWB
MOBILE USER DEVICE 104
WALLET APP 202
ISSUER 126

FIG. 2

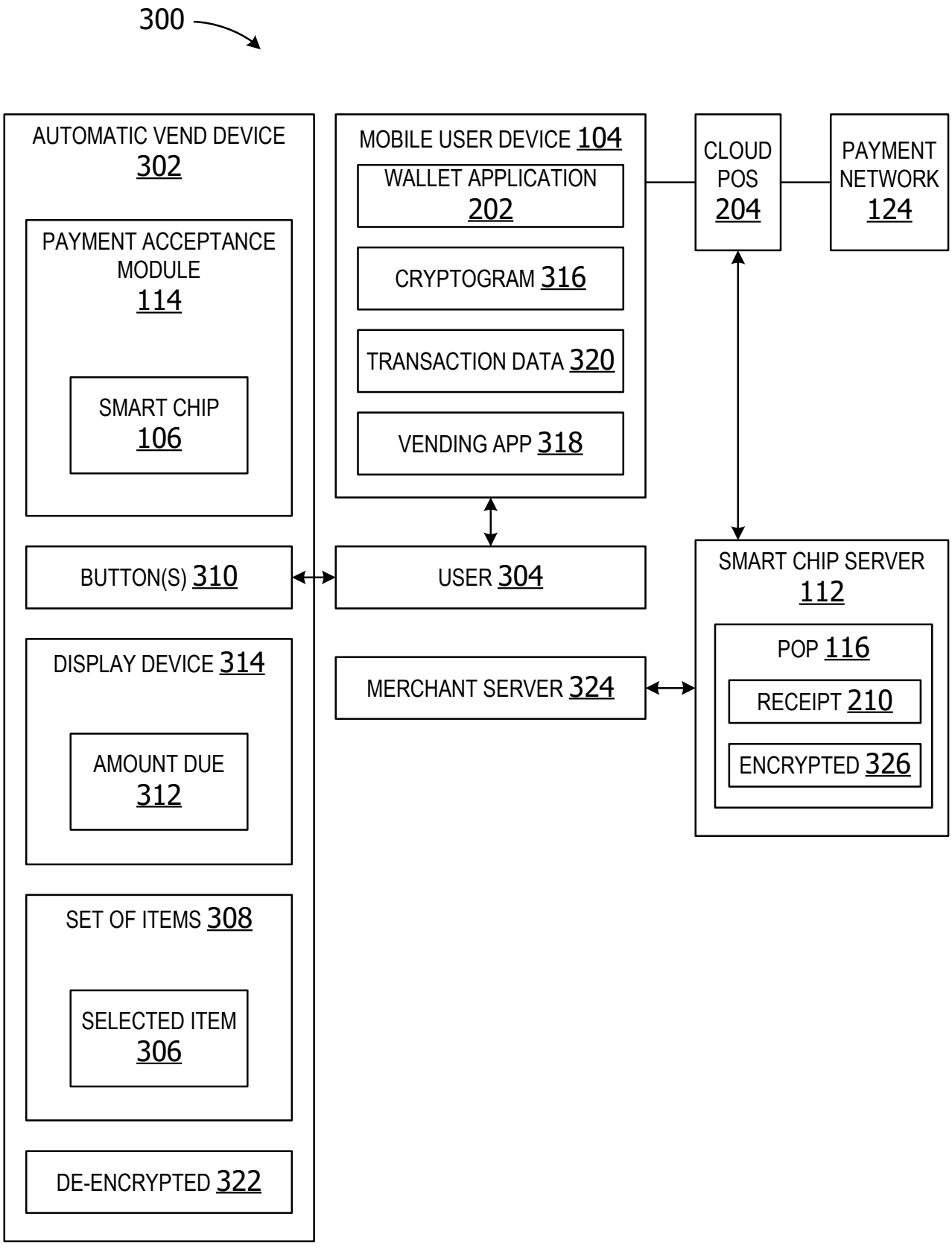

300
AUTOMATIC VEND DEVICE 302
PAYMENT ACCEPTANCE MODULE 114
SMART CHIP 106
BUTTON(S) 310
DISPLAY DEVICE 314
AMOUNT DUE 312
SET OF ITEMS 308
SELECTED ITEM 306
DE-ENCRYPTED 322
MOBILE USER DEVICE 104
WALLET APPLICATION 202
CRYPTOGRAM 316
TRANSACTION DATA 320
VENDING APP 318
USER 304
MERCHANT SERVER 324
CLOUD POS 204
PAYMENT NETWORK 124
SMART CHIP SERVER 112
POP 116
RECEIPT 210
ENCRYPTED 326

FIG. 3

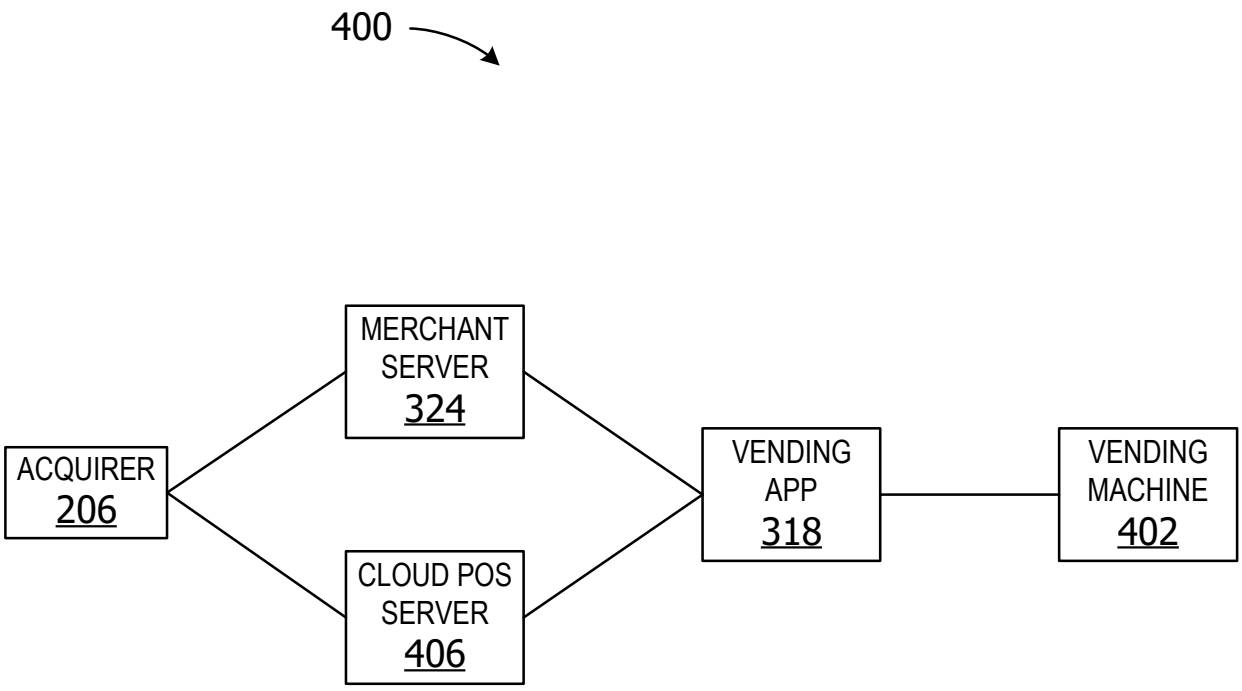

400
MERCHANT SERVER 324
ACQUIRER 206
CLOUD POS SERVER 406
VENDING APP 318
VENDING MACHINE 402

FIG. 4

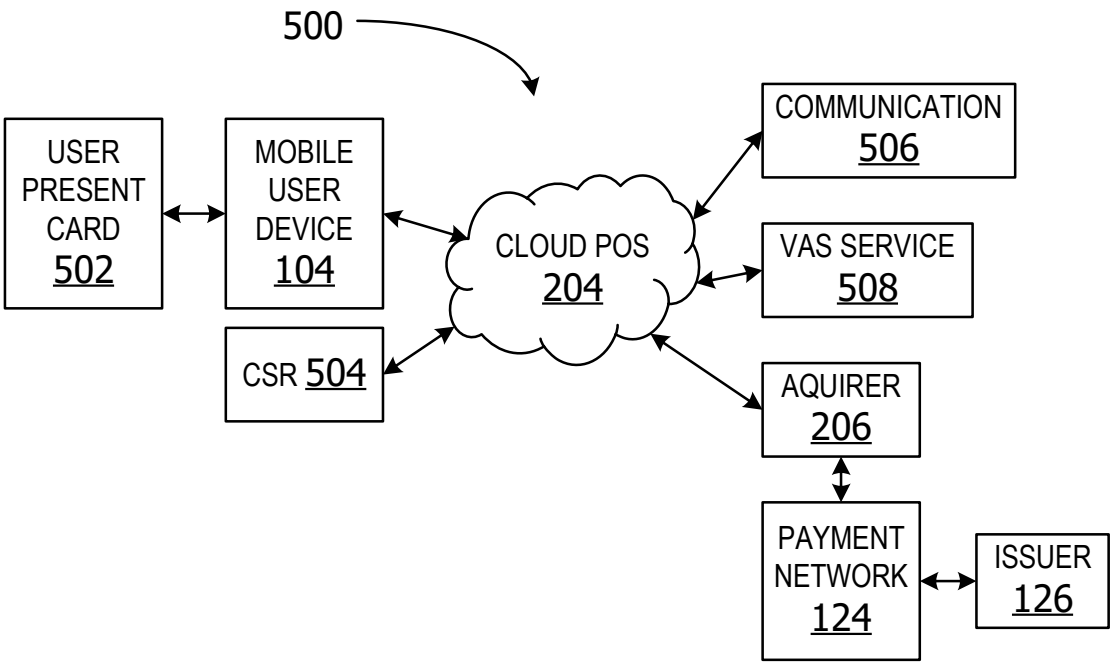

500
USER PRESENT CARD 502
MOBILE USER DEVICE 104
CSR 504
CLOUD POS 204
COMMUNICATION 506
VAS SERVICE 508
AQUIRER 206
PAYMENT NETWORK 124
ISSUER 126

FIG. 5

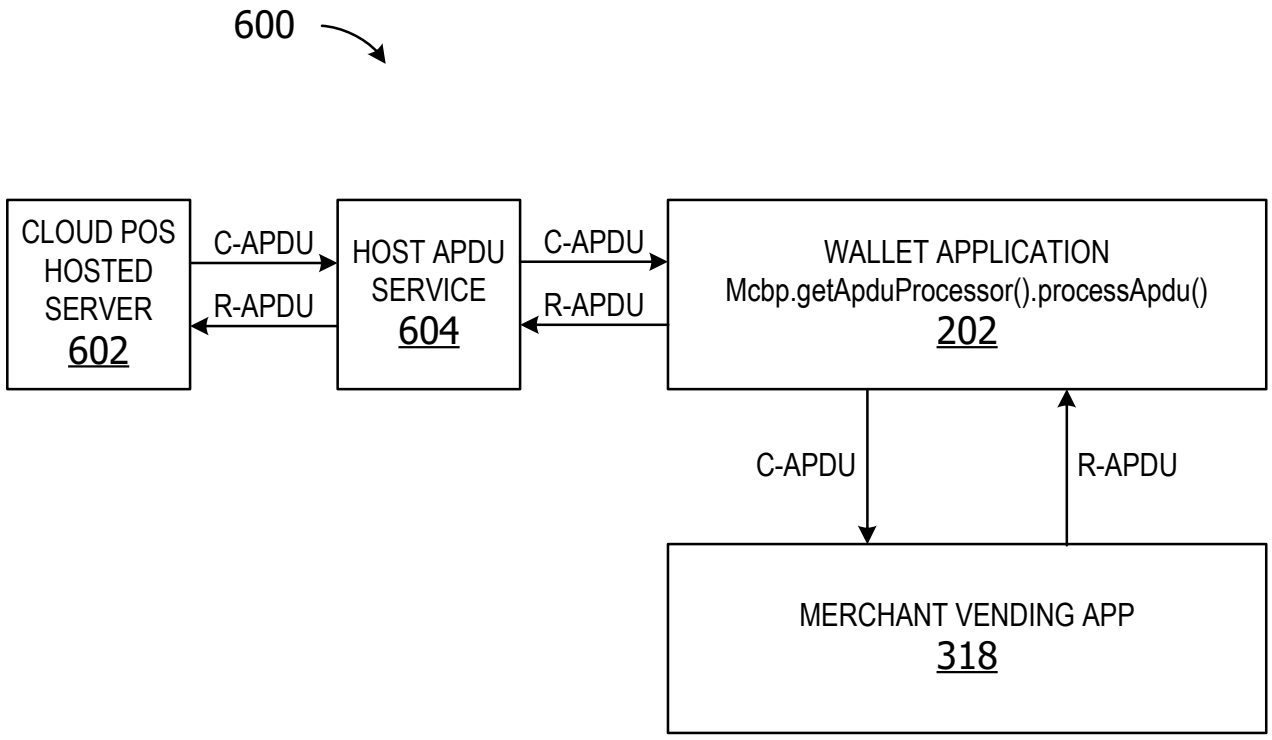

600
CLOUD POS HOSTED SERVER 602
C-APDU
R-APDU
HOST APDU SERVICE 604
C-APDU
R-APDU
WALLET APPLICATION Mcbp.getApduProcessor().processApdu() 202
C-APDU
R-APDU
MERCHANT VENDING APP 318

FIG. 6

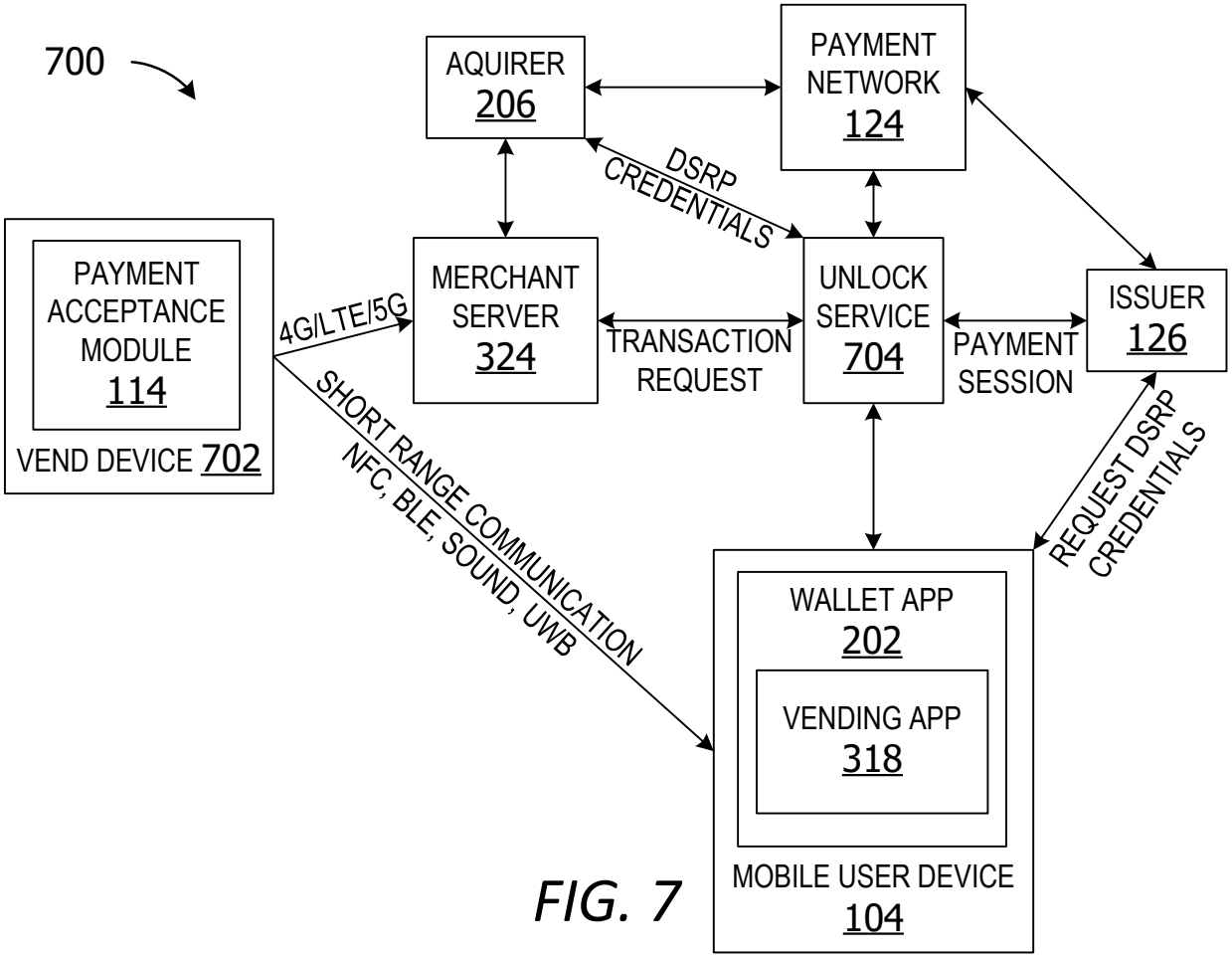

700
AQUIRER
206
PAYMENT
NETWORK
124
DSRP
CREDENTIALS
PAYMENT
ACCEPTANCE
MODULE
114
VEND DEVICE 702
4G/LTE/5G
MERCHANT
SERVER
324
TRANSACTION
REQUEST
UNLOCK
SERVICE
704
PAYMENT
SESSION
ISSUER
126
SHORT RANGE COMMUNICATION
NFC, BLE, SOUND, UWB
REQUEST DSRP
CREDENTIALS
WALLET APP
202
VENDING APP
318
MOBILE USER DEVICE
104

FIG. 7

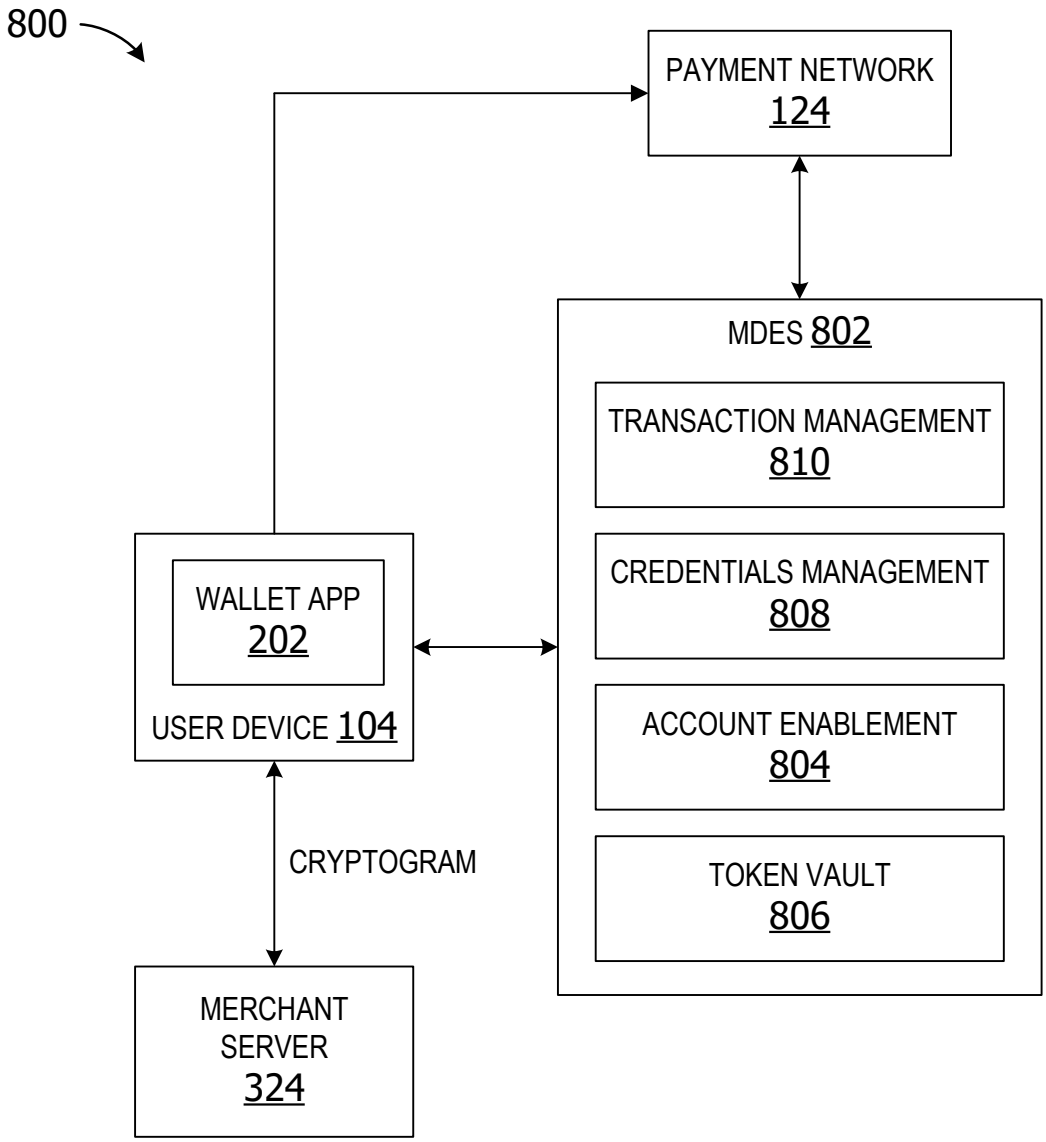

800
PAYMENT NETWORK
124
MDES 802
TRANSACTION MANAGEMENT
810
CREDENTIALS MANAGEMENT
808
ACCOUNT ENABLEMENT
804
TOKEN VAULT
806
WALLET APP
202
USER DEVICE 104
CRYPTOGRAM
MERCHANT
SERVER
324

FIG. 8

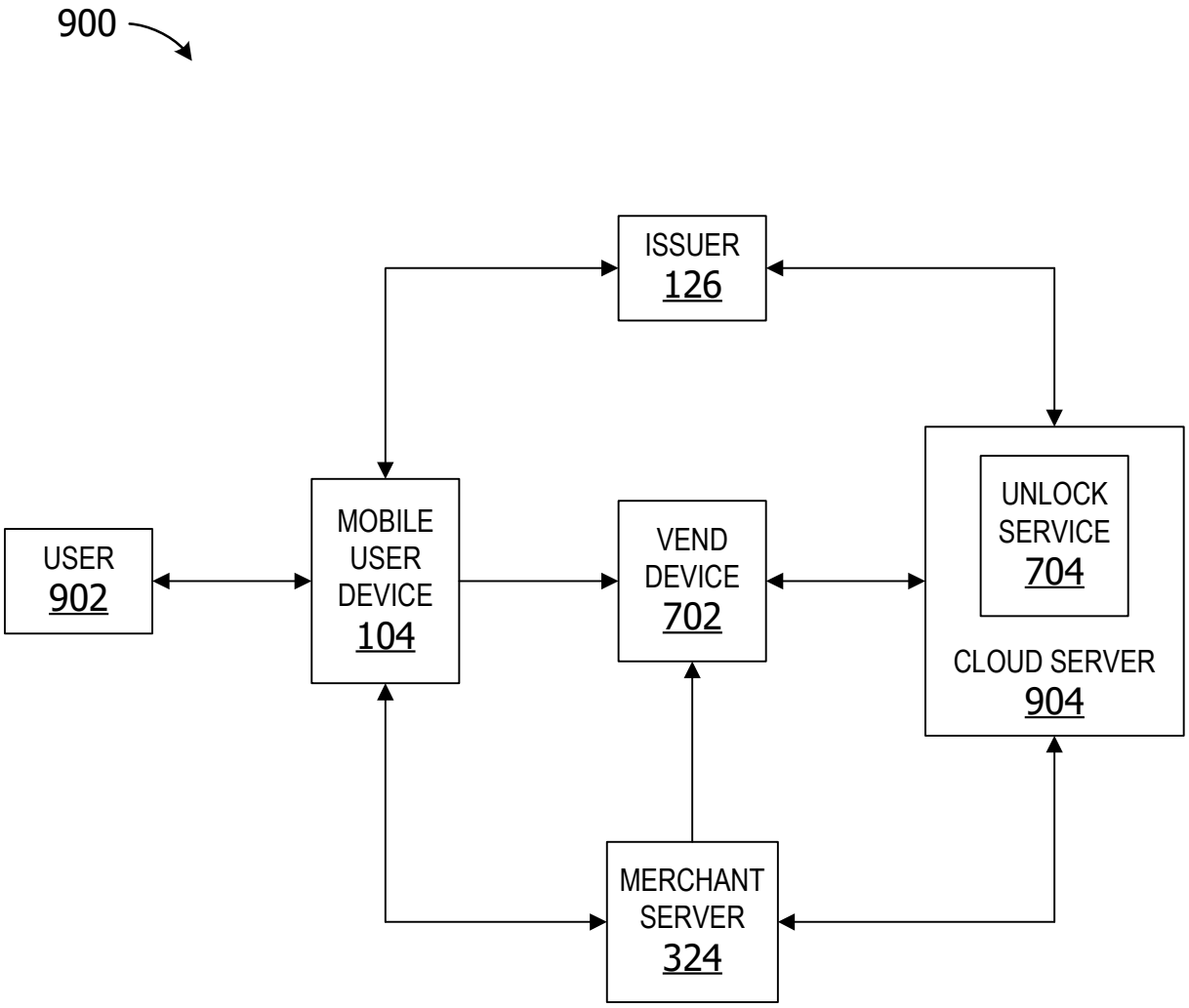

900
ISSUER
126
USER
902
MOBILE
USER
DEVICE
104
VEND
DEVICE
702
UNLOCK
SERVICE
704
CLOUD SERVER
904
MERCHANT
SERVER
324

FIG. 9

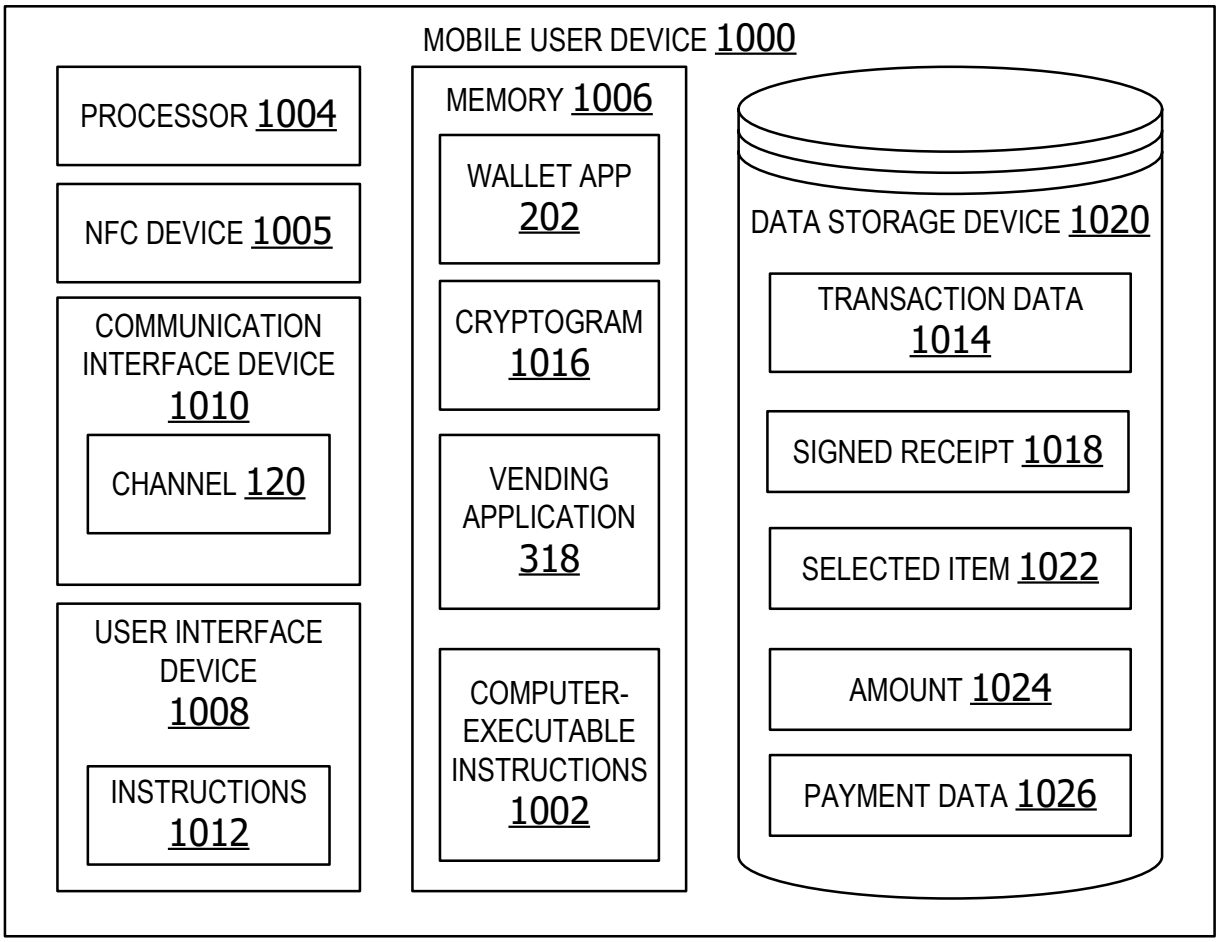

MOBILE USER DEVICE 1000
PROCESSOR 1004
NFC DEVICE 1005
COMMUNICATION INTERFACE DEVICE 1010
CHANNEL 120
USER INTERFACE DEVICE 1008
INSTRUCTIONS 1012
MEMORY 1006
WALLET APP 202
CRYPTOGRAM 1016
VENDING APPLICATION 318
COMPUTER-EXECUTABLE INSTRUCTIONS 1002
DATA STORAGE DEVICE 1020
TRANSACTION DATA 1014
SIGNED RECEIPT 1018
SELECTED ITEM 1022
AMOUNT 1024
PAYMENT DATA 1026

FIG. 10

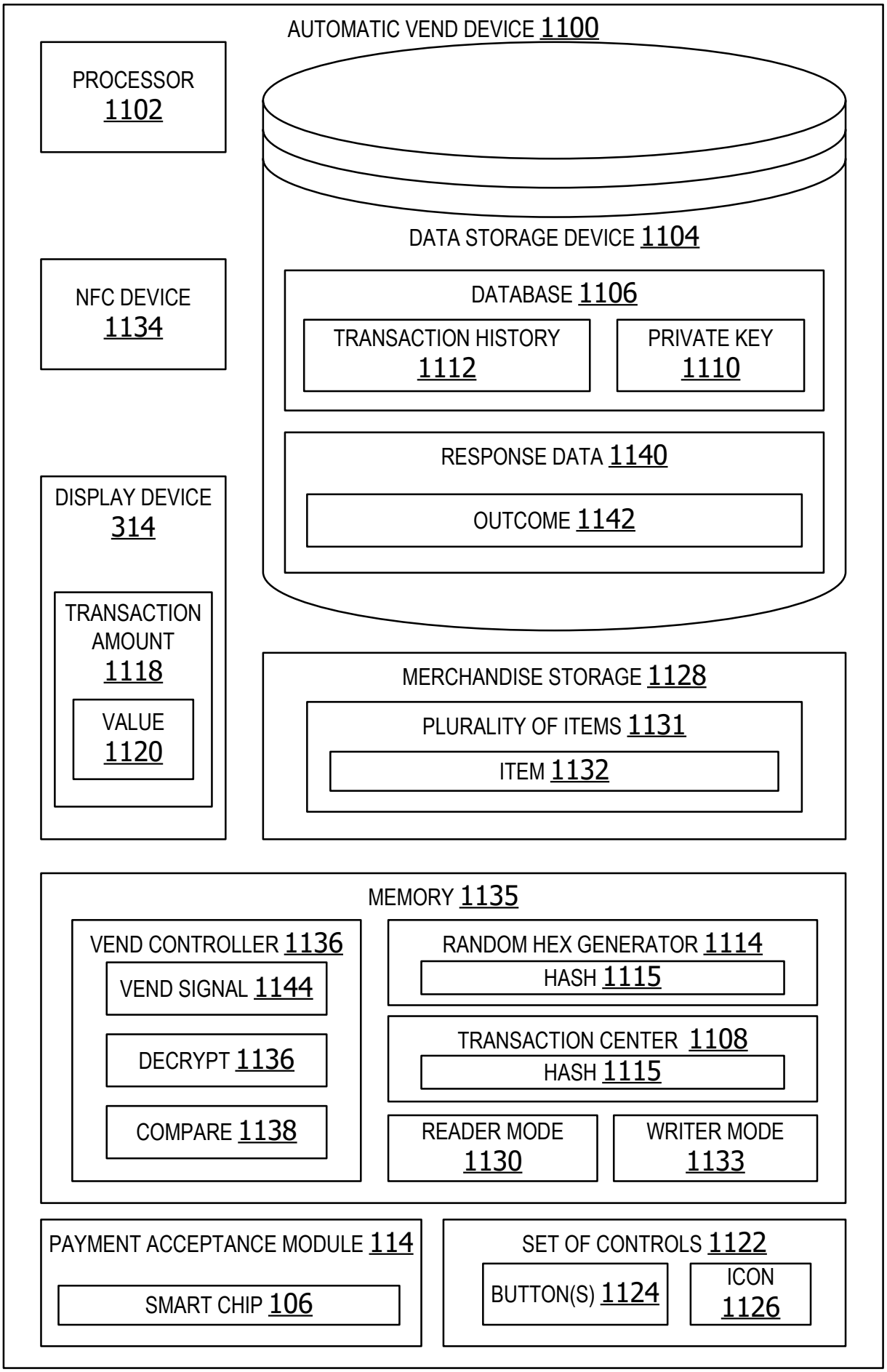

AUTOMATIC VEND DEVICE 1100
PROCESSOR 1102
DATA STORAGE DEVICE 1104
DATABASE 1106
TRANSACTION HISTORY 1112
PRIVATE KEY 1110
RESPONSE DATA 1140
OUTCOME 1142
NFC DEVICE 1134
DISPLAY DEVICE 314
TRANSACTION AMOUNT 1118
VALUE 1120
MERCHANDISE STORAGE 1128
PLURALITY OF ITEMS 1131
ITEM 1132
MEMORY 1135
VEND CONTROLLER 1136
VEND SIGNAL 1144
DECRYPT 1136
COMPARE 1138
RANDOM HEX GENERATOR 1114
HASH 1115
TRANSACTION CENTER 1108
HASH 1115
READER MODE 1130
WRITER MODE 1133
PAYMENT ACCEPTANCE MODULE 114
SMART CHIP 106
SET OF CONTROLS 1122
BUTTON(S) 1124
ICON 1126

FIG. 11

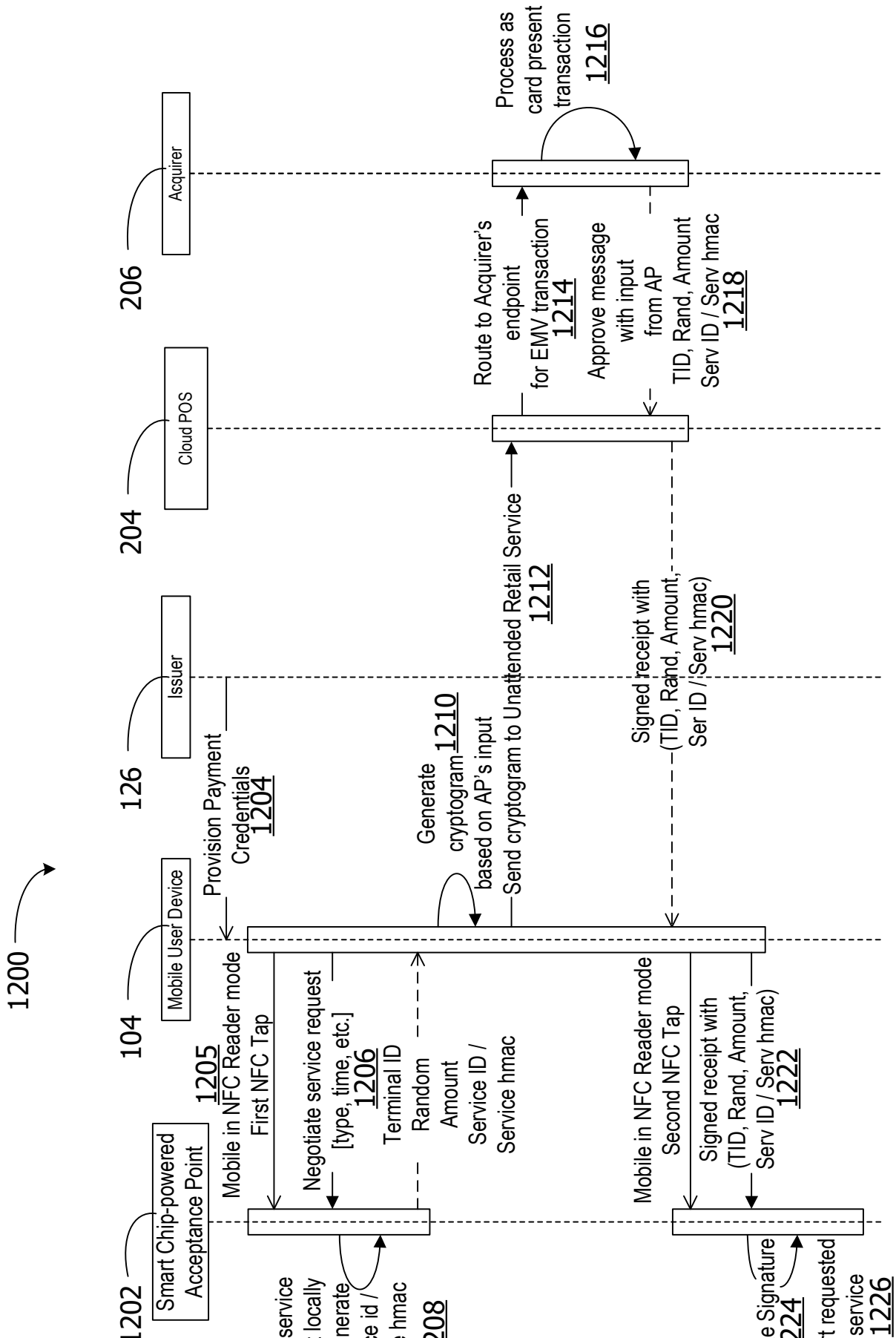

1200
1202
Smart Chip-powered Acceptance Point
104
Mobile User Device
126
Issuer
204
Cloud POS
206
Acquirer
Provision Payment Credentials 1204
Mobile in NFC Reader mode 1205
First NFC Tap
Negotiate service request [type, time, etc.] 1206
Terminal ID
Random
Amount
Service ID / Service hmac
Persist service request locally and generate service id / service hmac 1208
Generate cryptogram 1210 based on AP's input
Send cryptogram to Unattended Retail Service 1212
Route to Acquirer's endpoint for EMV transaction 1214
Process as card present transaction 1216
Approve message with input from AP
TID, Rand, Amount
Serv ID / Serv hmac 1218
Signed receipt with (TID, Rand, Amount, Ser ID / Serv hmac) 1220
Mobile in NFC Reader mode
Second NFC Tap
Signed receipt with (TID, Rand, Amount, Serv ID / Serv hmac) 1222
Validate Signature 1224
Start requested service 1226

FIG. 12

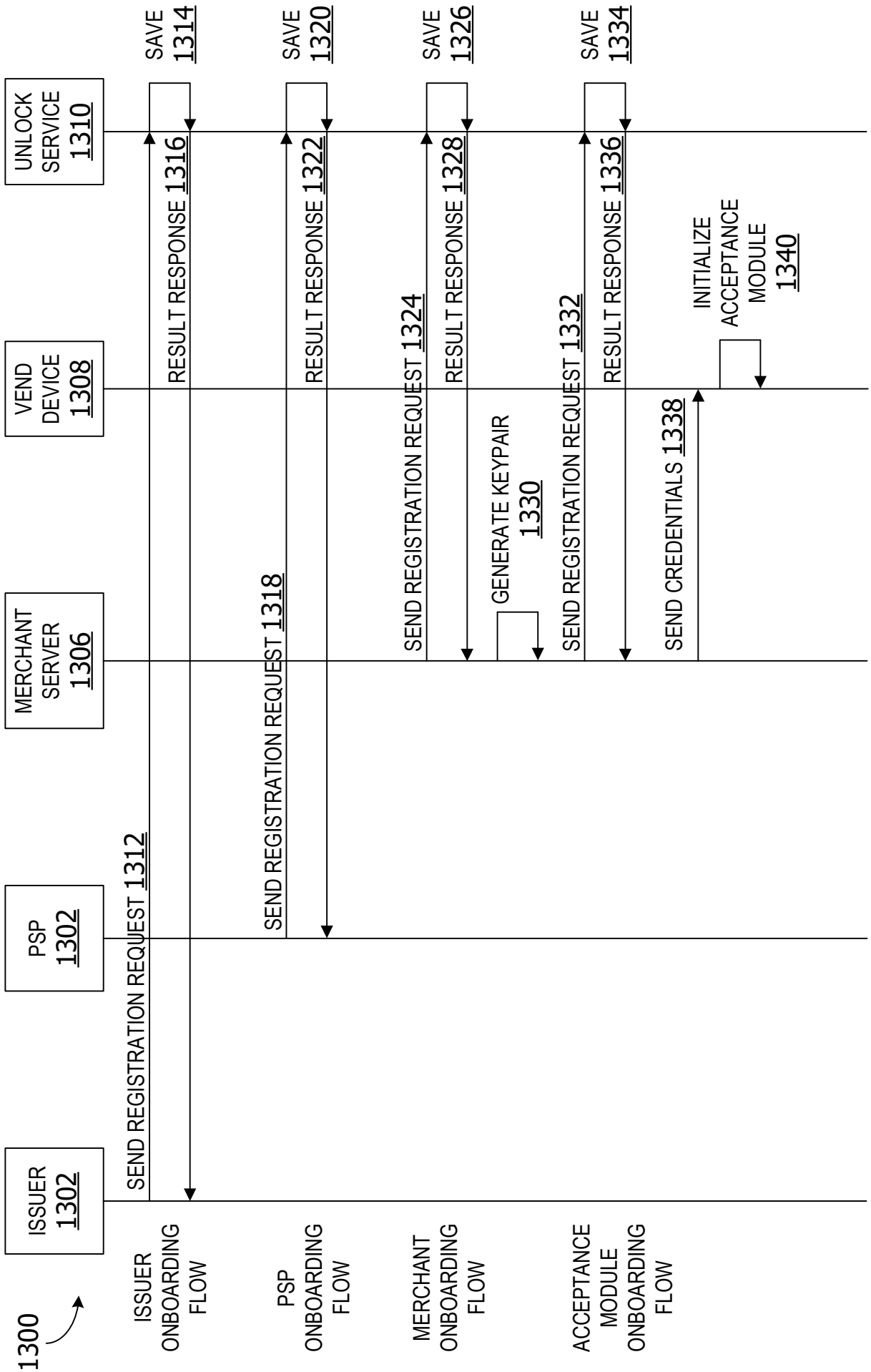

1300
ISSUER 1302
PSP 1302
MERCHANT SERVER 1306
VEND DEVICE 1308
UNLOCK SERVICE 1310
ISSUER ONBOARDING FLOW
PSP ONBOARDING FLOW
MERCHANT ONBOARDING FLOW
ACCEPTANCE MODULE ONBOARDING FLOW
SEND REGISTRATION REQUEST 1312
SAVE 1314
RESULT RESPONSE 1316
SEND REGISTRATION REQUEST 1318
SAVE 1320
RESULT RESPONSE 1322
SEND REGISTRATION REQUEST 1324
SAVE 1326
RESULT RESPONSE 1328
GENERATE KEYPAIR 1330
SEND REGISTRATION REQUEST 1332
SAVE 1334
RESULT RESPONSE 1336
SEND CREDENTIALS 1338
INITIALIZE ACCEPTANCE MODULE 1340

FIG. 13

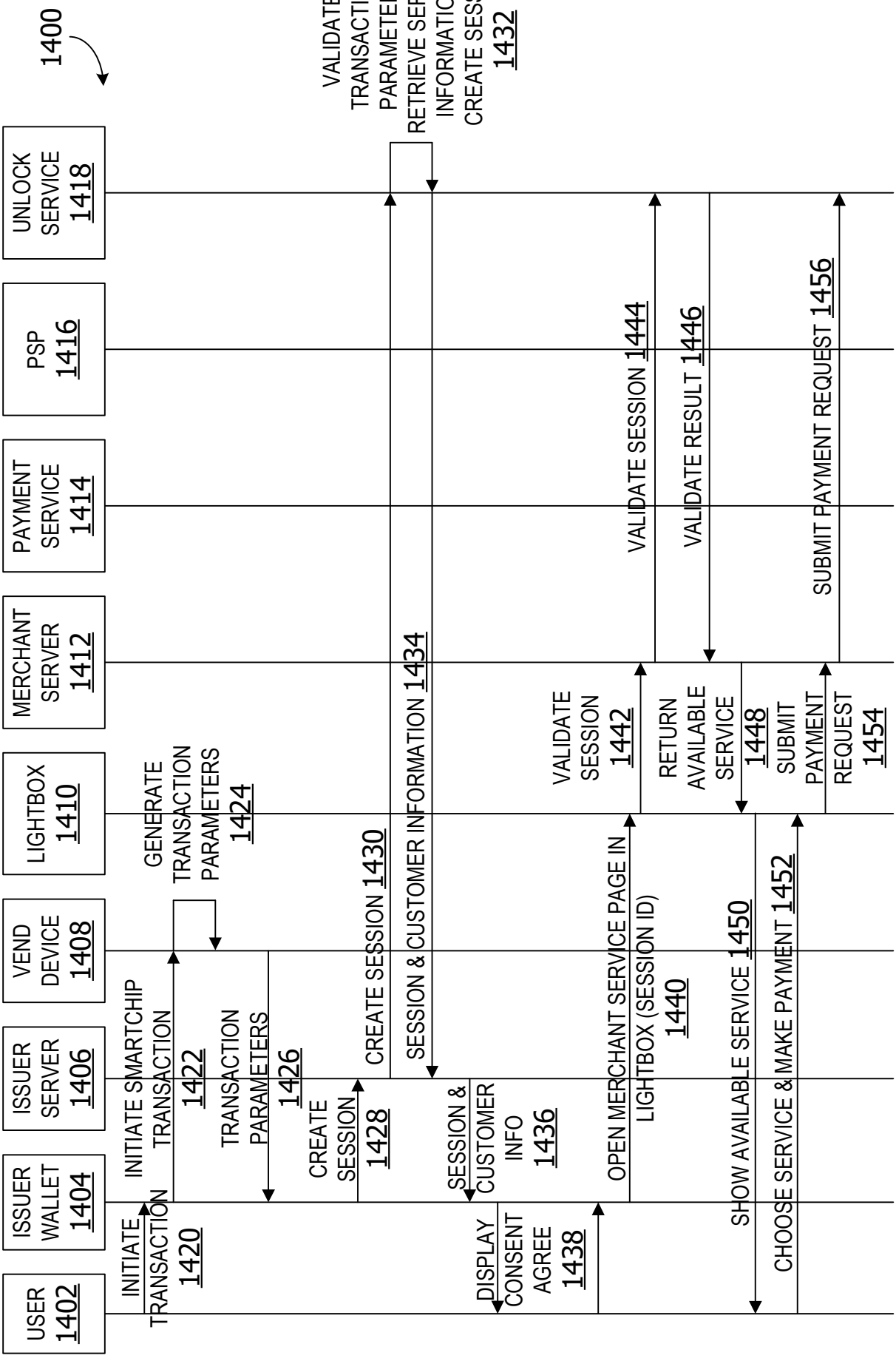

1400
USER 1402
ISSUER WALLET 1404
ISSUER SERVER 1406
VEND DEVICE 1408
LIGHTBOX 1410
MERCHANT SERVER 1412
PAYMENT SERVICE 1414
PSP 1416
UNLOCK SERVICE 1418
INITIATE TRANSACTION 1420
INITIATE SMARTCHIP TRANSACTION 1422
GENERATE TRANSACTION PARAMETERS 1424
TRANSACTION PARAMETERS 1426
CREATE SESSION 1428
CREATE SESSION 1430
VALIDATE TRANSACTION PARAMETERS, RETRIEVE SERVICE INFORMATION & CREATE SESSION 1432
SESSION & CUSTOMER INFORMATION 1434
SESSION & CUSTOMER INFO 1436
DISPLAY CONSENT AGREE 1438
OPEN MERCHANT SERVICE PAGE IN LIGHTBOX (SESSION ID) 1440
SHOW AVAILABLE SERVICE 1450
CHOOSE SERVICE & MAKE PAYMENT 1452
VALIDATE SESSION 1442
VALIDATE SESSION 1444
RETURN AVAILABLE SERVICE 1448
VALIDATE RESULT 1446
SUBMIT PAYMENT REQUEST 1454
SUBMIT PAYMENT REQUEST 1456

FIG. 14

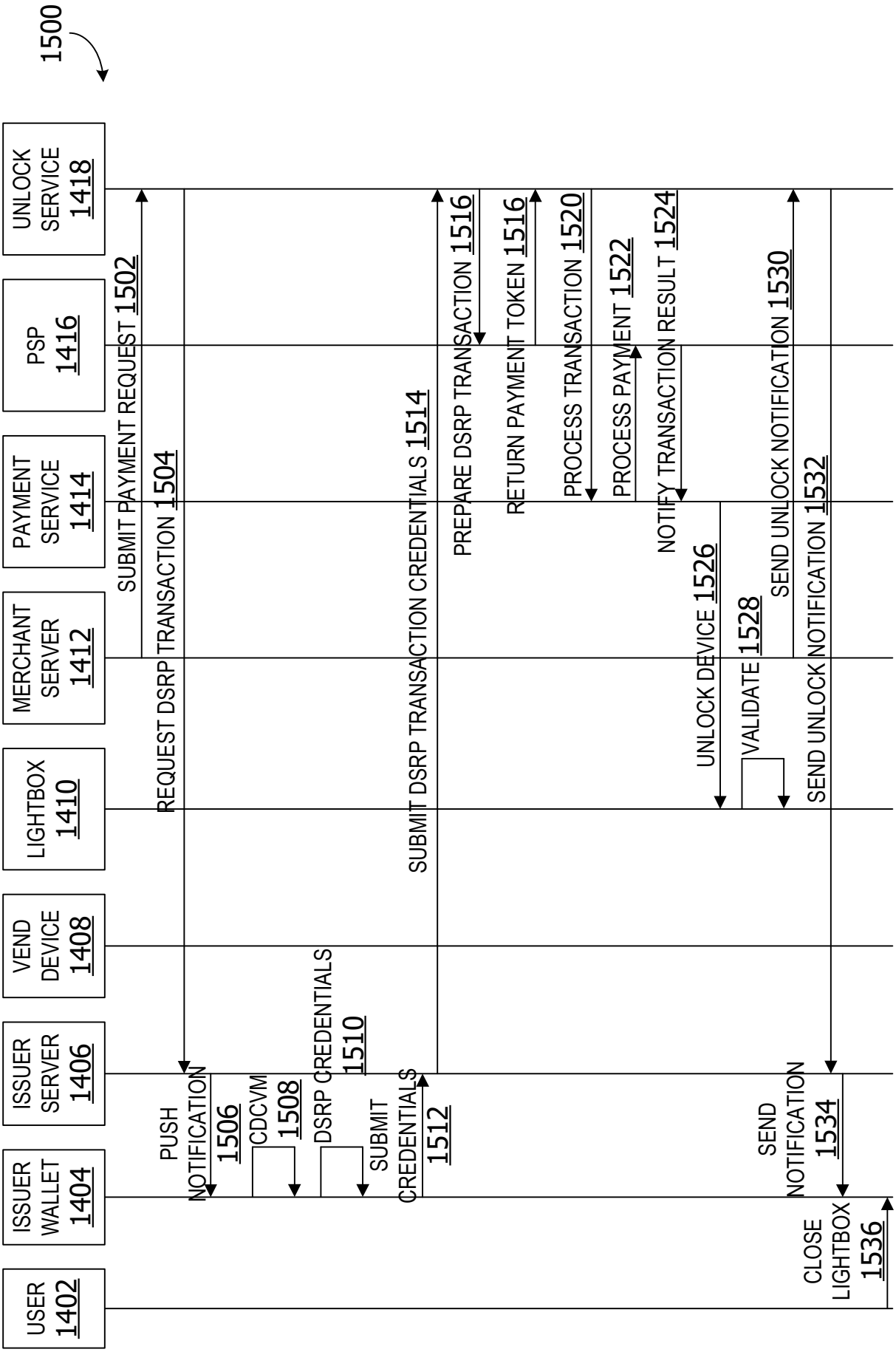

1500
USER 1402
ISSUER WALLET 1404
ISSUER SERVER 1406
VEND DEVICE 1408
LIGHTBOX 1410
MERCHANT SERVER 1412
PAYMENT SERVICE 1414
PSP 1416
UNLOCK SERVICE 1418
SUBMIT PAYMENT REQUEST 1502
REQUEST DSRP TRANSACTION 1504
PUSH NOTIFICATION 1506
CDCVM 1508
DSRP CREDENTIALS 1510
SUBMIT CREDENTIALS 1512
SUBMIT DSRP TRANSACTION CREDENTIALS 1514
PREPARE DSRP TRANSACTION 1516
RETURN PAYMENT TOKEN 1516
PROCESS TRANSACTION 1520
PROCESS PAYMENT 1522
NOTIFY TRANSACTION RESULT 1524
UNLOCK DEVICE 1526
VALIDATE 1528
SEND UNLOCK NOTIFICATION 1530
SEND UNLOCK NOTIFICATION 1532
SEND NOTIFICATION 1534
CLOSE LIGHTBOX 1536

FIG. 15

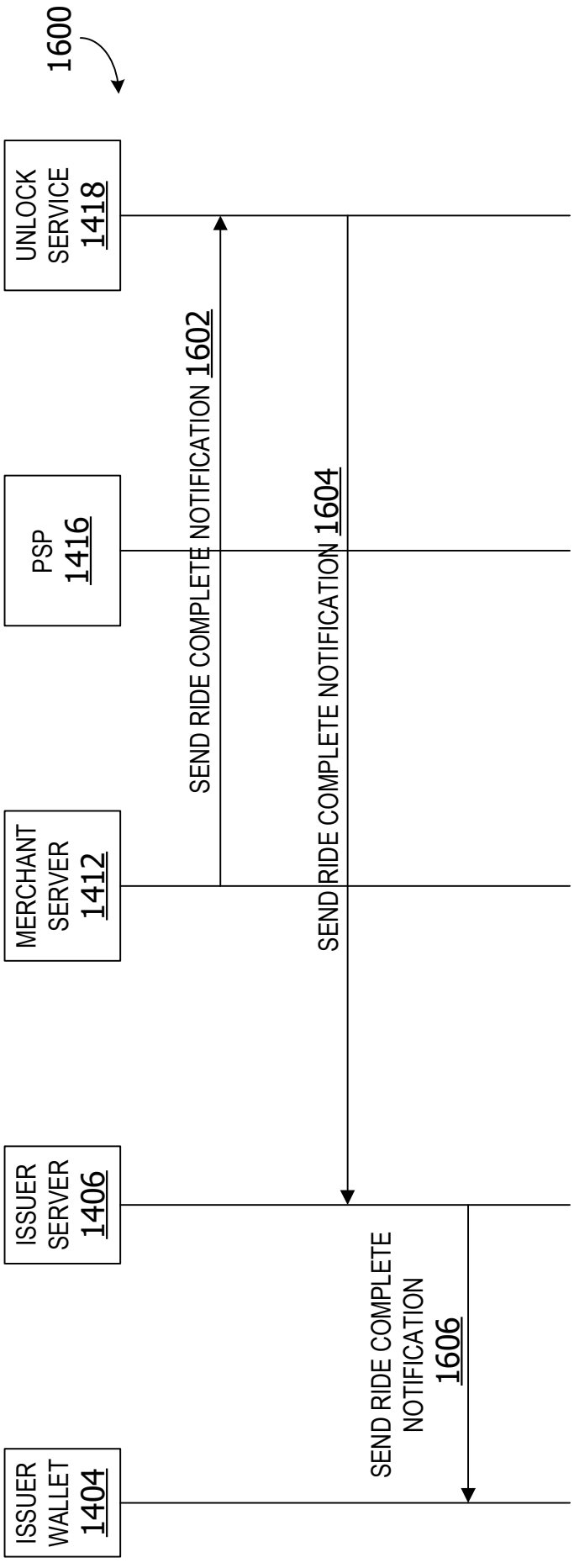

1600
UNLOCK SERVICE 1418
PSP 1416
MERCHANT SERVER 1412
ISSUER SERVER 1406
ISSUER WALLET 1404
SEND RIDE COMPLETE NOTIFICATION 1602
SEND RIDE COMPLETE NOTIFICATION 1604
SEND RIDE COMPLETE NOTIFICATION 1606

FIG. 16

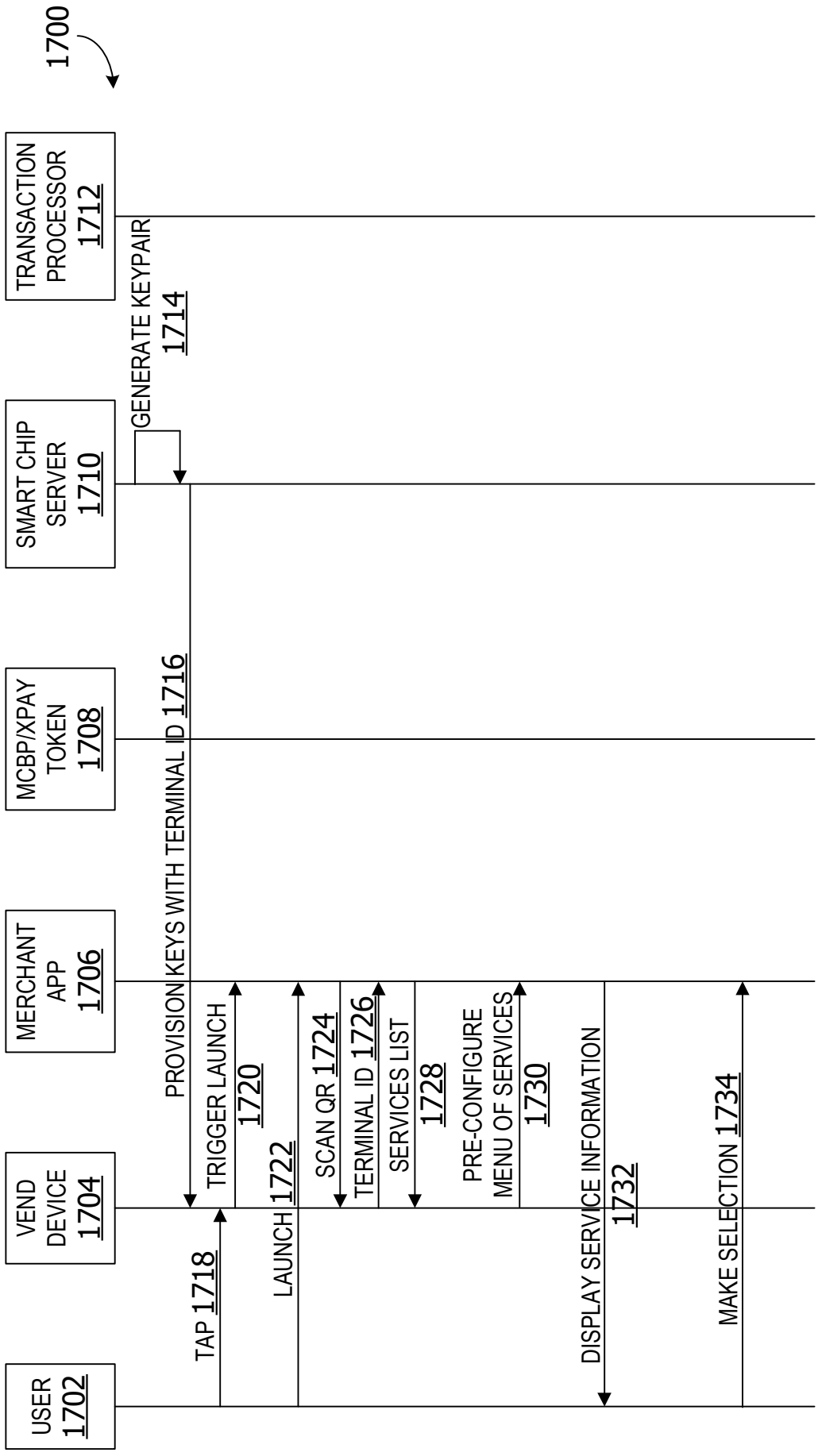

1700
USER 1702
VEND DEVICE 1704
MERCHANT APP 1706
MCBP/XPAY TOKEN 1708
SMART CHIP SERVER 1710
TRANSACTION PROCESSOR 1712
GENERATE KEYPAIR 1714
PROVISION KEYS WITH TERMINAL ID 1716
TAP 1718
TRIGGER LAUNCH 1720
LAUNCH 1722
SCAN QR 1724
TERMINAL ID 1726
SERVICES LIST 1728
PRE-CONFIGURE MENU OF SERVICES 1730
DISPLAY SERVICE INFORMATION 1732
MAKE SELECTION 1734

FIG. 17

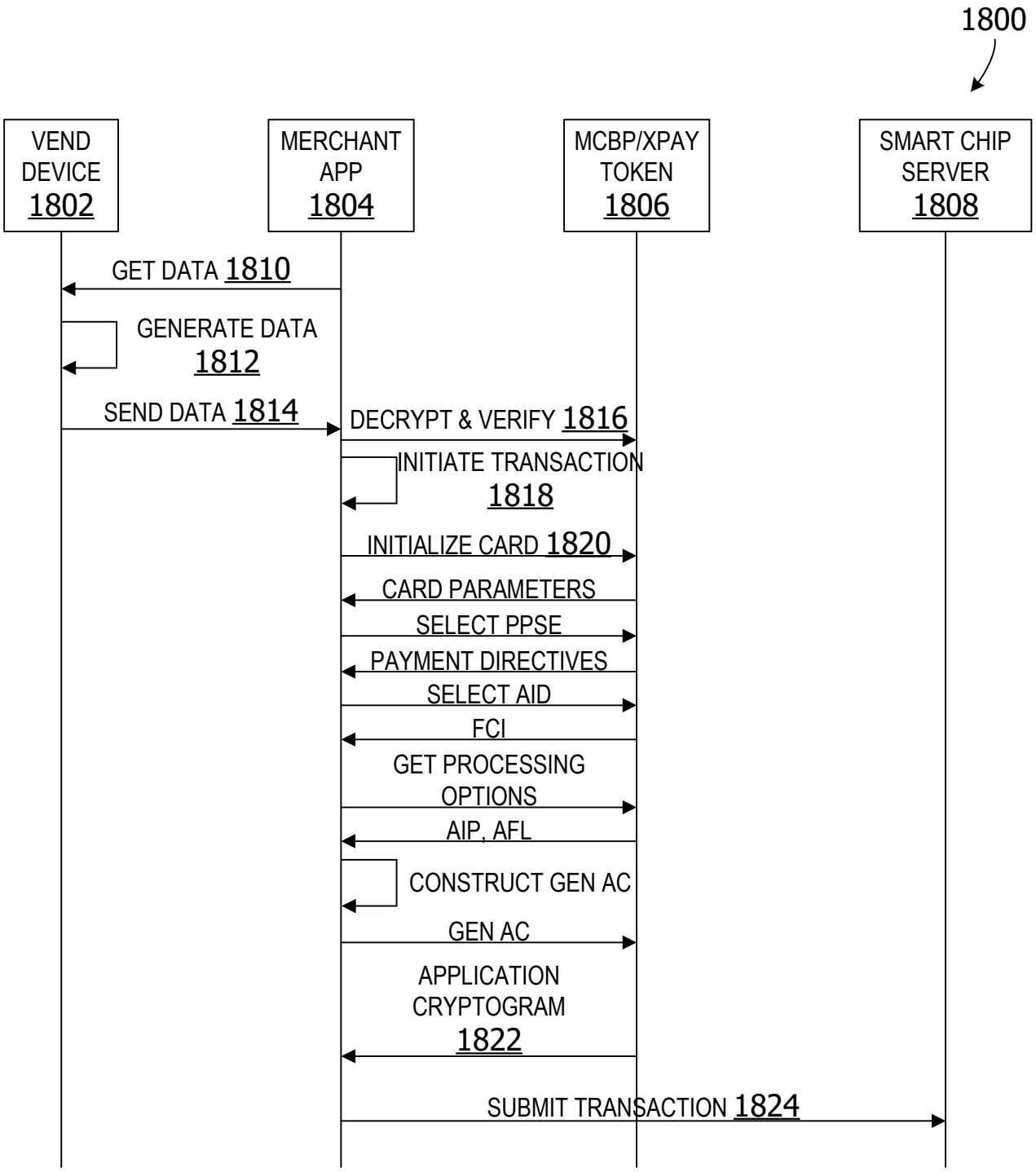

1800
VEND DEVICE 1802
MERCHANT APP 1804
MCBP/XPAY TOKEN 1806
SMART CHIP SERVER 1808
GET DATA 1810
GENERATE DATA 1812
SEND DATA 1814
DECRYPT & VERIFY 1816
INITIATE TRANSACTION 1818
INITIALIZE CARD 1820
CARD PARAMETERS
SELECT PPSE
PAYMENT DIRECTIVES
SELECT AID
FCI
GET PROCESSING OPTIONS
AIP, AFL
CONSTRUCT GEN AC
GEN AC
APPLICATION CRYPTOGRAM 1822
SUBMIT TRANSACTION 1824

FIG. 18

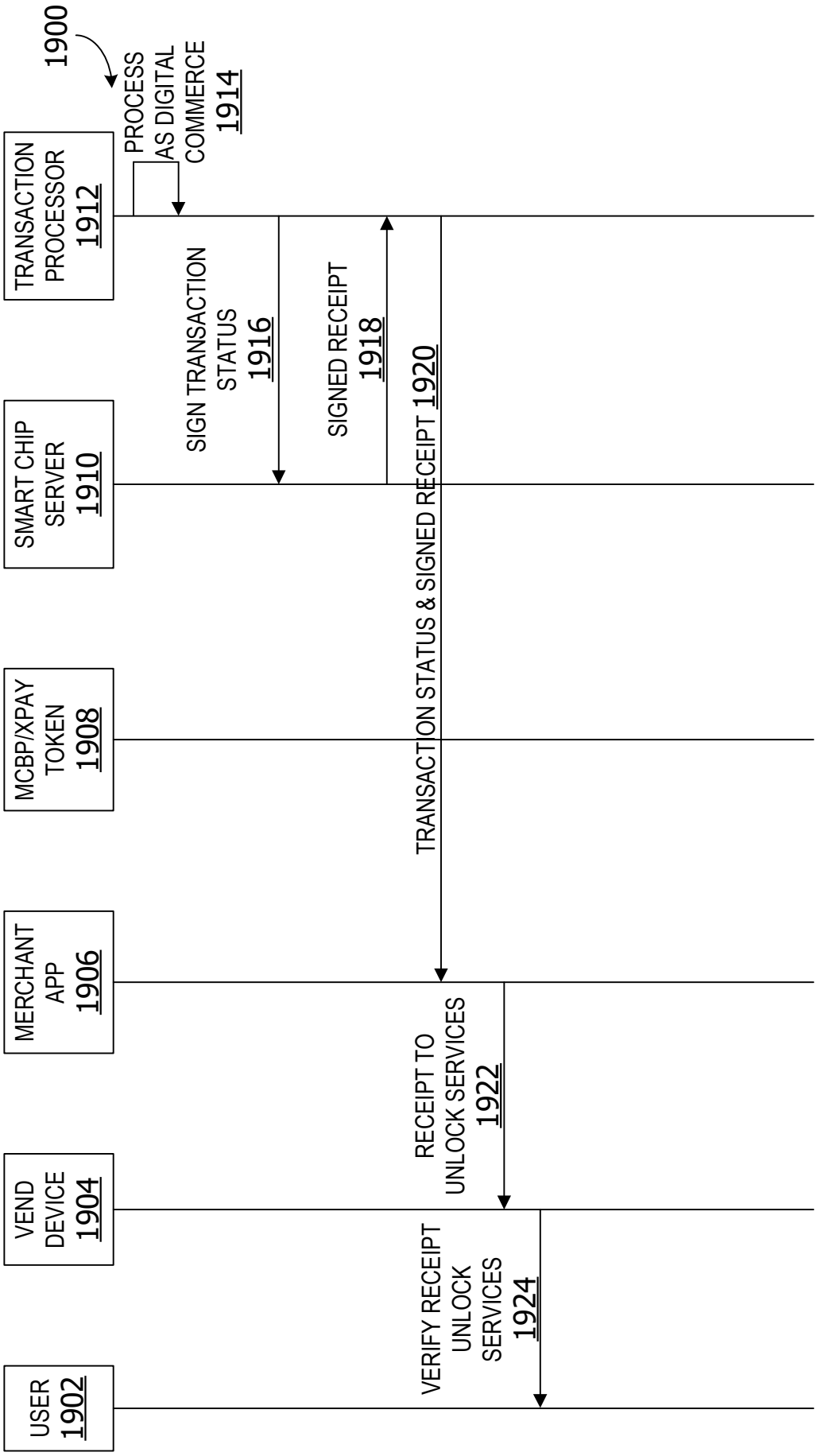

1900
PROCESS AS DIGITAL COMMERCE 1914
TRANSACTION PROCESSOR 1912
SMART CHIP SERVER 1910
MCBP/XPAY TOKEN 1908
MERCHANT APP 1906
VEND DEVICE 1904
USER 1902
SIGN TRANSACTION STATUS 1916
SIGNED RECEIPT 1918
TRANSACTION STATUS & SIGNED RECEIPT 1920
RECEIPT TO UNLOCK SERVICES 1922
VERIFY RECEIPT UNLOCK SERVICES 1924

FIG. 19

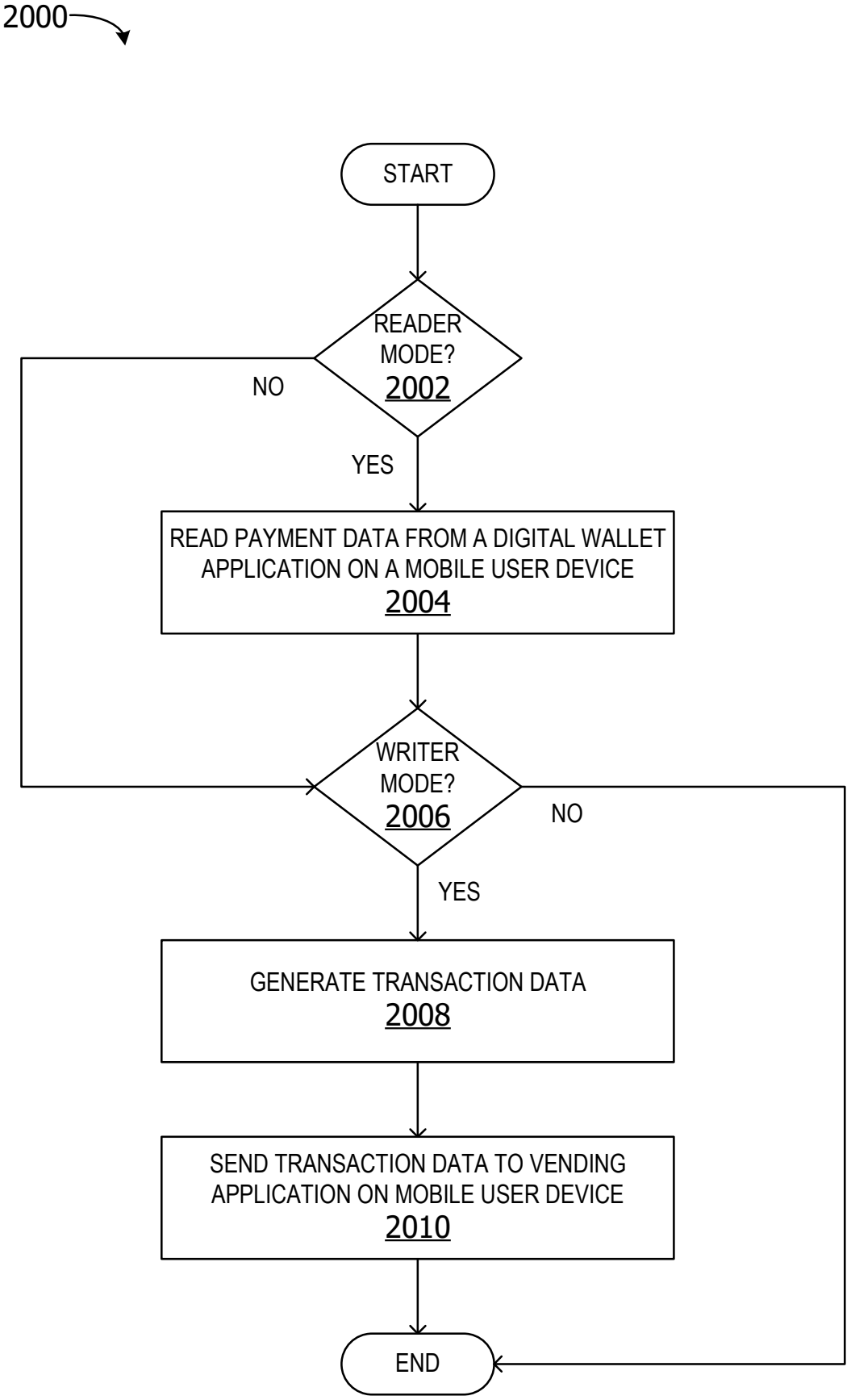

2000
START
READER MODE? 2002
NO
YES
READ PAYMENT DATA FROM A DIGITAL WALLET APPLICATION ON A MOBILE USER DEVICE 2004
WRITER MODE? 2006
NO
YES
GENERATE TRANSACTION DATA 2008
SEND TRANSACTION DATA TO VENDING APPLICATION ON MOBILE USER DEVICE 2010
END

FIG. 20

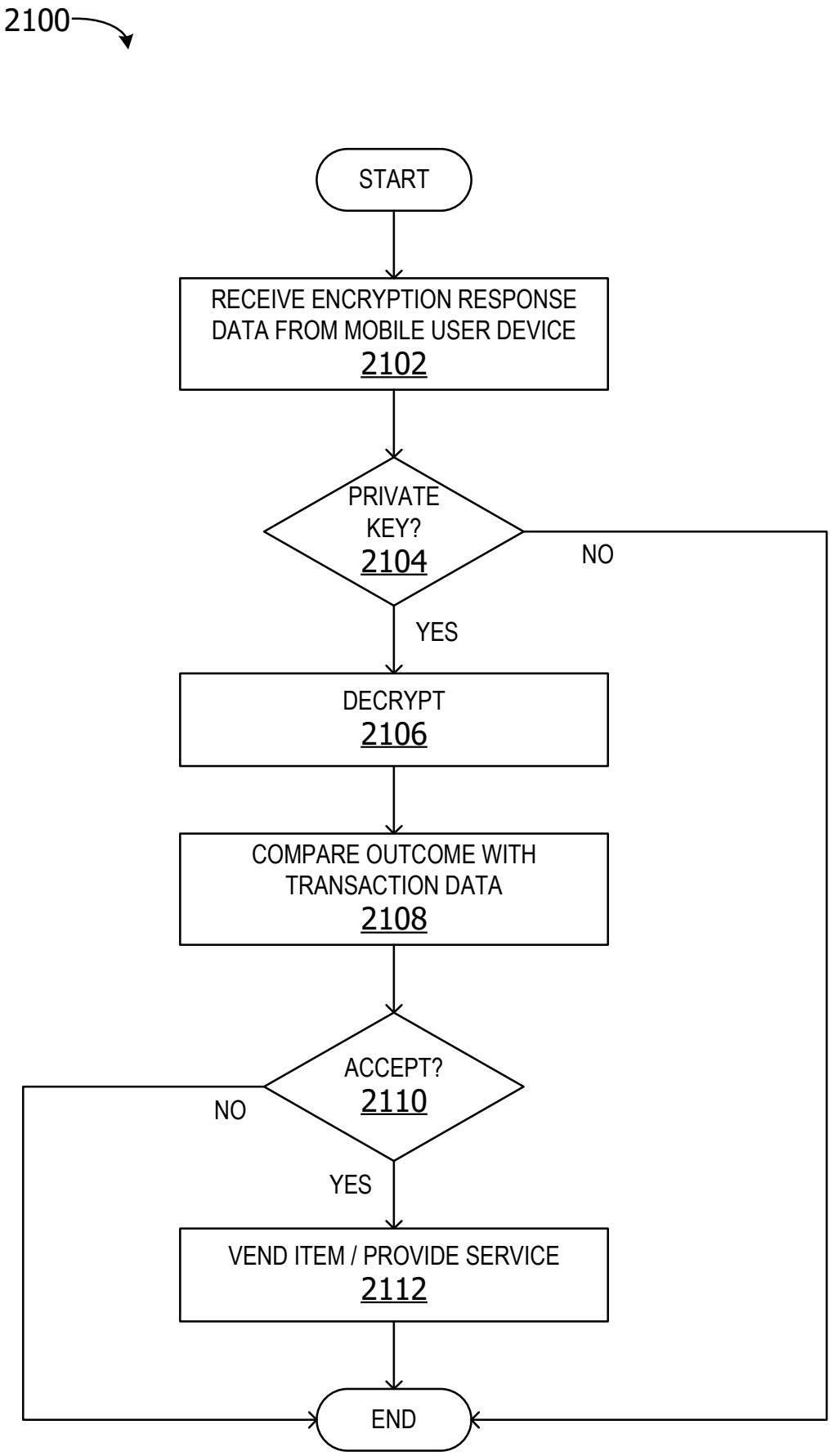

2100
START
RECEIVE ENCRYPTION RESPONSE DATA FROM MOBILE USER DEVICE
2102
PRIVATE KEY?
2104
NO
YES
DECRYPT
2106
COMPARE OUTCOME WITH TRANSACTION DATA
2108
ACCEPT?
2110
NO
YES
VEND ITEM / PROVIDE SERVICE
2112
END

FIG. 21

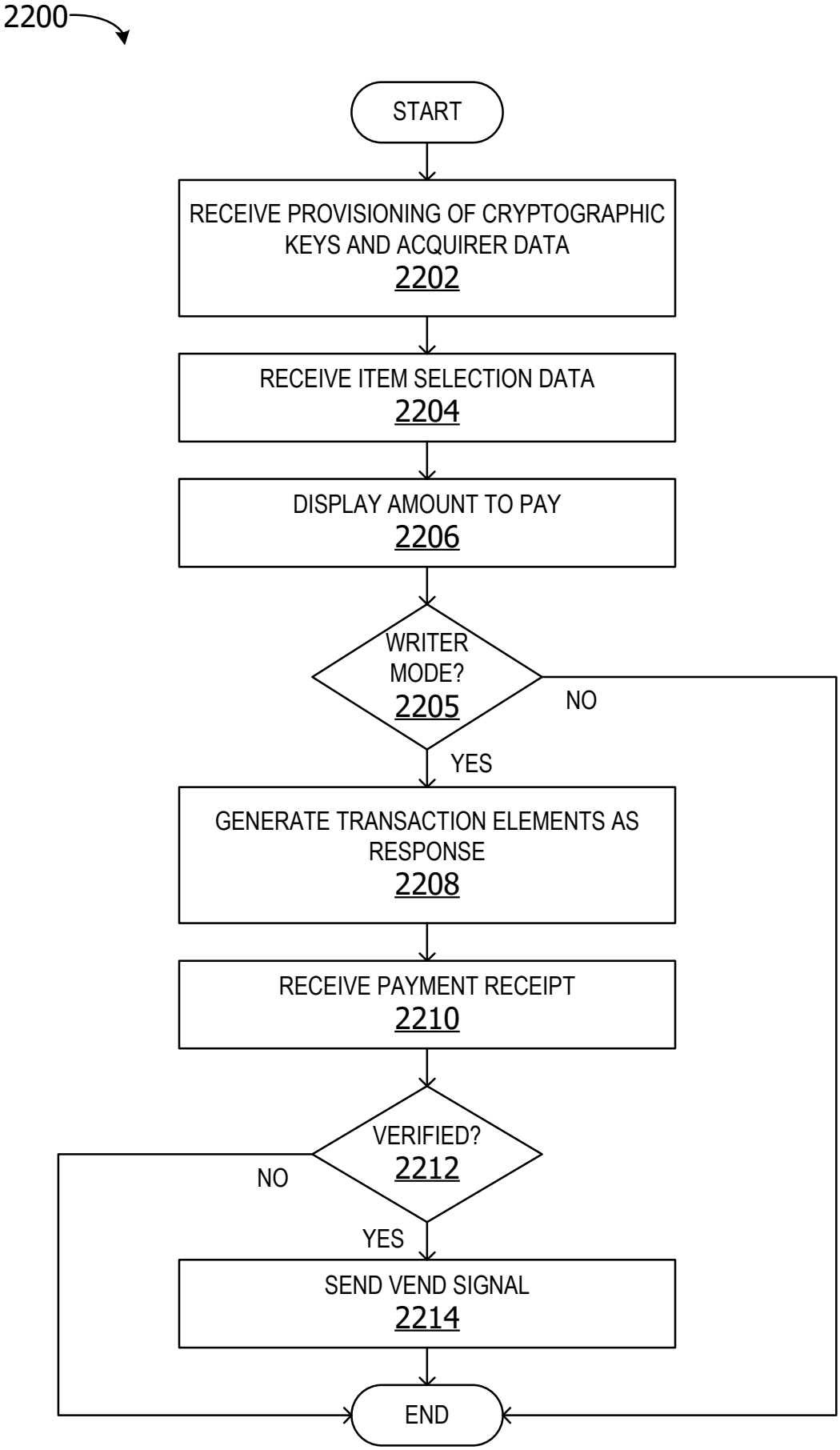

2200
START
RECEIVE PROVISIONING OF CRYPTOGRAPHIC KEYS AND ACQUIRER DATA
2202
RECEIVE ITEM SELECTION DATA
2204
DISPLAY AMOUNT TO PAY
2206
WRITER MODE?
2205
NO
YES
GENERATE TRANSACTION ELEMENTS AS RESPONSE
2208
RECEIVE PAYMENT RECEIPT
2210
VERIFIED?
2212
NO
YES
SEND VEND SIGNAL
2214
END

FIG. 22

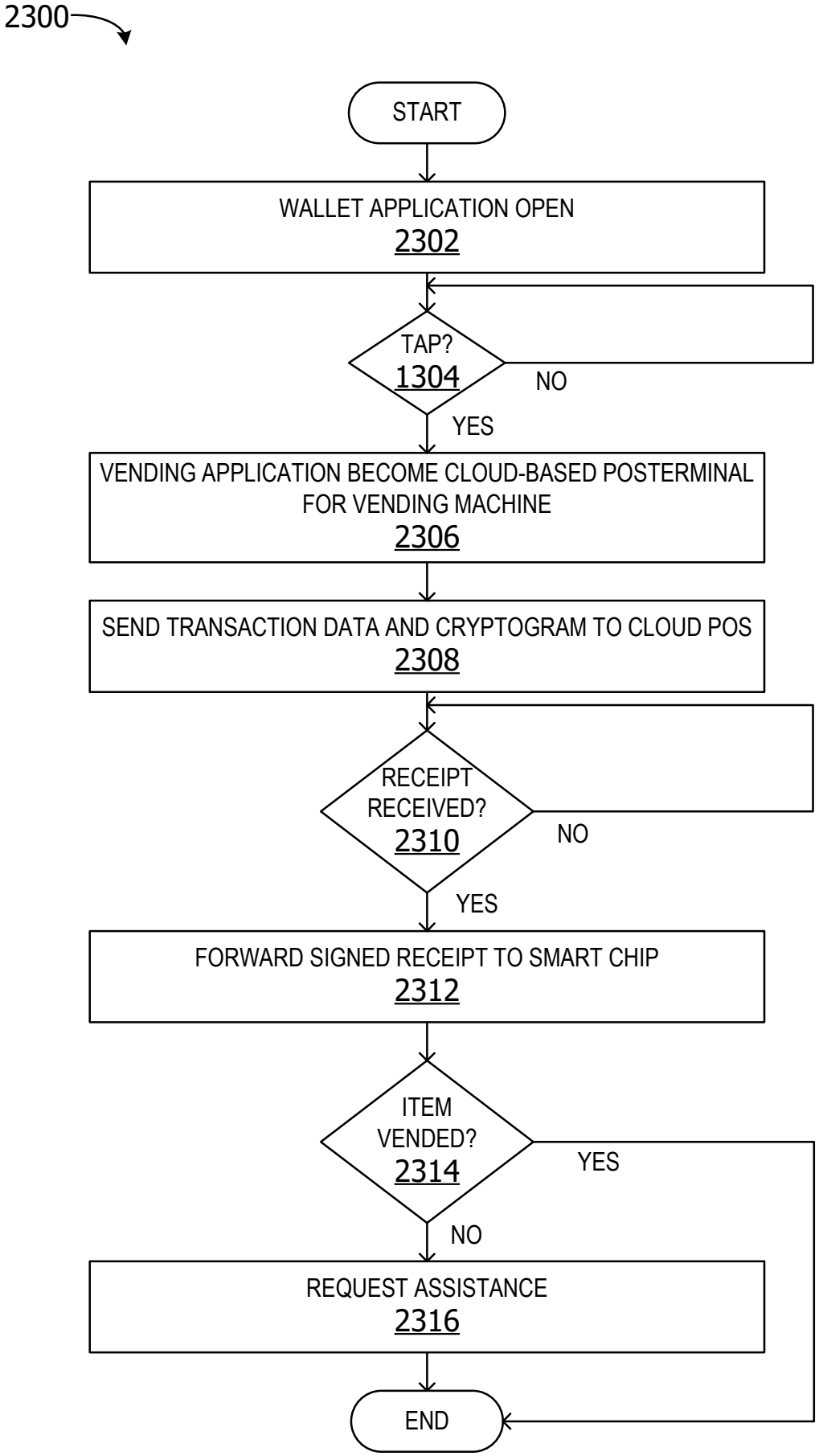

2300
START
WALLET APPLICATION OPEN
2302
TAP?
1304
NO
YES
VENDING APPLICATION BECOME CLOUD-BASED POSTERMINAL FOR VENDING MACHINE
2306
SEND TRANSACTION DATA AND CRYPTOGRAM TO CLOUD POS
2308
RECEIPT RECEIVED?
2310
NO
YES
FORWARD SIGNED RECEIPT TO SMART CHIP
2312
ITEM VENDED?
2314
YES
NO
REQUEST ASSISTANCE
2316
END

FIG. 23

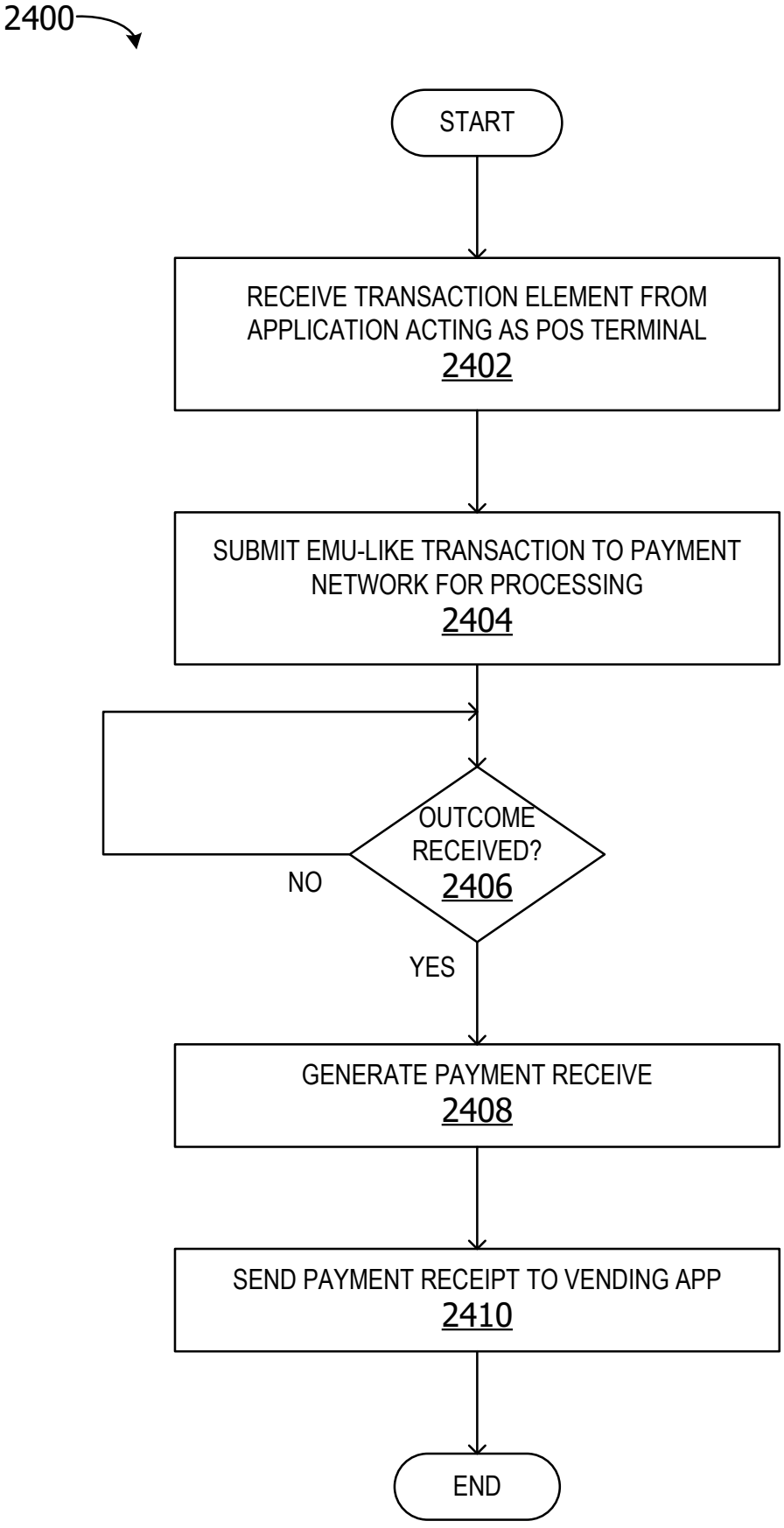

2400
START
RECEIVE TRANSACTION ELEMENT FROM APPLICATION ACTING AS POS TERMINAL
2402
SUBMIT EMU-LIKE TRANSACTION TO PAYMENT NETWORK FOR PROCESSING
2404
OUTCOME RECEIVED?
2406
NO
YES
GENERATE PAYMENT RECEIVE
2408
SEND PAYMENT RECEIPT TO VENDING APP
2410
END

FIG. 24

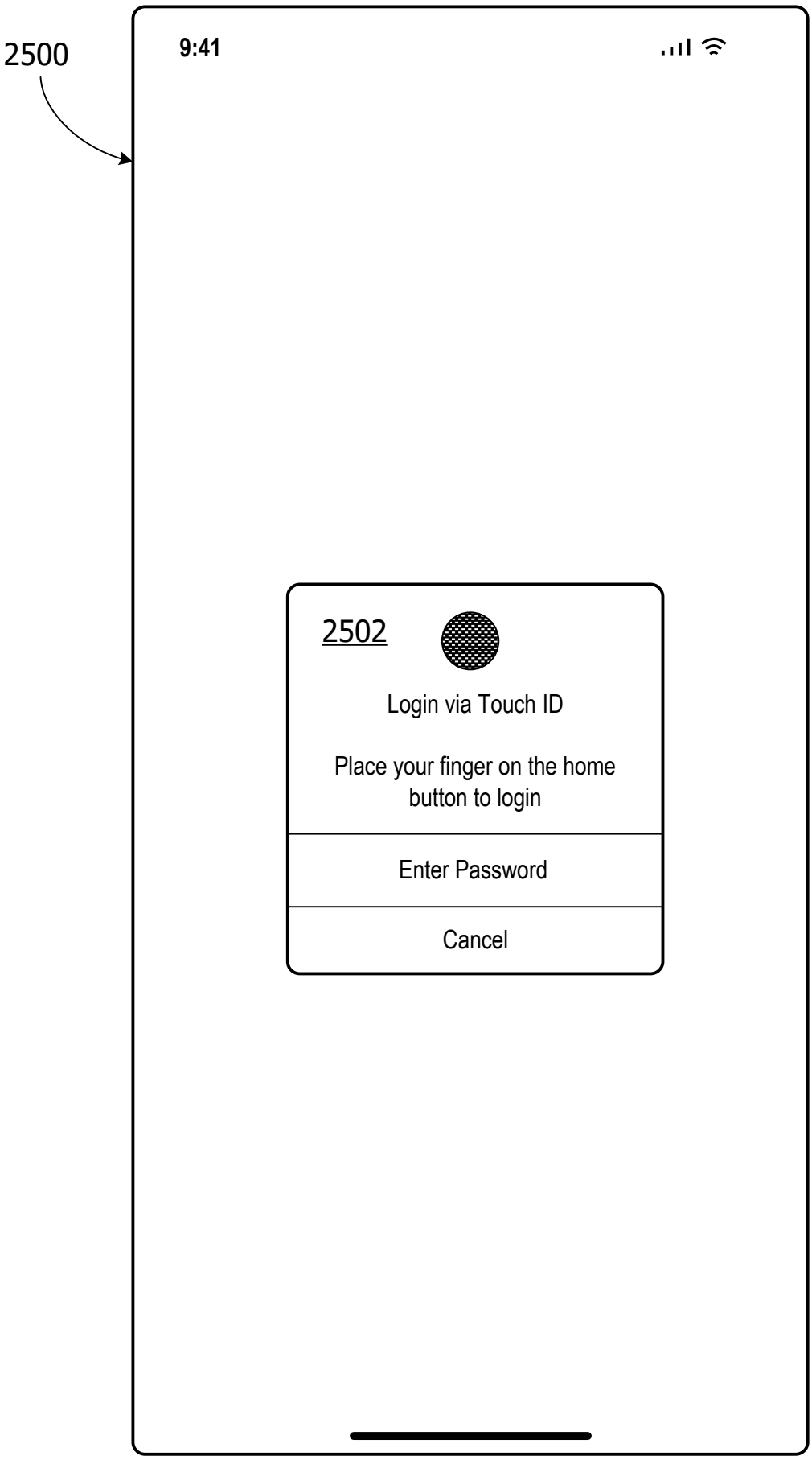

2500
9:41
2502
Login via Touch ID
Place your finger on the home button to login
Enter Password
Cancel

FIG. 25

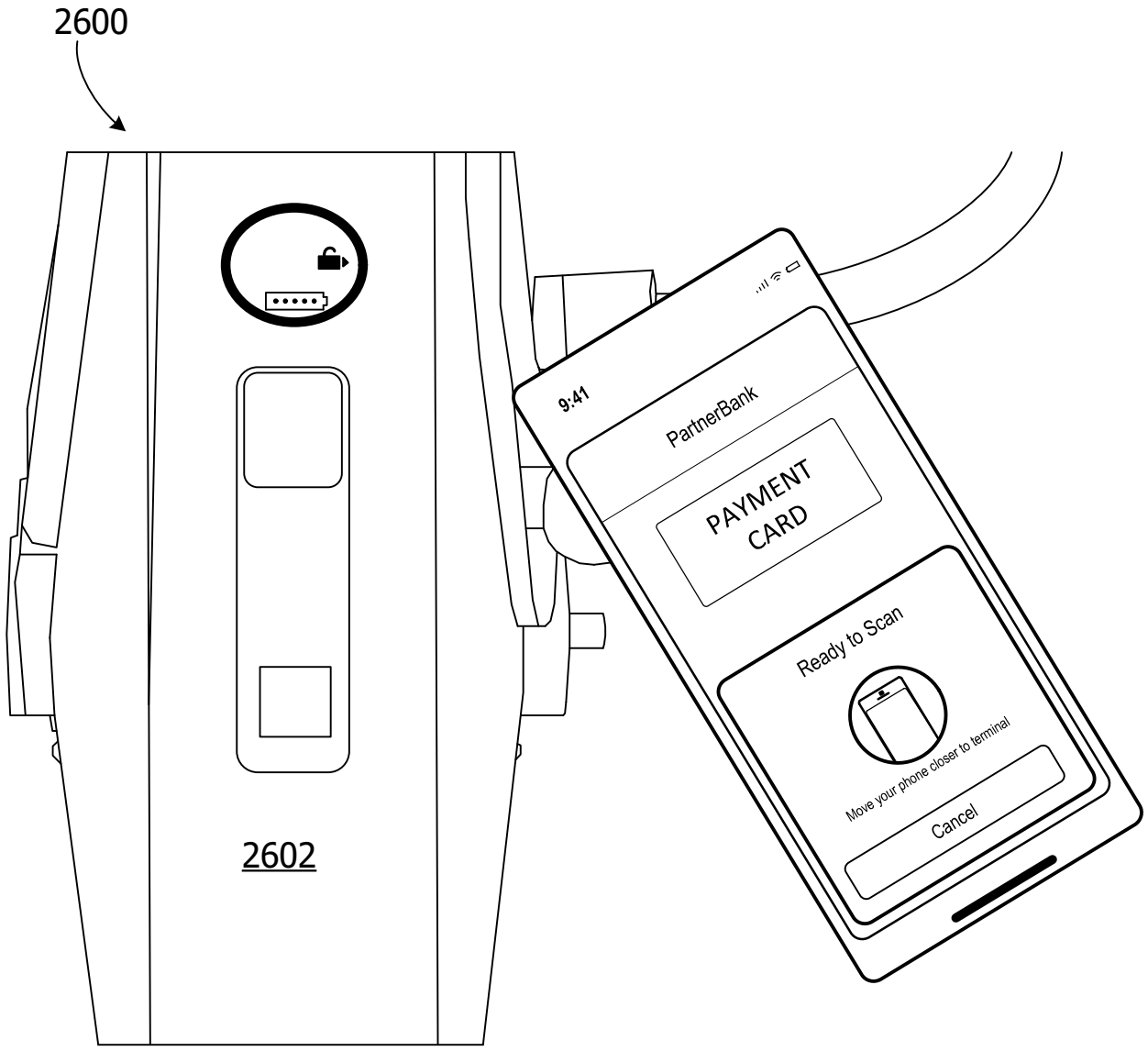

2600
2602
9:41
PartnerBank
PAYMENT CARD
Ready to Scan
Move your phone closer to terminal
Cancel

FIG. 26

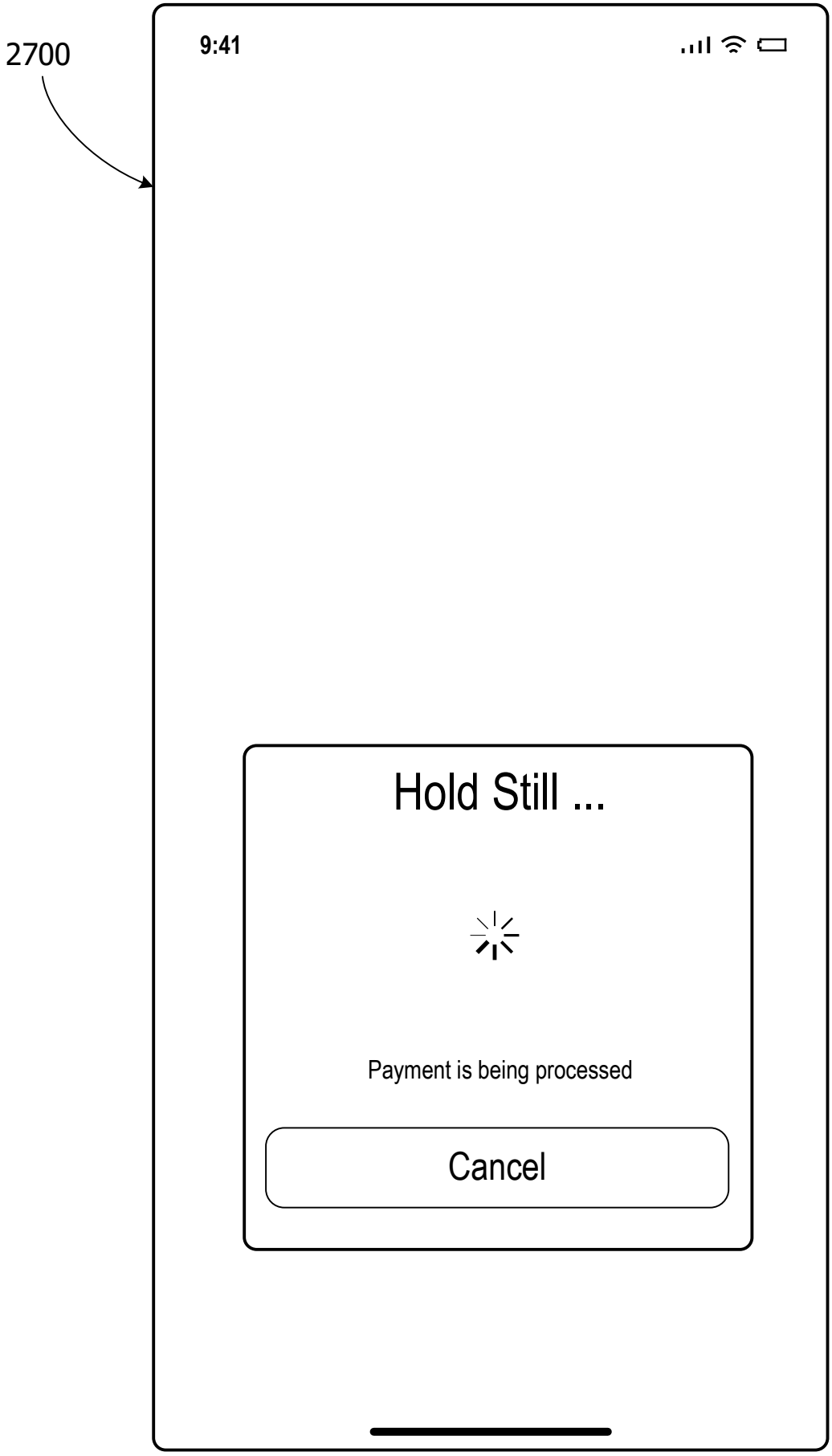


FIG. 27

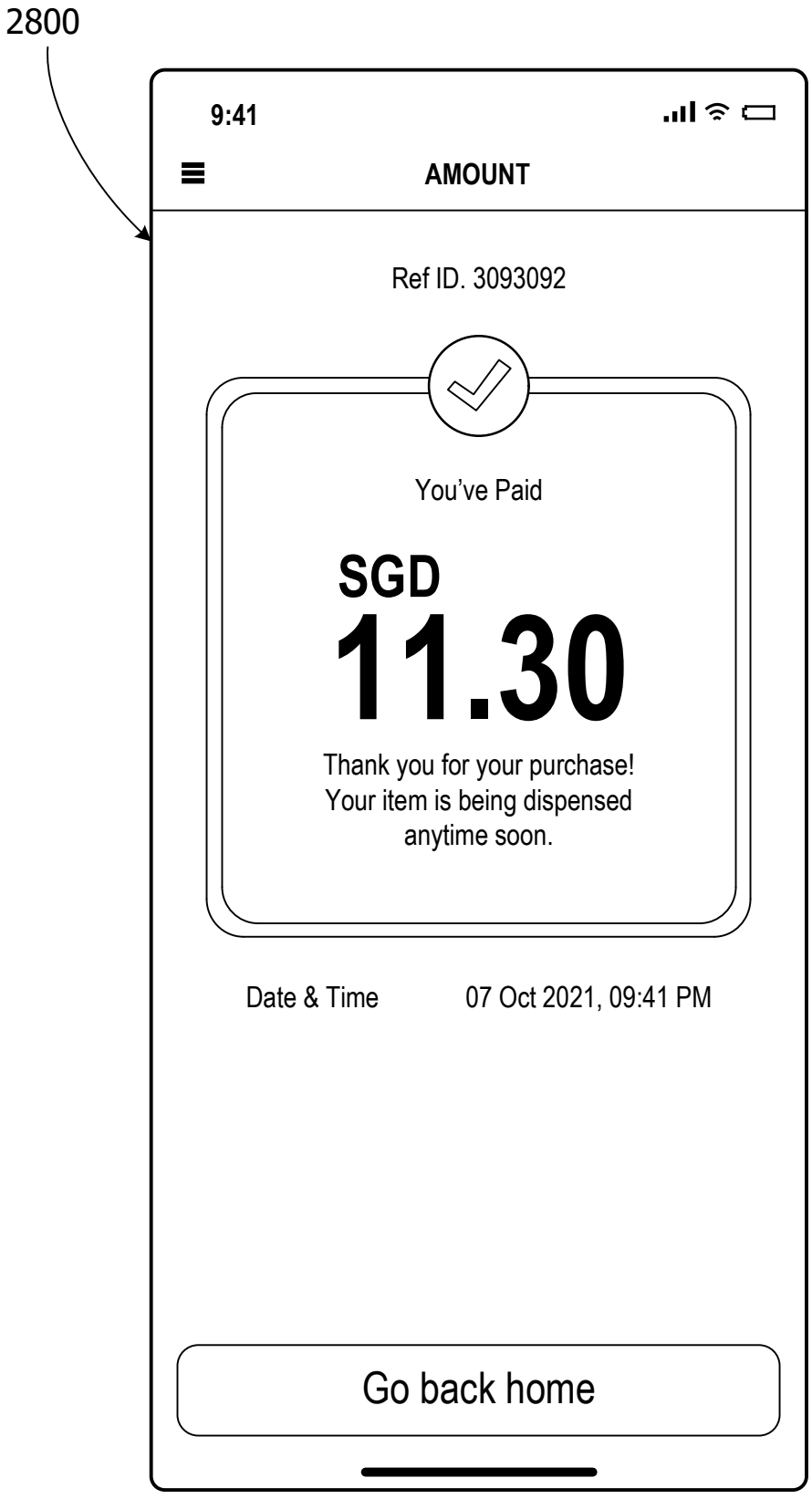

2800
9:41
AMOUNT
Ref ID. 3093092
You've Paid
SGD
11.30
Thank you for your purchase!
Your item is being dispensed
anytime soon.
Date & Time
07 Oct 2021, 09:41 PM
Go back home

FIG. 28

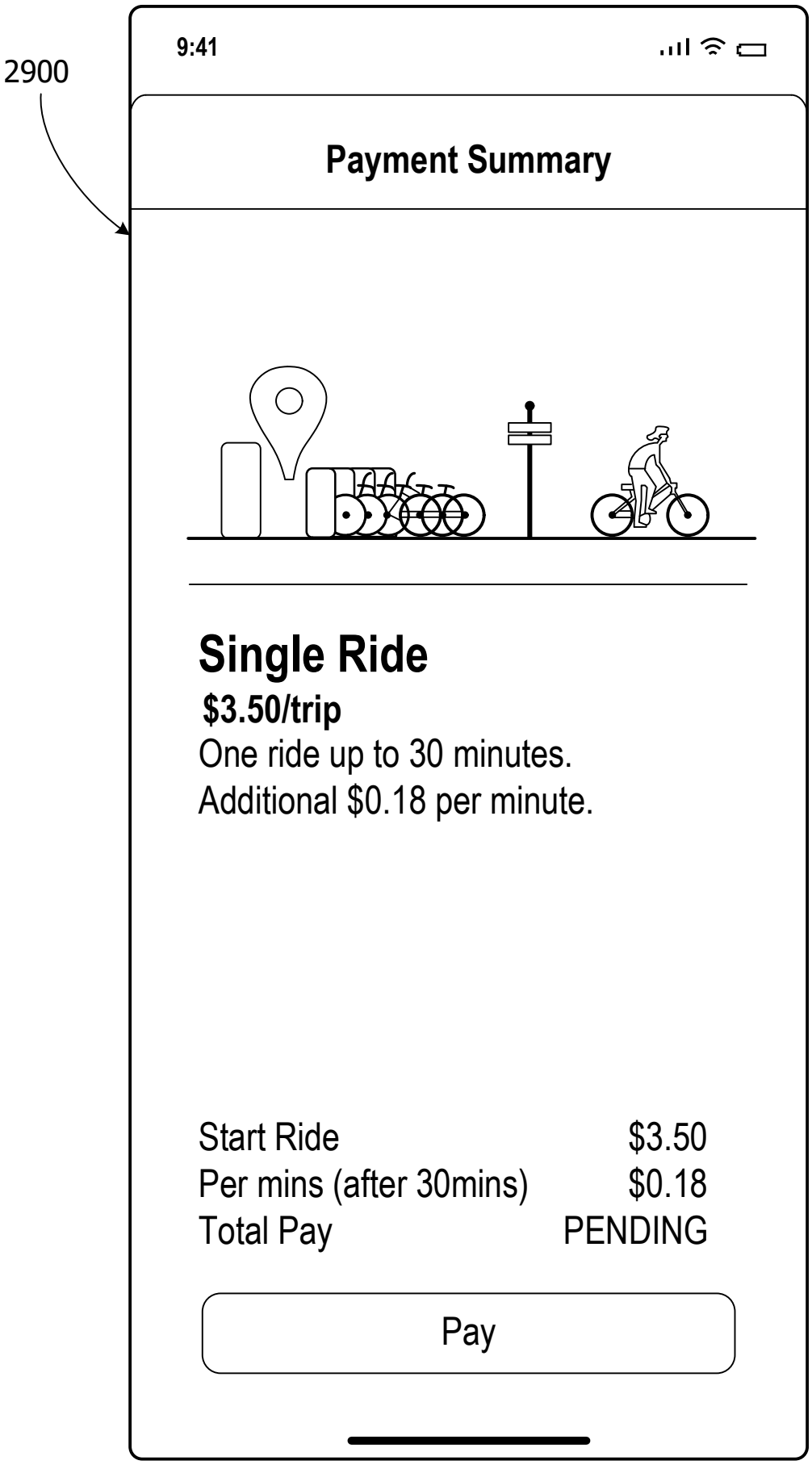

2900
9:41
Payment Summary
Single Ride
$3.50/trip
One ride up to 30 minutes.
Additional $0.18 per minute.
Start Ride $3.50
Per mins (after 30mins) $0.18
Total Pay PENDING
Pay

FIG. 29

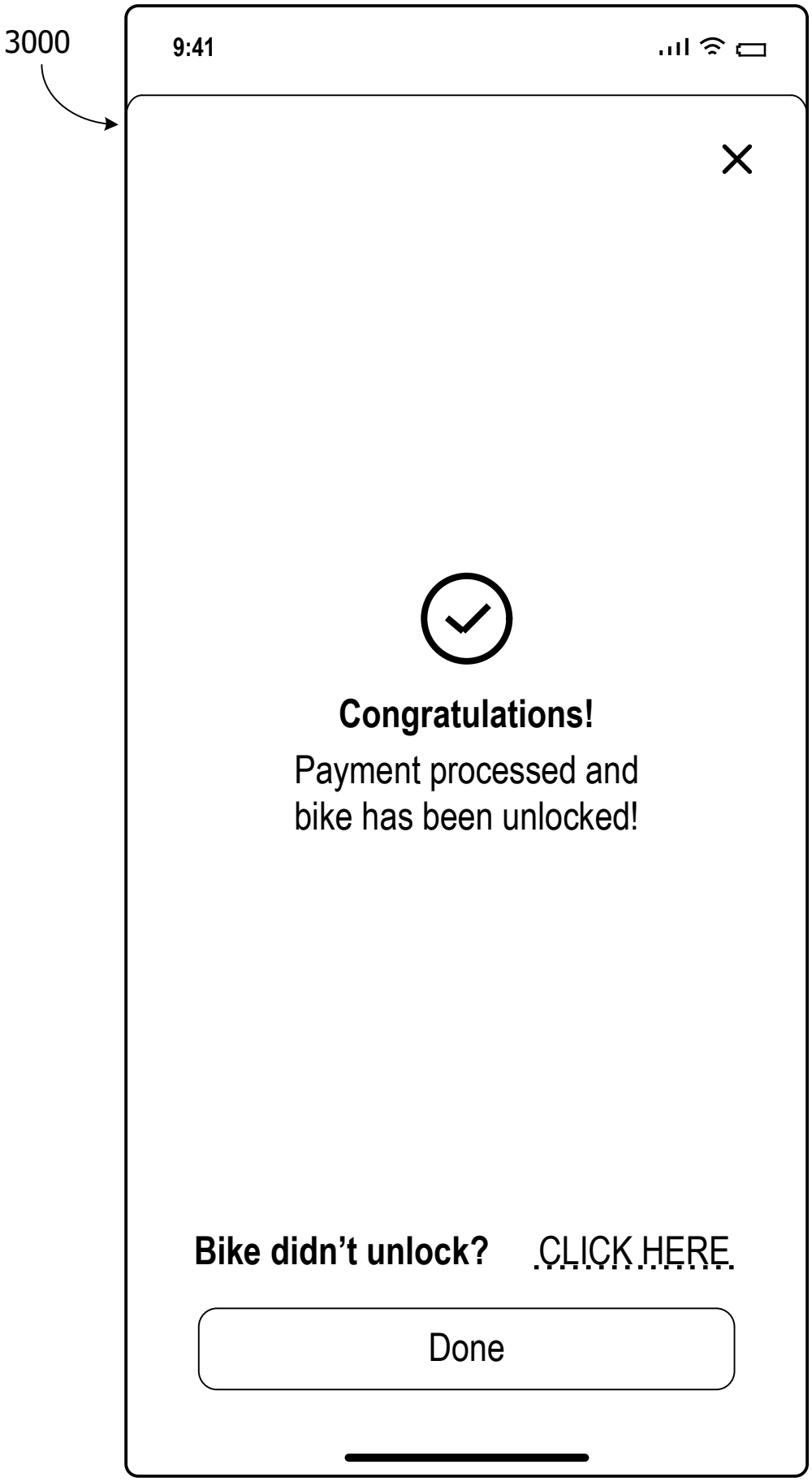

3000
9:41
Congratulations!
Payment processed and
bike has been unlocked!
Bike didn’t unlock?
CLICK HERE
Done

FIG. 30

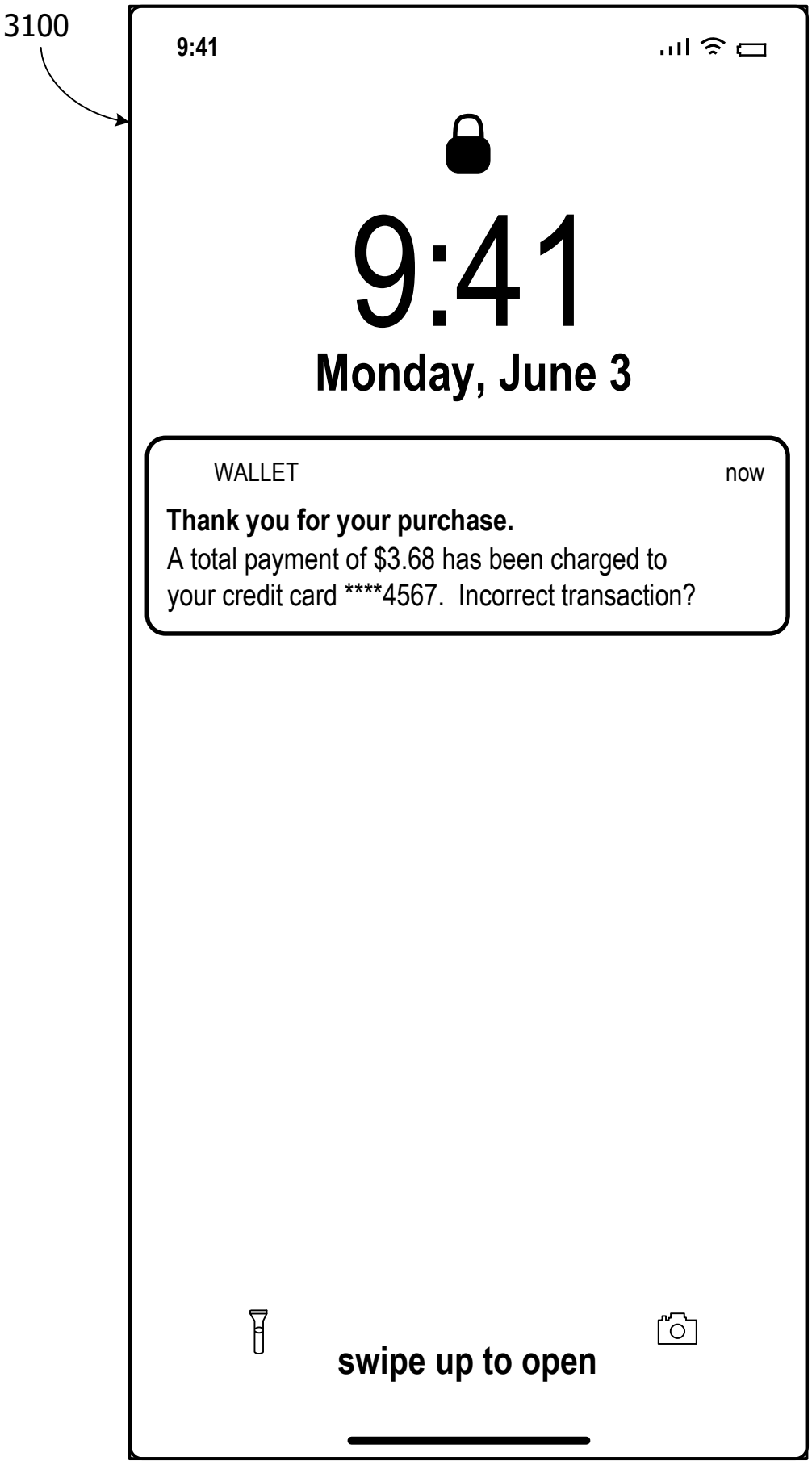

3100
9:41
9:41
Monday, June 3
WALLET
now
Thank you for your purchase.
A total payment of $3.68 has been charged to your credit card ****4567. Incorrect transaction?
swipe up to open

FIG. 31

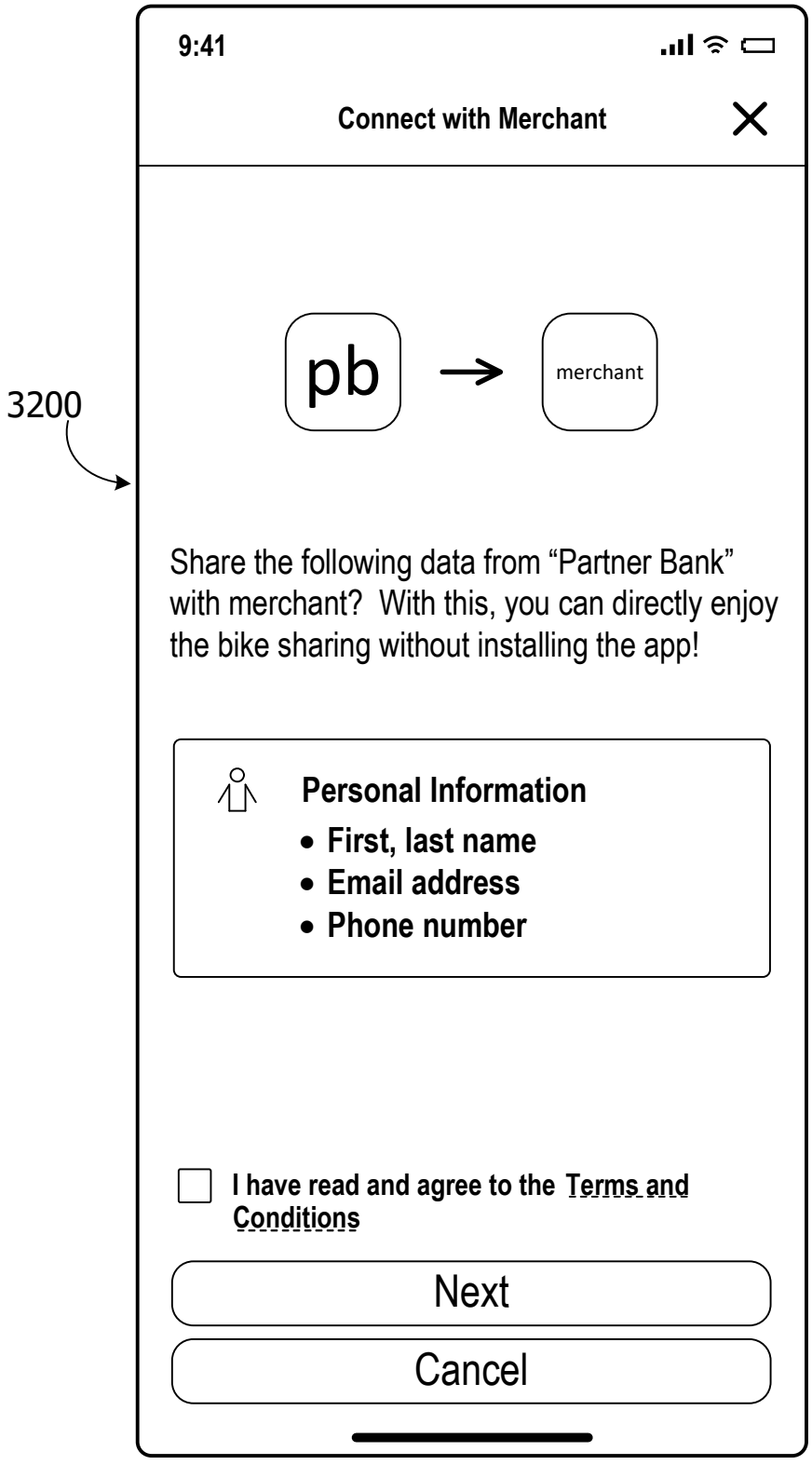

3200
9:41
Connect with Merchant
pb
merchant
Share the following data from “Partner Bank” with merchant? With this, you can directly enjoy the bike sharing without installing the app!
Personal Information
First, last name
Email address
Phone number
I have read and agree to the Terms and Conditions
Next
Cancel

FIG. 32

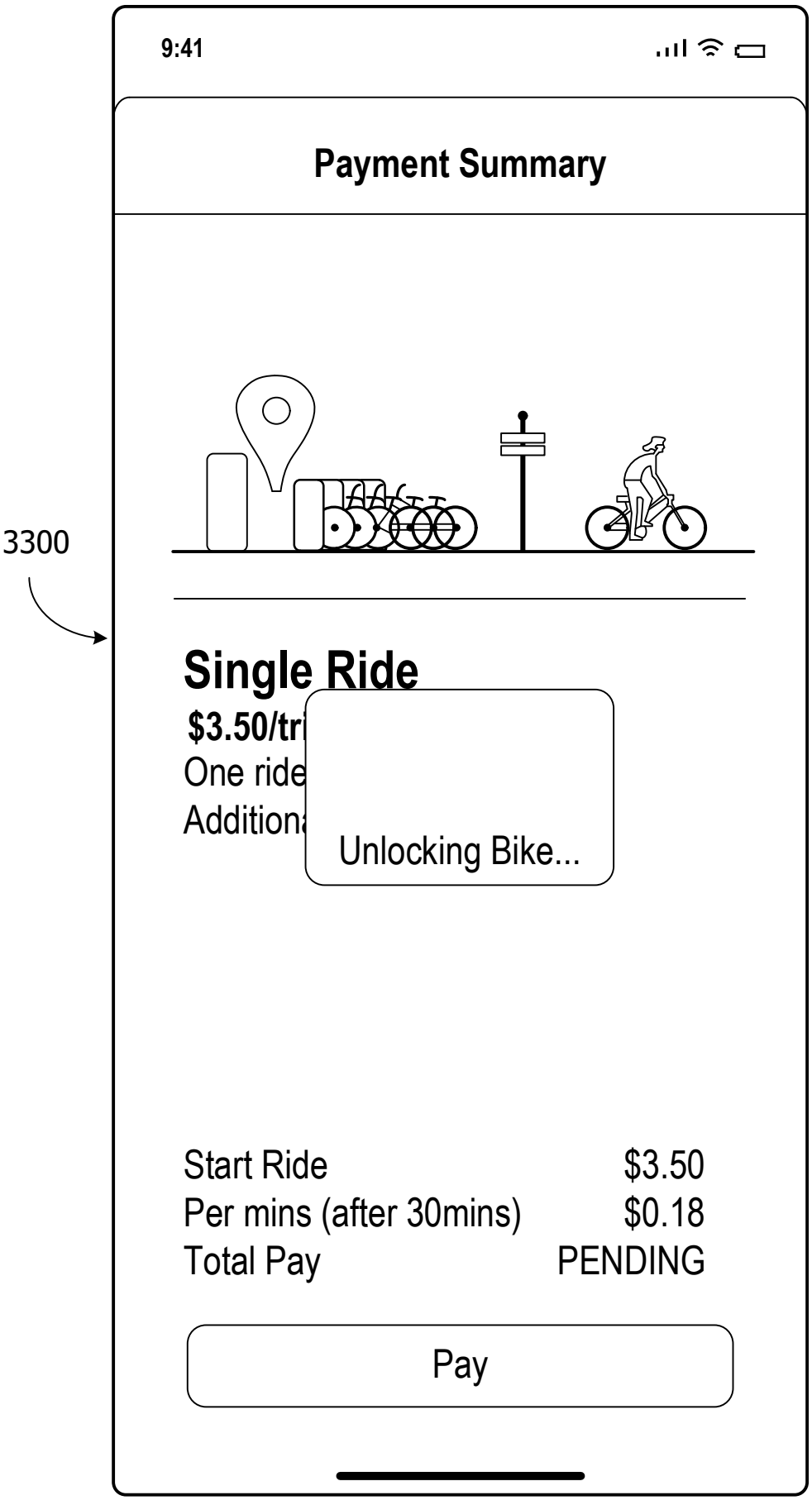

9:41
Payment Summary
3300
Single Ride
$3.50/tri
One ride
Additiona
Unlocking Bike...
Start Ride $3.50
Per mins (after 30mins) $0.18
Total Pay PENDING
Pay

FIG. 33

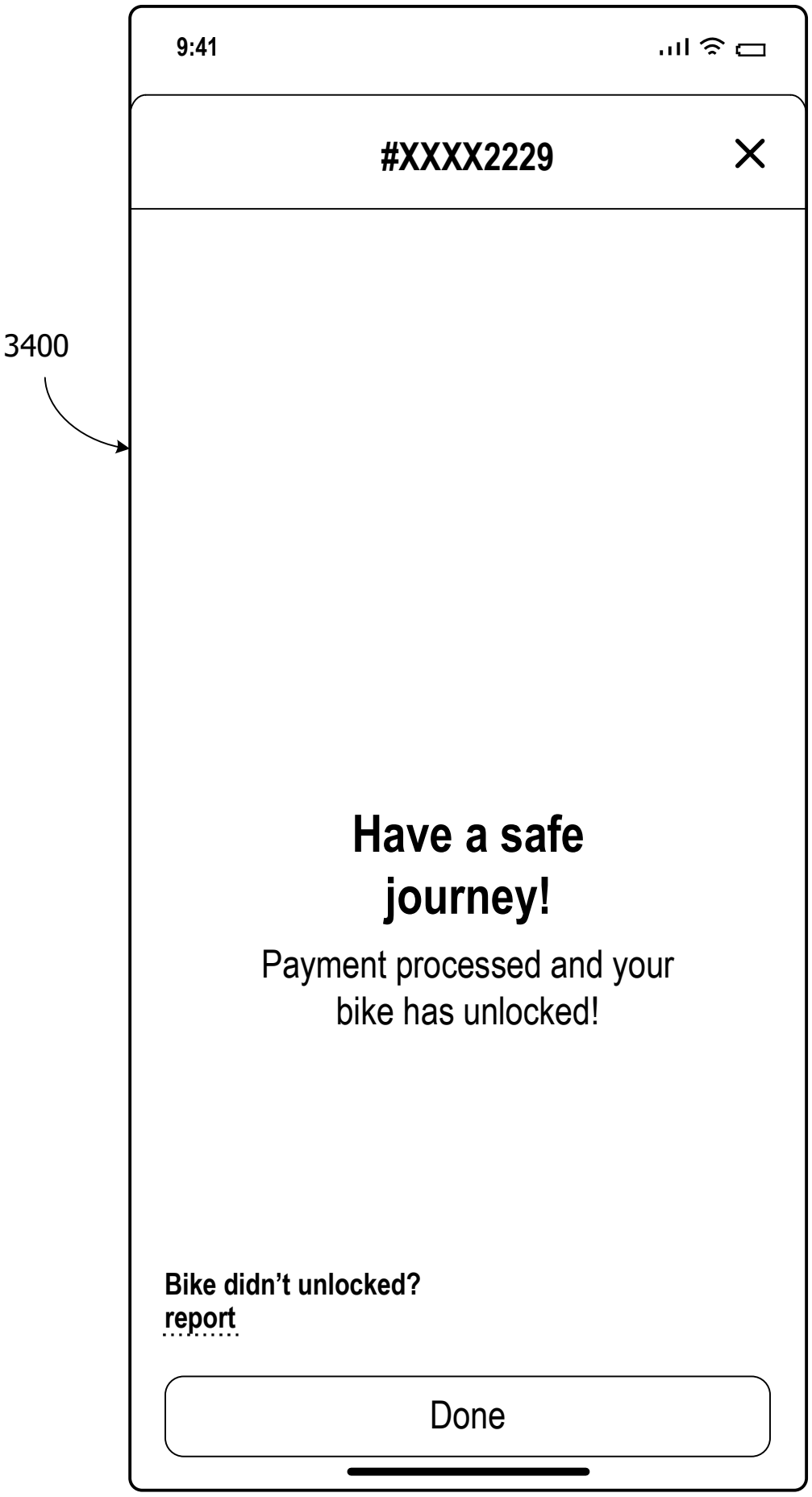

3400
9:41
#XXXX2229
Have a safe journey!
Payment processed and your bike has unlocked!
Bike didn't unlocked?
report
Done

FIG. 34

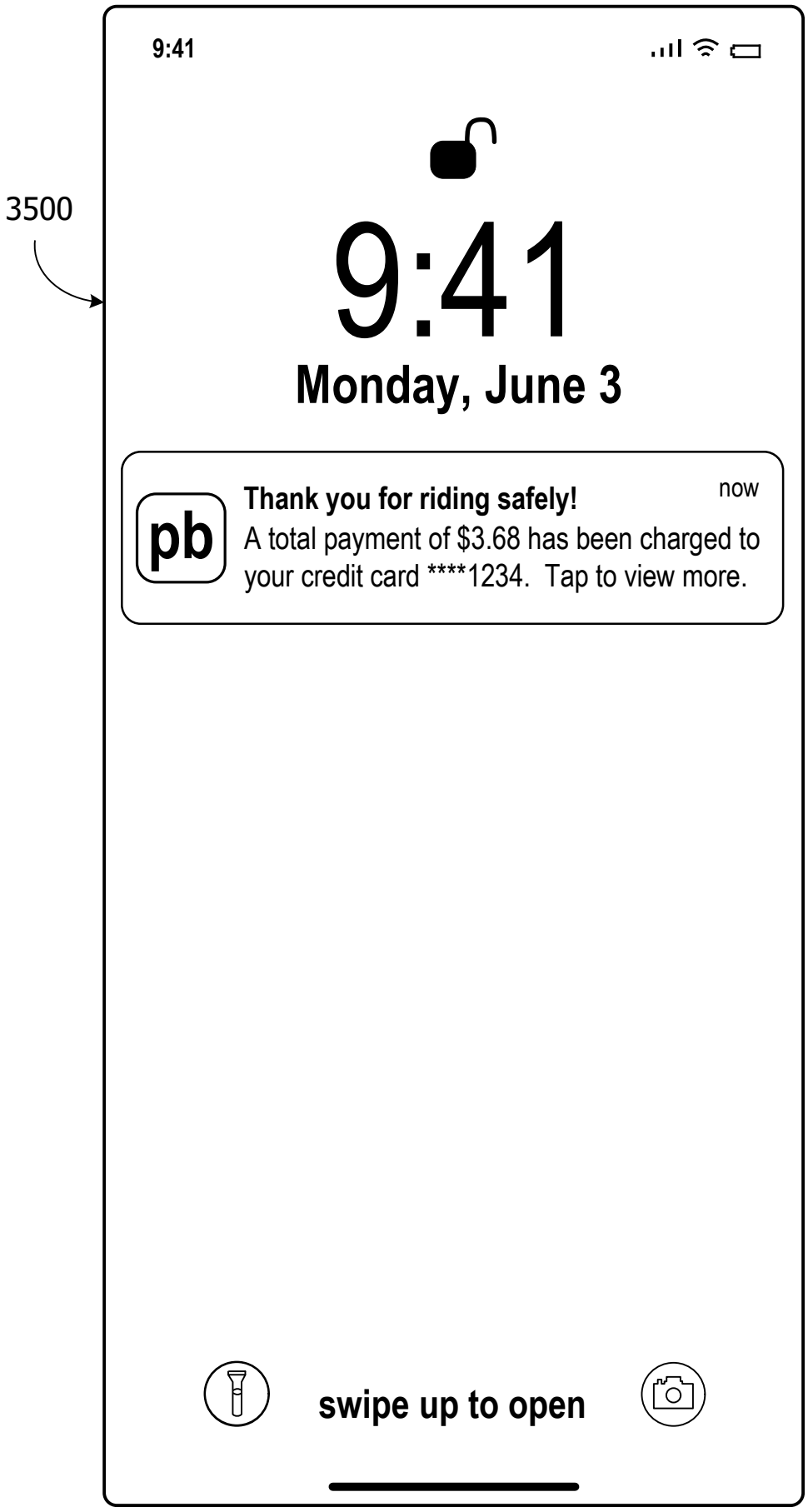

3500
9:41
9:41
Monday, June 3
pb
Thank you for riding safely!
now
A total payment of $3.68 has been charged to your credit card ****1234. Tap to view more.
swipe up to open

FIG. 35

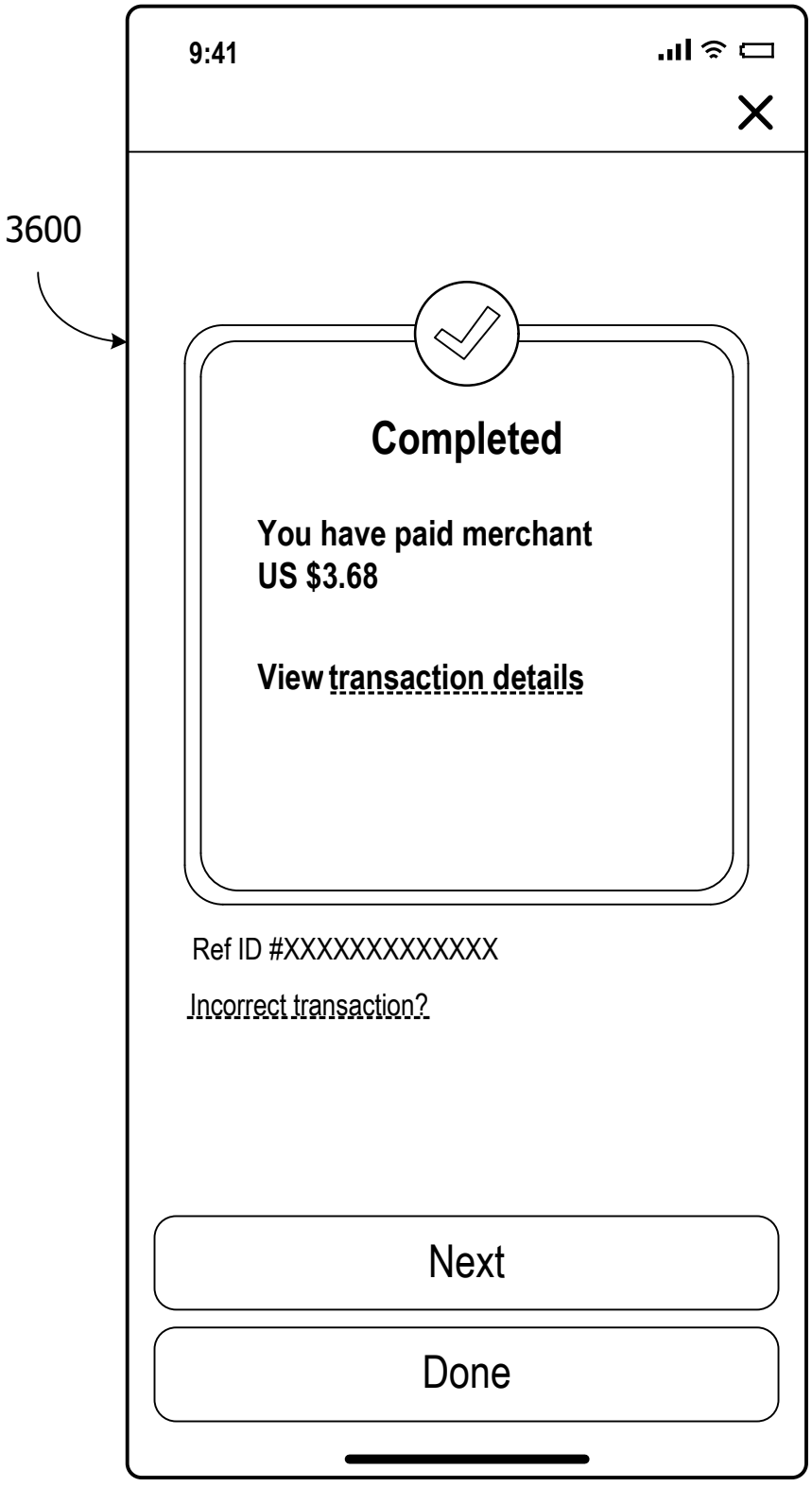

9:41
3600
Completed
You have paid merchant
US $3.68
View transaction details
Ref ID #XXXXXXXXXXXX
Incorrect transaction?
Next
Done

FIG. 36

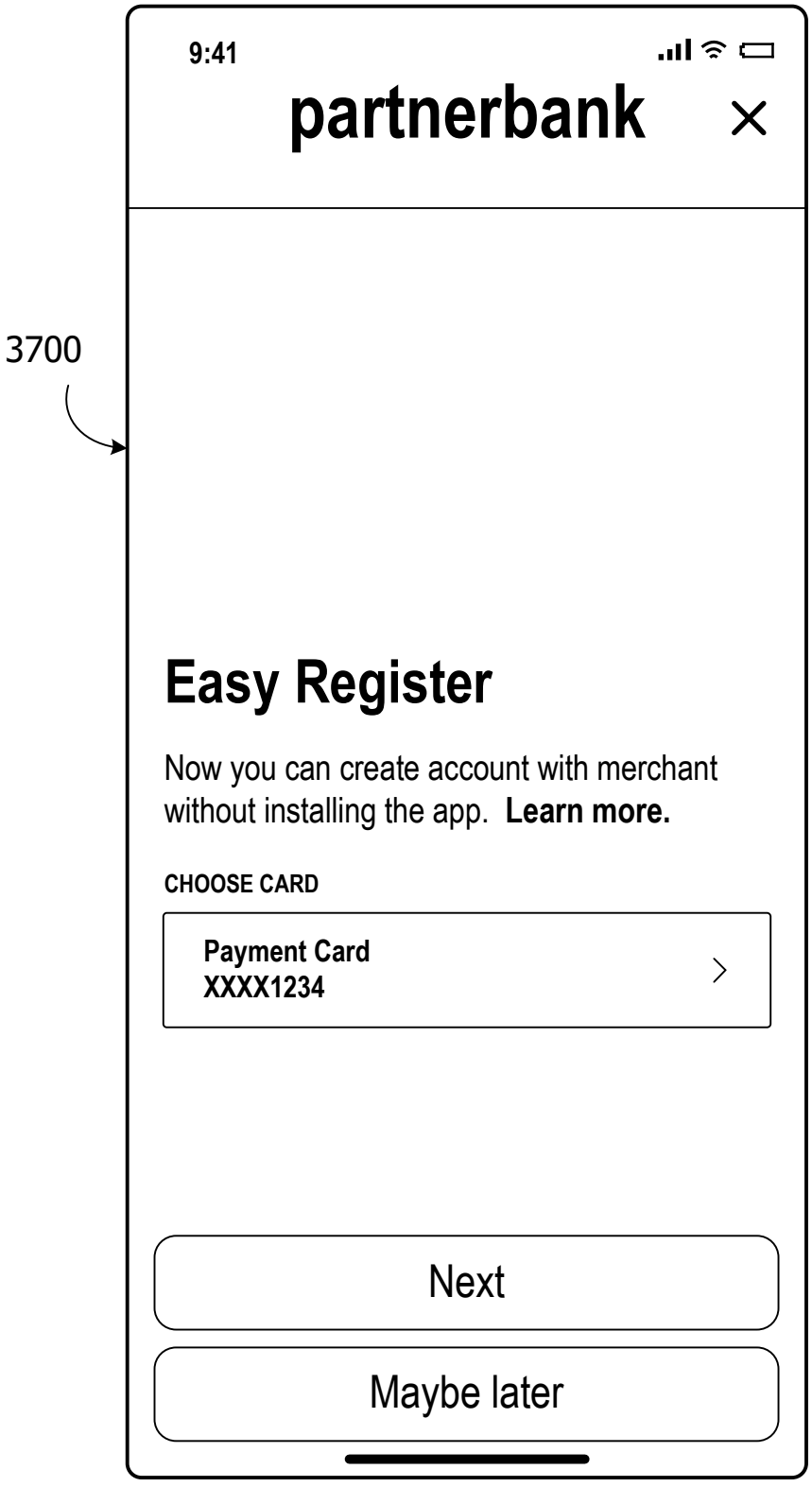

3700
9:41
partnerbank
Easy Register
Now you can create account with merchant without installing the app. Learn more.
CHOOSE CARD
Payment Card
XXXX1234
Next
Maybe later

FIG. 37

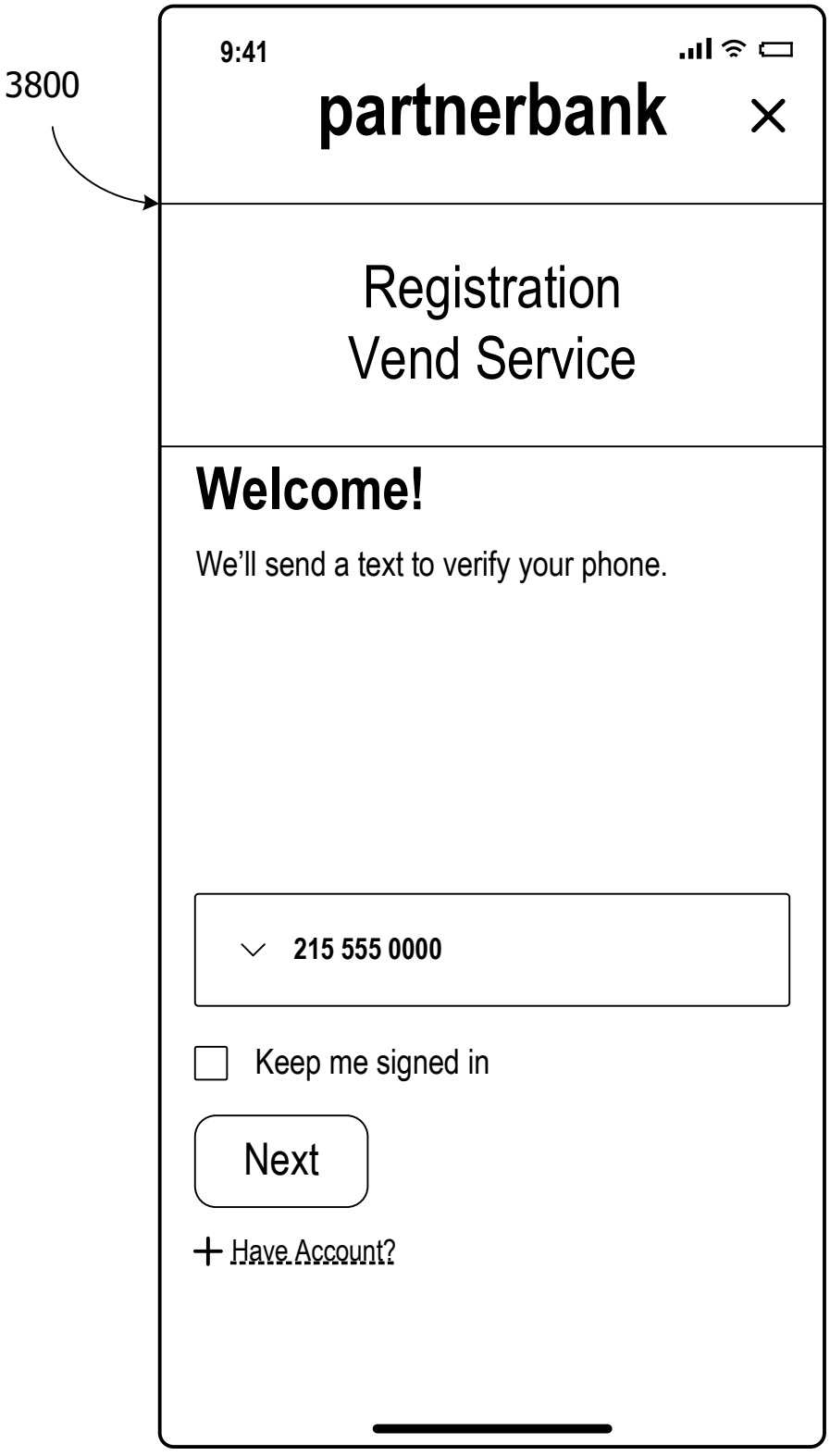

3800
9:41
partnerbank
Registration
Vend Service
Welcome!
We'll send a text to verify your phone.
215 555 0000
Keep me signed in
Next
Have Account?

FIG. 38

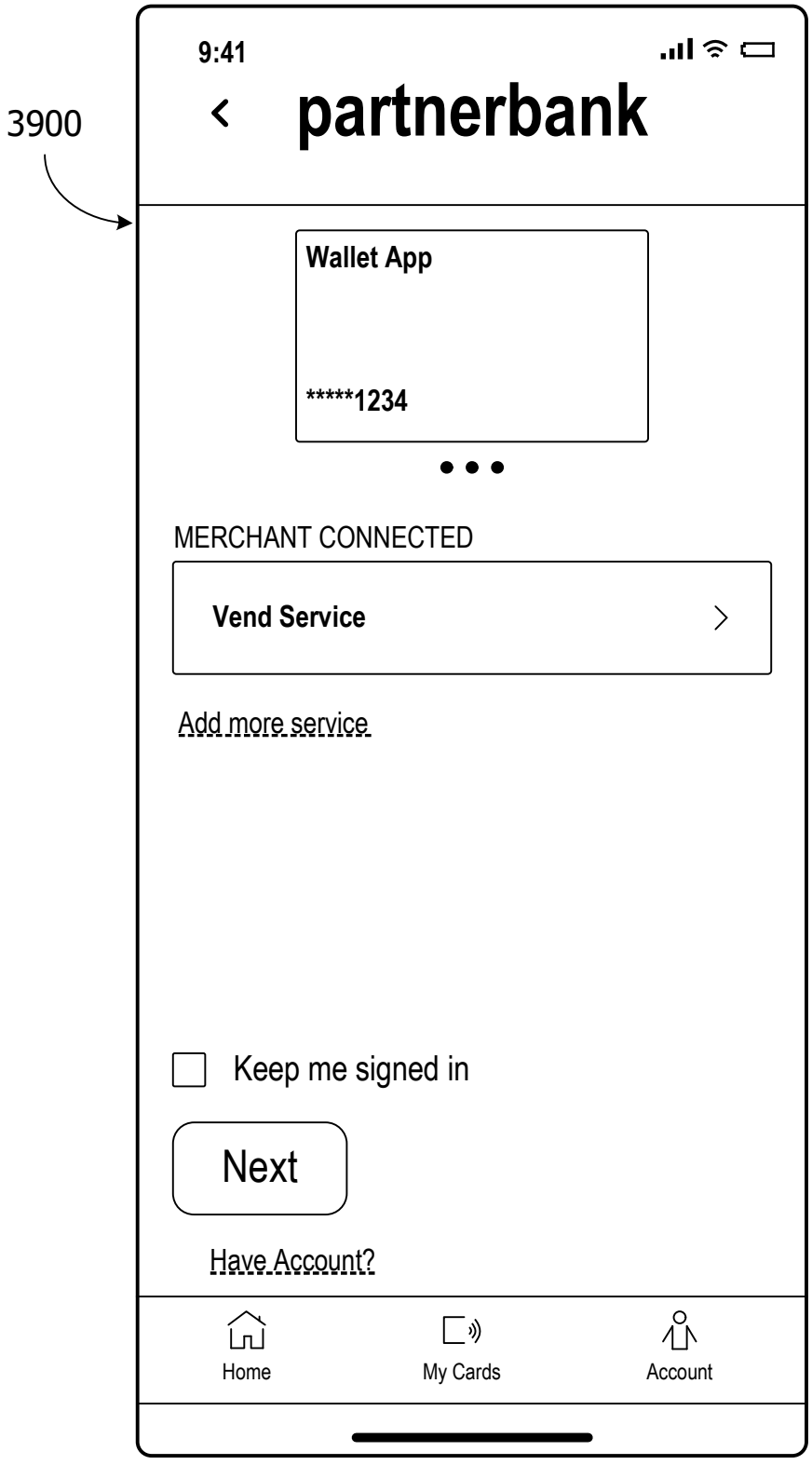
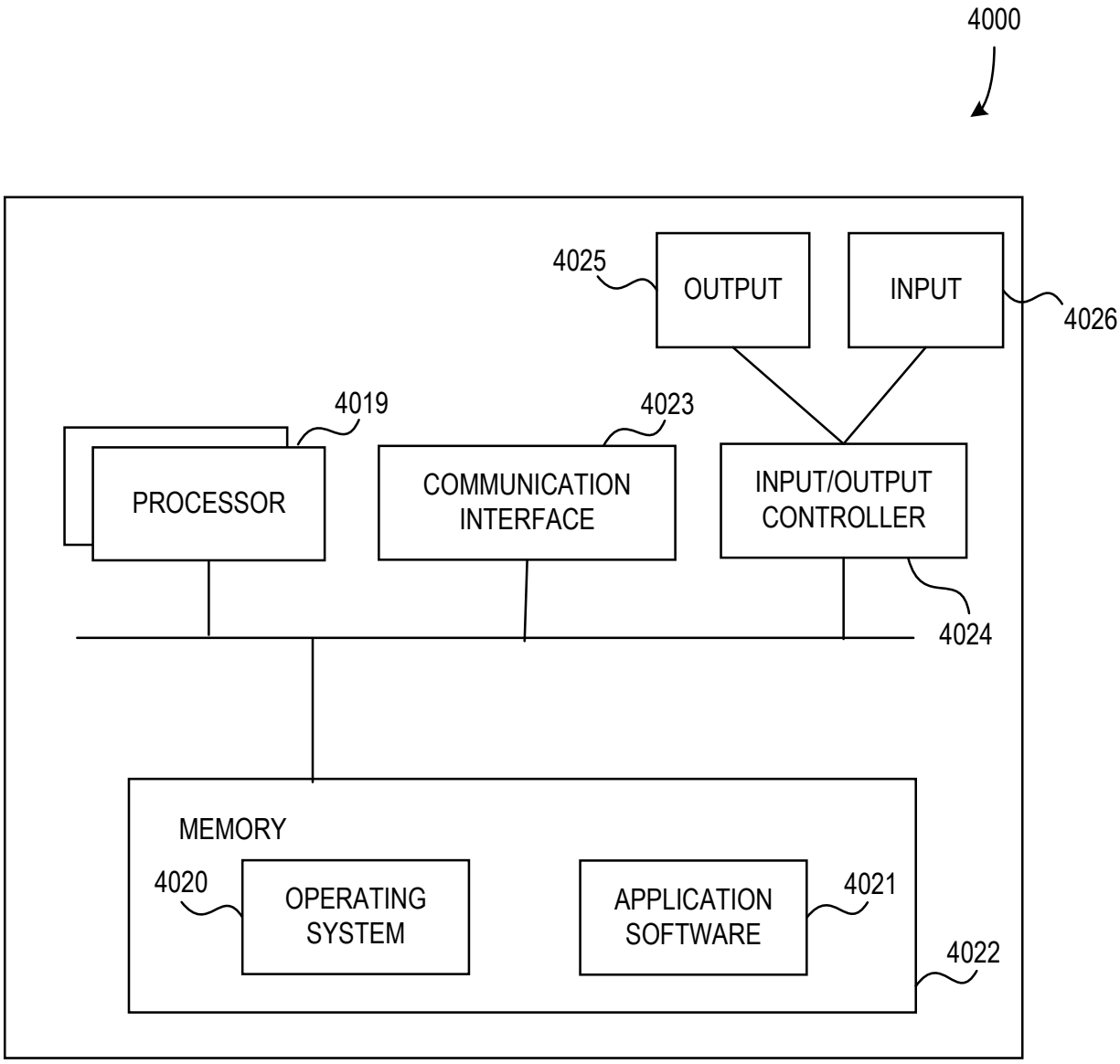

3900
9:41
partnerbank
Wallet App
*****1234
MERCHANT CONNECTED
Vend Service
Add more service
Keep me signed in
Next
Have Account?
Home
My Cards
Account

FIG. 39

FIG. 40


4000
4025
OUTPUT
INPUT
4026
4019
4023
PROCESSOR
COMMUNICATION INTERFACE
INPUT/OUTPUT CONTROLLER
4024
MEMORY
4020
OPERATING SYSTEM
APPLICATION SOFTWARE
4021
4022