UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/934,933	07/21/2020	Paresh K. Patel	104402-5041-US

CONFIRMATION NO. 1013

24341
Morgan, Lewis & Bockius LLP (PA)
1400 Page Mill Road
Palo Alto, CA 94304-1124

POA ACCEPTANCE LETTER

OC000000127395060

Date Mailed: 08/04/2021

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 07/28/2021.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/ttran/

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

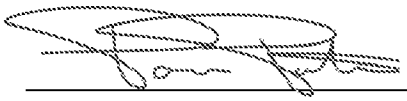
I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint the practitioners of Morgan, Lewis & Bockius LLP, Customer Number **24341** as attorneys or agents to represent the undersigned and to transact all business before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications and patents assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 C.F.R. § 3.73(c), said appointment to be to the exclusion of the inventor(s) and their attorney(s) in accordance with the provisions of 37 C.F.R. § 3.71, provided that, if any one of these attorneys ceases being affiliated with the law firm of Morgan, Lewis & Bockius LLP as partner, counsel, or employee, then the appointment of that attorney and all powers derived therefrom shall terminate on the date such attorney ceases being so affiliated.

Assignee Name and Address: PAYRANGE INC.
9600 NE Cascades Pkwy, Suite 280
Portland, OR 97220

SIGNATURE of Assignee of Record

The undersigned whose signature and title is supplied below is authorized to act on behalf of the assignee.

Signature 

Name Paresh K. Patel, Ph.D., MBA Date February 9, 2018

Title CEO, PayRange Inc. Telephone (855) 856-6398

A copy of this form, together with a statement under 37 C.F.R. § 3.73(c) (Form PTO/SB96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 C.F.R. § 3.73(c) may be completed by one of the practitioners appointed in this form if the appointed practitioner is authorized to act on behalf of the assignee and must identify the application in which this Power of Attorney is to be filed.

Electronic Acknowledgement Receipt

EFS ID:	43366513
Application Number:	16934933
International Application Number:	
Confirmation Number:	1013
Title of Invention:	DEVICE AND METHOD FOR PROVIDING EXTERNAL ACCESS TO MULTI-DROP BUS PERIPHERAL DEVICES
First Named Inventor/Applicant Name:	Paresh K. Patel
Customer Number:	24341
Filer:	Douglas James Crisman/Linda Quintana
Filer Authorized By:	Douglas James Crisman
Attorney Docket Number:	104402-5041-US
Receipt Date:	28-JUL-2021
Filing Date:	21-JUL-2020
Time Stamp:	14:43:12
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Assignee showing of ownership per 37 CFR 3.73	104402-5041-US_373c.pdf	125699 c59d676cda2b3223aadd6973f8953f84166c52a8	no	1

Warnings:

Information:					
2	Power of Attorney	PAYRANGE_POA_373c.pdf	134105 b582636fe21578c00bac318cf732886478d051a6	no	1
Warnings:					
Information:					
		Total Files Size (in bytes):	259804		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Electronically filed July 28, 2021

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of:	Paresh K. Patel	Confirmation No.:	1013
Serial No.:	16/934,933	Art Unit	2184
Filed:	July 21, 2020	Examiner:	Aurangzeb Hassan
Issued:	July 27, 2021	Pat. No.:	11,074,580
For:	DEVICE AND METHOD FOR PROVIDING EXTERNAL ACCESS TO MULTI-DROP BUS PERIPHERAL DEVICES	Attorney Docket No.:	104402-5041-US

STATEMENT UNDER 37 C.F.R. § 3.73(c)

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

PAYRANGE INC., a corporation, states that it is the assignee of the entire right, title and interest in the patent identified above by virtue of an assignment from the inventor of the patent identified above.

The assignment was recorded in the United States Patent and Trademark Office on July 27, 221 at Reel/Frame 056990/0586, or for which a copy thereof is attached.

The undersigned is authorized to act on behalf of the assignee.

Date: July 28, 2021

/Douglas J. Crisman/ 39,951

Douglas J. Crisman (Reg. No.)
MORGAN, LEWIS & BOCKIUS LLP
1400 Page Mill Road
Palo Alto, CA 94304
(650) 843-4000

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/934,933	07/27/2021	11074580	104402-5041-US	1013

24341 7590 07/07/2021

Morgan, Lewis & Bockius LLP (PA)
1400 Page Mill Road
Palo Alto, CA 94304-1124

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Paresh K. Patel, Portland, OR;
PAYRANGE INC., Portland, OR;

PART B - FEE(S) TRANSMITTAL

Electronically filed June 23, 2021

Complete and send this form with applicable fee(s), to: Mail
Mail Stop ISSUE FEE
Commissioner of Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571) 273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advanced orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS

MORGAN, LEWIS & BOCKIUS LLP
1400 Page Mill Road
Palo Alto, CA 94304

Note: A certificate of mailing below can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing.

Certificate of Mailing

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)

(Signature)

(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTY'S DOCKET NO.	CONFIRMATION NO.
16/934,933	07/21/2020	Paresh K. Patel	104402-5041-US	1013

TITLE OF INVENTION **DEVICE AND METHOD FOR PROVIDING EXTERNAL ACCESS TO MULTI-DROP BUS PERIPHERAL DEVICES**

APPLN. TYPE	ENTITY STATUS	ISSUE FEE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$600	$0	$600	06/30/2021

EXAMINER	ART UNIT	CLASS-SUB CLASS
HASSAN, AURANGZEB	2184	710-008000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed

1. **Morgan, Lewis & Bockius LLP**
2.
3.

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: PAYRANGE INC.

(B) RESIDENCE: (CITY and STATE OR COUNTRY) PORTLAND, OR

Please check the appropriate assignee category or categories (will not be printed on the patent) ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

☒ Issue Fee

☐ Advanced Order - # of Copies ___

4b. Payment of Fee(s): (**Please first reapply any previously paid issue fee shown above.**)

☒ Electronic Payment via Financial Manager

☐ Non-electronic payment by credit card. Form PTO-2038 is attached.

☒ The Director is hereby authorized to charge the required fee(s), or credit any overpayment, to Deposit Account Number 50-0310 (order no. 104402-5041-US).

5. **Change in Small Entity Status** (from status indicated above)

☐ a. Applicant certifying micro entity status. See 37 CFR 1.29.
NOTE: Absent a valid certification of Micro Entity (see form PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

☐ Applicant asserting small entity status. See 37 CFR 1.27.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

☐ Applicant changing to regular undiscounted fee status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be sign in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature: /Douglas J. Crisman/ Date: June 23, 2021

Printed Name: Douglas J. Crisman Registration No. 39,951

Electronic Patent Application Fee Transmittal

Application Number:	16934933
Filing Date:	21-Jul-2020
Title of Invention:	DEVICE AND METHOD FOR PROVIDING EXTERNAL ACCESS TO MULTI-DROP BUS PERIPHERAL DEVICES
First Named Inventor/Applicant Name:	Paresh K. Patel
Filer:	Douglas James Crisman/Linda Quintana
Attorney Docket Number:	104402-5041-US

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
UTILITY APPL ISSUE FEE	2501	1	600	600

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**600**

Electronic Acknowledgement Receipt

EFS ID:	43068033
Application Number:	16934933
International Application Number:	
Confirmation Number:	1013
Title of Invention:	DEVICE AND METHOD FOR PROVIDING EXTERNAL ACCESS TO MULTI-DROP BUS PERIPHERAL DEVICES
First Named Inventor/Applicant Name:	Paresh K. Patel
Customer Number:	24341
Filer:	Douglas James Crisman/Linda Quintana
Filer Authorized By:	Douglas James Crisman
Attorney Docket Number:	104402-5041-US
Receipt Date:	23-JUN-2021
Filing Date:	21-JUL-2020
Time Stamp:	15:09:41
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$600
RAM confirmation Number	E20216MF09592653
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	104402-5041-US_IssueFee_23-JUN-2021.pdf	161189 dc3d2b99408d4a8f55460ece953e0aa9dab97c97	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30634 b3c08a4e355c95204c29479c7c679bbac98c6860	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	191823		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

24341 7590 03/31/2021

Morgan, Lewis & Bockius LLP (PA)
1400 Page Mill Road
Palo Alto, CA 94304-1124

EXAMINER
HASSAN, AURANGZEB

ART UNIT	PAPER NUMBER
2184	

DATE MAILED: 03/31/2021

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/934,933	07/21/2020	Paresh K. Patel	104402-5041-US	1013

TITLE OF INVENTION: DEVICE AND METHOD FOR PROVIDING EXTERNAL ACCESS TO MULTI-DROP BUS PERIPHERAL DEVICES

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$600	$0.00	$0.00	$600	06/30/2021

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

24341 7590 03/31/2021
Morgan, Lewis & Bockius LLP (PA)
1400 Page Mill Road
Palo Alto, CA 94304-1124

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/934,933	07/21/2020	Paresh K. Patel	104402-5041-US	1013

TITLE OF INVENTION: DEVICE AND METHOD FOR PROVIDING EXTERNAL ACCESS TO MULTI-DROP BUS PERIPHERAL DEVICES

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$600	$0.00	$0.00	$600	06/30/2021

EXAMINER	ART UNIT	CLASS-SUBCLASS
HASSAN, AURANGZEB	2184	710-008000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑ Issue Fee ❑ Publication Fee (if required) ❑ Advance Order - # of Copies _____

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

❑ Applicant asserting small entity status. See 37 CFR 1.27

❑ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/934,933	07/21/2020	Paresh K. Patel	104402-5041-US	1013

24341 7590 03/31/2021

Morgan, Lewis & Bockius LLP (PA)
1400 Page Mill Road
Palo Alto, CA 94304-1124

EXAMINER	
HASSAN, AURANGZEB	
ART UNIT	PAPER NUMBER
2184	

DATE MAILED: 03/31/2021

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 16/934,933	Applicant(s) Patel, Paresh K.	
	Examiner AURANGZEB HASSAN	Art Unit 2184	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to Amendments 3/15/21.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are See Continuation Sheet . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☑ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☑ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/HENRY TSAI/
Supervisory Patent Examiner, Art Unit 2184

Continuation of 3. The allowed claim(s) is/are: 1-4,6-11,13-18 and 20

DETAILED ACTION

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Allowable Subject Matter

Claims 1 – 4, 6 – 11, 13 – 18, and 20 are allowed.

The following is an examiner's statement of reasons for allowance: Applicant's submission on 3/15/21 of amendments and arguments and interview on 3/12/21, have been fully considered to be persuasive therein the claim limitations are in allowable format.

The prior art fails to teach or suggest alone or in combination the limitations of the claims as a whole including retrofitting a machine with a multi-drop bus to include a peripheral device which communicates with a mobile device to access signals to validate and handle communication between the mobile device and the host. Furthermore where the peripheral device is configured to act as a slave to the electronic device and carry out commands directly with the host via MDB protocol and is decoupled from the MDB of the machine. Prior art is further silent on modification to combine such features and functionality and is therefore deemed allowable.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The Examiner has cited three prior art that relate to wireless configuration in a multi-drop bus environment in a manner which differs from the instant application.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AURANGZEB HASSAN whose telephone number is (571)272-8625. The examiner can normally be reached on 7 AM to 3 PM.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Henry Tsai can be reached on 571-272-4176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AH

/HENRY TSAI/
Supervisory Patent Examiner, Art Unit 2184

Notice of References Cited	Application/Control No. 16/934,933	Applicant(s)/Patent Under Reexamination Patel, Paresh K.	
	Examiner AURANGZEB HASSAN	Art Unit 2184	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-10163292-B1	12-2018	Romero; Carlos	G06Q20/322	1/1
*	B	US-20040133653-A1	07-2004	Defosse, Erin M.	G06Q20/32	709/217
*	C	US-8596529-B1	12-2013	Kolls; H. Brock	G07F9/026	235/381
	D					
	E					
	F					
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	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/934,933	Patel, Paresh K.
	Examiner	**Art Unit**
	AURANGZEB HASSAN	2184

CPC						
Symbol					**Type**	**Version**
G06Q	/	20	/	40	F	2013-01-01
G06Q	/	20	/	405	I	2013-01-01
G06Q	/	20	/	327	I	2013-01-01
G06Q	/	20	/	3829	I	2013-01-01
G06Q	/	20	/	3823	I	2013-01-01
G06Q	/	20	/	3278	I	2013-01-01
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G06Q	/	30	/	06	I	2013-01-01
G06Q	/	20	/	32	I	2013-01-01
G07F	/	9	/	023	I	2013-01-01
G07F	/	9	/	002	I	2020-05-01
G06Q	/	20	/	38	I	2013-01-01
G06Q	/	20	/	18	I	2013-01-01
G06Q	/	20	/	322	I	2013-01-01
G06Q	/	20	/	3821	I	2013-01-01
G06Q	/	20	/	401	I	2013-01-01
G06Q	/	20	/	3226	I	2013-01-01
G06F	/	13	/	00	I	2013-01-01
G06Q	/	2220	/	00	A	2013-01-01

CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
	/		/					

/AURANGZEB HASSAN/ Examiner, Art Unit 2184 (Assistant Examiner)	24 March 2021 (Date)	**Total Claims Allowed:** 17	
/HENRY TSAI/ Supervisory Patent Examiner, Art Unit 2184 (Primary Examiner)	25 March 2021 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/934,933	Patel, Paresh K.
	Examiner	**Art Unit**
	AURANGZEB HASSAN	2184

INTERNATIONAL CLASSIFICATION				
CLAIMED				
G06Q20/40	/	20	/	40

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**
710	8

CROSS REFERENCES(S)						
CLASS	**SUBCLASS (ONE SUBCLASS PER BLOCK)**					

/AURANGZEB HASSAN/ Examiner, Art Unit 2184	24 March 2021	**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	17	
/HENRY TSAI/ Supervisory Patent Examiner, Art Unit 2184	25 March 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/934,933	Patel, Paresh K.
	Examiner	**Art Unit**
	AURANGZEB HASSAN	2184

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	9	10		19										
2	2	10	11	17	20										
3	3		12												
4	4	11	13												
	5	12	14												
5	6	13	15												
6	7	14	16												
7	8	15	17												
8	9	16	18												

/AURANGZEB HASSAN/ Examiner, Art Unit 2184 (Assistant Examiner)	24 March 2021 (Date)	**Total Claims Allowed:** 17	
/HENRY TSAI/ Supervisory Patent Examiner, Art Unit 2184 (Primary Examiner)	25 March 2021 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/934,933	Patel, Paresh K.
	Examiner	Art Unit
	AURANGZEB HASSAN	2184

CPC - Searched*		
Symbol	Date	Examiner
G06Q20/ (40,18,32,322,3226,327,3278,36,38,3821,3823,3829,401,405)	03/24/2021	AH
G06F13/00	03/24/2021	AH

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner
710	008	03/24/2021	AH

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
EAST Text Search CPC/Inventor/Interference	03/24/2021	AH
NPL/Google Search	03/24/2021	AH
G06Q20/ (40,18,32,322,3226,327,3278,36,38,3821,3823,3829,401,405)	03/24/2021	AH
G06F13/00	03/24/2021	AH
PLUS Search	09/29/2020	

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/934,933	Patel, Paresh K.
	Examiner	**Art Unit**
	AURANGZEB HASSAN	2184

Interference Search			
US Class/CPC Symbol	**US Subclass/CPC Group**	**Date**	**Examiner**
G06Q20	40/18/32/322/3226/327/3278/36/38/3821/3823/3829/401/405	03/24/2021	AH
G06F13	00	03/24/2021	AH

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
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L27	851	slave and (multi$drop near2 bus mdb) and (host master) and @ad<="20131217"	US-PGPUB; USPAT	OR	ON	2021/03/24 17:22
L28	455	slave and (multi$drop near2 bus mdb) and (host master) and @ad<="20131217" and peripheral and (ack acknowledg$5 response)	US-PGPUB; USPAT	OR	ON	2021/03/24 17:22
L29	2	slave and (multi$drop near2 bus mdb) and (host master) and @ad<="20131217" and peripheral and (ack acknowledg$5 response) and short$range and long$range	US-PGPUB; USPAT	OR	ON	2021/03/24 17:22
L30	3	"20130332293" "20140143074"	US-PGPUB; USPAT	OR	ON	2021/03/24 17:22
L31	70,971	(g06q20/40 g07f9/002 g06f13/00 g06q20/18 g06q20/32 g06q/322 g06q20/3226 g06q20/327 g06q20/3278 g06q20/36 g06q20/38 g06q20/3821 g06q20/3823	US-PGPUB; USPAT	OR	OFF	2021/03/24 17:22

		g06q20/3829 g06q20/401 g06q20/405 g06q30/06 g07f9/023 g06q2220/00).cpc.				
L32	380	L31 and (multi$drop near2 bus mdb)	US-PGPUB; USPAT	OR	OFF	2021/03/24 17:22
L33	157	(multi$drop near2 bus mdb) not payrange and (wireless or mobile) same (device connection) and @ad<="20131217" and host and slave	US-PGPUB; USPAT	OR	OFF	2021/03/24 17:24
L34	15	(multi$drop near2 bus mdb) with (wireless or mobile) same (device connection) and @ad<="20131217" and host and slave not payrange	US-PGPUB; USPAT	OR	OFF	2021/03/24 17:25

3/24/2021 5:33:27 PM
C:\Users\ahassan\Documents\EAST\Workspaces\search on 9_27_20 for app 16_934933.wsp

Google multi-drop bus wireless mobile

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www.qibixx.com › company › blogs › news › what-is-

What is an MDB and how is it integrated in vending machines ...

Jul 4, 2017 — The definition of MDB (Multi Drop Bus), the application in machines, the advantages ... Special versions with 4G/LTE modem and intelligence, WiFi connection ... device" and to accept TWINT mobile payments for the machine.

en.wikipedia.org › wiki › Multidrop_bus

Multidrop bus - Wikipedia

A multidrop bus (MDB) is a computer bus in which all components are connected to the electrical circuit. A process of arbitration determines which device sends ...
Missing: wireless | Must include: wireless

www.instructables.com › Circuits › Electronics

Make a Device/Feature for Vending Machines : 7 Steps (with ...

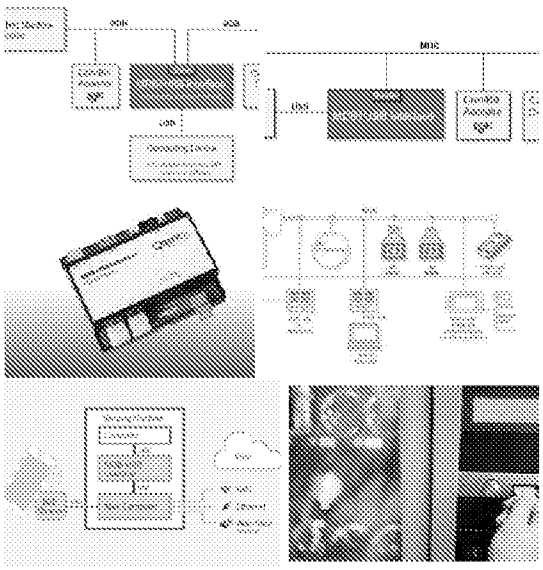
7 steps
1. If making a device that talks to vending machines, you need to speak their language. That i...
2. You will be making a breadboard version of your MDB device, prior to making a custom ver...
3. Preparation:It's smart to make your software and features before committing to developing...

hackaday.com › tag › multidrop-bus

Multidrop Bus | Hackaday

Apr 18, 2014 — Today, [Dan] is working on sniffing vending machine Multidrop Bus. The Multidrop Bus (MDB) protocol is a standard used in vending machines ...

Images for multi-drop bus wireless mobile



Report images

View all

www.qiba.pt › mdb-explained

MDB Explained – Qiba

May 26, 2020 — MDB: stands for "Multi Drop Bus". In connection with vending machines, this refers to a connection technology for peripheral devices (coin ...

patents.justia.com › patent

US Patent Application for FUNCTION-SPECIFIC ...

Jul 25, 2019 — FUNCTION-SPECIFIC COMMUNICATION ON A MULTI-DROP BUS ... a first modem 202 is configured for operation using a mobile wireless ...

www.namanow.org › wp-content › uploads › 202... PDF

12 Terms Every Vendor Needs to Know

MDB, Merchandising, Par Level, Prekitting, Saas, Telemetry, VMS, Wireless ... MDB – MDB, or Multi Drop Bus, is the way a vending machine communicates to a ... work through the mobile telephone system, relying on radio waves to send and ...

www.vendingmarketwatch.com › home › article › dex-...

DEX and MDB: A Primer For Vendors | Vending Market Watch

Feb 7, 2008 — Remote monitoring devices (wireless, LAN or telephone) can forward DEX, usually via the Internet, to a central computer where the software ...
Missing: mobile | Must include: mobile

patents.google.com › patent

US20140100977A1 - Vending data communications systems ...

MDB is an acronym for Multi-Drop Bus and is an internal (vending machine) ... The cell phone 104 is then networked via wireless cellular communications 114, ...

Related searches

multi drop bus **protocol**	**convert vending machine to mdb**
multi-drop communication	**mdb to usb vending**
mdb protocol vending machine source code	**mdb compatible vending machine**
multi drop **rs485**	multi drop **ethernet**

Bibliographic Data

Application No: 16/934,933

Foreign Priority claimed: ○ Yes ◉ No

35 USC 119 (a-d) conditions met: ☐ Yes ☐ No ☐ Met After Allowance

Verified and Acknowledged: /AURANGZEB HASSAN/ Examiner's Signature | Initials

Title: DEVICE AND METHOD FOR PROVIDING EXTERNAL ACCESS TO MULTI-DROP BUS PERIPHERAL DEVICES

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
07/21/2020	710	2184	104402-5041-US
RULE			

APPLICANTS

PAYRANGE INC., Portland, OR,

INVENTORS

Paresh K. Patel, Portland, OR, UNITED STATES

CONTINUING DATA

This application is a CIP of 16029483 07/06/2018 PAT 10963905

This application is a CIP of 15893514 02/09/2018

15893514 is a CON of PCT/US2017/015676 01/30/2017

This application is a CIP of 15406492 01/13/2017 PAT 10719833

PCT/US2017/015676 has PRO of 62289158 01/29/2016

15893514 is a CIP of 14641236 03/06/2015ABN

16029483 is a CON of 14611065 01/30/2015 PAT 10019724

14641236 has PRO of 62081492 11/18/2014

15406492 is a CON of 14335762 07/18/2014 PAT 9547859

14641236 is a CIP of 14320534 06/30/2014ABN

14335762 is a CON of 14214644 03/14/2014 PAT 8856045

14320534 is a CIP of 14214644 03/14/2014 PAT 8856045

14214644 is a CIP of 29477025 12/18/2013 PAT D755183

14214644 has PRO of 61917936 12/18/2013

FOREIGN APPLICATIONS

IF REQUIRED, FOREIGN LICENSE GRANTED**

07/29/2020

**** SMALL ENTITY ****

STATE OR COUNTRY

UNITED STATES

ADDRESS

Morgan, Lewis & Bockius LLP (PA)
1400 Page Mill Road
Palo Alto, CA 94304-1124
UNITED STATES

FILING FEE RECEIVED

$2,855

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/934,933	07/21/2020	Paresh K. Patel	104402-5041-US	1013

24341 7590 03/19/2021

Morgan, Lewis & Bockius LLP (PA)
1400 Page Mill Road
Palo Alto, CA 94304-1124

EXAMINER	
HASSAN, AURANGZEB	

ART UNIT	PAPER NUMBER
2184	

NOTIFICATION DATE	DELIVERY MODE
03/19/2021	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

padocketingdepartment@morganlewis.com
vskliba@morganlewis.com

Applicant-Initiated Interview Summary	**Application No.** 16/934,933	**Applicant(s)** Patel, Paresh K.		
	Examiner AURANGZEB HASSAN	**Art Unit** 2184	**AIA (First Inventor to File) Status** Yes	**Page** 1 of 1

All Participants (applicant, applicants representative, PTO personnel)	**Title**	**Type**
AURANGZEB HASSAN	Examiner	Telephonic
Benjamin Pezzner	Attorney	
Douglas Crisman	Attorney	

Date of Interview: 12 March 2021

Issues Discussed:

Proposed Amendment(s)

The Applicants provided extensive insight on the inventive concepts of the application and proposed a set of claims which combined portions of the previously allowable subject matter into independent form. Upon consideration and clarification the Examiner agreed that the key elements of novelty were well represented in the proposed amendment and would overcome the cited prior art with a final search/ consideration remaining in order to complete a determination of allowability at the time of official filing.

/AURANGZEB HASSAN/ Examiner, Art Unit 2184	/HENRY TSAI/ Supervisory Patent Examiner, Art Unit 2184

Applicant is reminded that a complete written statement as to the substance of the interview must be made of record in the application file. It is the applicants responsibility to provide the written statement, unless the interview was initiated by the Examiner and the Examiner has indicated that a written summary will be provided. See MPEP 713.04
Please further see:
MPEP 713.04
Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews, paragraph (b)
37 CFR § 1.2 Business to be transacted in writing

Applicant recordation instructions: The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

Electronically filed March 15, 2021

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of:	Paresh K. Patel	Confirmation No.:	1013
Serial No.:	16/934,933	Art Unit:	2184
Filed:	July 21, 2020	Examiner:	Hassan, Aurangzeb
For:	*Device And Method For Providing External Access To Multi-Drop Bus Peripheral Devices*	Atty. Docket No.:	104402-5041-US

AMENDMENT AND INTERVIEW SUMMARY

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

The enclosed Amendment is in response to the Office Action dated October 28, 2020 for the above identified patent application.

Petition for Extension of Time under 37 CFR 1.136. It is respectfully requested that the time for responding to the Office Action dated October 28, 2020 be extended for a period of two (2) months from January 28, 2021 to March 28, 2021.

The Commissioner is hereby authorized to charge any required fee(s) to Morgan, Lewis & Bockius LLP Deposit Account No. 50-0310 (order no. 104402-5041-US).

IN THE CLAIMS:

Rewrite the pending claims and add new claims as follows:

1. (Currently Amended) An electronic device for retrofitting a machine to accommodate one or more electronic peripheral devices, the electronic device comprising:

a slave interface configured to couple the electronic device to ~~the~~ a machine controller via a multi-drop bus (MDB); ~~and~~

a host interface configured to couple the electronic device to a first peripheral device of the one or more electronic peripheral devices, wherein the first peripheral device is configured to communicate via MDB protocol and is decoupled from the MDB of the machine;

a wireless transceiver;

one or more processors; and

non-transitory memory storing one or more programs to be executed by the one or more processors, the one or more programs comprising instructions for:

registering the electronic device as a slave to the machine controller;

registering the first peripheral device as a slave to the electronic device;

receiving, at the slave interface of the electronic device, a first command from the machine controller, wherein the first command is directed to the first peripheral device; and

in response to receiving the first command from the machine controller:

sending an acknowledgement to the machine controller via the slave interface in a manner as if originated from the first peripheral device; and

relaying the first command to the first peripheral device via the host interface;

receiving, from a mobile device via the wireless transceiver, a request to access signals generated by the first peripheral device;

validating the request, wherein validation of the request indicates that the mobile device is authorized, by a remote server, to access the signals generated by the first peripheral device; and

sending a first reset command to the first peripheral device via the host interface, wherein the first reset command includes a directive to update a signal destination address of the first peripheral device from a controller address of the machine controller to a device address of the electronic device.

2. (Original) The electronic device of claim 1, wherein the one or more programs further comprise instructions for:

receiving, at the host interface of the electronic device, a first signal from the first peripheral device, wherein the first signal is directed to the machine controller; and

in response to receiving the first signal from the first peripheral device:

sending an acknowledgement to the first peripheral device via the host interface in a manner as if originated from the machine controller; and

relaying the first signal to the machine controller via the slave interface.

3. (Original) The electronic device of claim 1, wherein the instructions for registering the electronic device as a slave to the machine controller comprise instructions for:

identifying the electronic device to the machine controller as the first peripheral device; and

accepting registration of the electronic device as the first peripheral device.

4. (Currently Amended) The electronic device of claim 1, wherein:

~~the electronic device further includes an internal peripheral device including a short-range communication capability corresponding to a short-range communication protocol; and~~

the one or more programs further comprise instructions for communicating, via the ~~short-range communication capability~~ wireless transceiver, with [[a]] the mobile device including (i) a complimentary ~~short-range communication capability~~ wireless transceiver and (ii) a long-range communication capability ~~corresponding to a long-range communication protocol~~.

5. (Canceled)

6. (Currently Amended) The electronic device of claim [[5]] 4, wherein the one or more programs further comprise instructions for:

receiving, at the host interface of the electronic device, a second signal from the first peripheral device, wherein the second signal is directed to the electronic device in accordance with the updated signal destination address;

in response to receiving the second signal from the first peripheral device:

sending an acknowledgement to the first peripheral device via the host interface;

transmitting a third signal to the mobile device via the short-range communication capability for forwarding to the server via the long-range communication capability, wherein the third signal includes data associated with the received second signal; and

forgoing provision of the second signal to the machine controller.

7. (Currently Amended) The electronic device of claim [[5]] 4, wherein the one or more programs further comprise instructions for:

receiving, from the mobile device via the short-range communication capability, a notification to cease interaction with the mobile device;

in response to receiving the notification to cease interaction with the mobile device:

sending a second reset command to the first peripheral device via the host interface, wherein the second reset command includes a directive to update, at the first peripheral device, the signal destination address from the device address to the controller address.

8. (Currently Amended) A method of retrofitting a machine to accommodate one or more electronic peripheral devices, the method comprising:

at an electronic device coupled to (i) a machine controller and (ii) a first of the one or more electronic peripheral devices, the electronic device including:

a wireless transceiver;

one or more processors;

non-transitory memory;

a slave interface configured to couple the electronic device to the machine controller via a multi-drop bus (MDB); and

a host interface configured to couple the electronic device to the first peripheral device;

wherein the first peripheral device is configured to communicate via MDB protocol and is decoupled from the MDB of the machine:

registering the electronic device as a slave to the machine controller;

registering the first peripheral device as a slave to the electronic device;

receiving, at the slave interface of the electronic device, a first command from the machine controller, wherein the first command is directed to the first peripheral device; and

in response to receiving the first command from the machine controller:

sending an acknowledgement to the machine controller via the slave interface in a manner as if originated from the first peripheral device; and

relaying the first command to the first peripheral device via the host interface;

receiving, from a mobile device via the wireless transceiver, a request to access signals generated by the first peripheral device;

validating the request, wherein validation of the request indicates that the mobile device is authorized, by a remote server, to access the signals generated by the first peripheral device; and

sending a first reset command to the first peripheral device via the host interface, wherein the first reset command includes a directive to update a signal destination address of the first peripheral device from a controller address of the machine controller to a device address of the electronic device.

9. (Original) The method of claim 8, further comprising:

receiving, at the host interface of the electronic device, a first signal from the first peripheral device, wherein the first signal is directed to the machine controller; and

in response to receiving the first signal from the first peripheral device:

sending an acknowledgement to the first peripheral device via the host interface in a manner as if originated from the machine controller; and

relaying the first signal to the machine controller via the slave interface.

10. (Original) The method of claim 8, wherein registering the electronic device as a slave to the machine controller includes:

identifying the electronic device to the machine controller as the first peripheral device; and

accepting registration of the electronic device as the first peripheral device.

11. (Currently Amended) The method of claim 8, wherein:

~~the electronic device further includes an internal peripheral device including a short-range communication capability corresponding to a short-range communication protocol; and~~

the method further comprises communicating, via the ~~short-range communication capability~~ wireless transceiver, with [[a]] the mobile device including (i) a complimentary ~~short-range communication capability~~ wireless transceiver and (ii) a long-range communication capability ~~corresponding to a long-range communication protocol~~.

12. (Canceled)

13. (Currently Amended) The method of claim [[12]] 11, further comprising:

receiving, at the host interface of the electronic device, a second signal from the first peripheral device, wherein the second signal is directed to the electronic device in accordance with the updated signal destination address;

in response to receiving the second signal from the first peripheral device:

sending an acknowledgement to the first peripheral device via the host interface;

transmitting a third signal to the mobile device via the short-range communication capability for forwarding to the server via the long-range communication capability, wherein the third signal includes data associated with the received second signal; and

forgoing provision of the second signal to the machine controller.

14. (Currently Amended) The method of claim [[12]] 11, further comprising:

receiving, from the mobile device via the short-range communication capability, a notification to cease interaction with the mobile device;

in response to receiving the notification to cease interaction with the mobile device:

sending a second reset command to the first peripheral device via the host interface, wherein the second reset command includes a directive to update, at the first peripheral device, the signal destination address from the device address to the controller address.

15. (Currently Amended) A non-transitory computer readable storage medium storing one or more programs, the one or more programs comprising instructions, which, when executed by an electronic device (i) coupled to a machine controller and a first of one or more electronic peripheral devices and (ii) including:

a wireless transceiver

one or more processors;

a slave interface configured to couple the electronic device with the machine controller via a multi-drop bus (MDB); and

a host interface configured to couple the electronic device with the first peripheral device, wherein the first peripheral device is configured to communicate via MDB protocol and is decoupled from the MDB of the machine;

cause the electronic device to perform operations comprising:

registering the electronic device as a slave to the machine controller;

registering the first peripheral device as a slave to the electronic device;

receiving, at the slave interface of the electronic device, a first command from the machine controller, wherein the first command is directed to the first peripheral device; and

in response to receiving the first command from the machine controller:

sending an acknowledgement to the machine controller via the slave interface in a manner as if originated from the first peripheral device; and

relaying the first command to the first peripheral device via the host interface;

receiving, from a mobile device via the wireless transceiver, a request to access signals generated by the first peripheral device;

validating the request, wherein validation of the request indicates that the mobile device is authorized, by a remote server, to access the signals generated by the first peripheral device; and

sending a first reset command to the first peripheral device via the host interface, wherein the first reset command includes a directive to update a signal destination address of the first peripheral device from a controller address of the machine controller to a device address of the electronic device.

16. (Original) The non-transitory computer readable storage medium of claim 15, wherein the one or more programs further comprise instructions for:

receiving, at the host interface of the electronic device, a first signal from the first peripheral device, wherein the first signal is directed to the machine controller; and

in response to receiving the first signal from the first peripheral device:

sending an acknowledgement to the first peripheral device via the host interface in a manner as if originated from the machine controller; and

relaying the first signal to the machine controller via the slave interface.

17. (Original) The non-transitory computer readable storage medium of claim 15, wherein the instructions for registering the electronic device as a slave to the machine controller comprise instructions for:

identifying the electronic device to the machine controller as the first peripheral device; and

accepting registration of the electronic device as the first peripheral device.

18. (Currently Amended) The non-transitory computer readable storage medium of claim 15, wherein:

~~the electronic device further includes an internal peripheral device including a short-range communication capability corresponding to a short-range communication protocol; and~~

the one or more programs further comprise instructions for communicating, via the ~~short-range communication capability~~ wireless transceiver, with [[a]] the mobile device including (i) a complimentary ~~short-range communication capability~~ wireless transceiver and (ii) a long-range communication capability ~~corresponding to a long-range communication protocol~~.

19. (Canceled)

20. (Currently Amended) The non-transitory computer readable storage medium of claim [[19]] 18, wherein the one or more programs further comprise instructions for:

receiving, at the host interface of the electronic device, a second signal from the first peripheral device, wherein the second signal is directed to the electronic device in accordance with the updated signal destination address;

in response to receiving the second signal from the first peripheral device:

sending an acknowledgement to the first peripheral device via the host interface;

transmitting a third signal to the mobile device via the short-range communication capability for forwarding to the server via the long-range communication capability, wherein the third signal includes data associated with the received second signal; and

forgoing provision of the second signal to the machine controller;

receiving, from the mobile device via the short-range communication capability, a notification to cease interaction with the mobile device; and

in response to receiving the notification to cease interaction with the mobile device:

sending a second reset command to the first peripheral device via the host interface, wherein the second reset command includes a directive to update, at the first peripheral device, the signal destination address from the device address to the controller address.

REMARKS

This amendment responds to the office action mailed October 28, 2020. In the office action the Examiner:

- rejected claim 1 under 35 U.S.C. 112(b) as being indefinite for failing to particularly point out and distinctly claim the subject matter;
- rejected claims 1 and 9 under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter;
- rejected claims 1-4, 8-11, and 15-18 under 35 U.S.C. 103 as being unpatentable over Ran (US 2013/0332293), in view of Kolls (US 2014/0143074); and
- objected to claims 5- 7, 12-14, and 19-20 as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form.

INTERVIEW SUMMARY

Applicant's attorneys thank Examiner Hassan for the opportunity to discuss the application during a telephone interview on March 12, 2021 with Douglas Crisman and Benjamin Pezzner. In the interview, the Examiner agreed that amending claims 1, 8, and 15 to include subject matter recited in claims 5, 12, and 19, respectively, would overcome the prior art of record, but a final decision regarding allowability would be subject to another search. The claims have been amended accordingly. The Examiner is invited to call Benjamin Pezzner at (650) 843-7584, if a telephone call could help resolve any remaining items.

AMENDMENTS TO THE CLAIMS

Claims 1, 8, and 15 have been amended to include subject matter originally recited in claims 4-5, 11-12, and 18-19.

In order to maintain antecedent basis and consistent terminology, claims 4, 6, 7, 11, 13, 14, 18, and 20 have been amended, and claims 5, 12, and 19 have been canceled.

No new matter has been added.

After entry of this amendment, claims 1-4, 6-11, 13-18, and 20 are pending.

REMARKS CONCERNING REJECTIONS UNDER 35 U.S.C. 112

I. REJECTION OF CLAIM 1 UNDER 35 U.S.C. 112(B) AS BEING INDEFINITE FOR FAILING TO PARTICULARLY POINT OUT AND DISTINCTLY CLAIM THE SUBJECT MATTER

Claim 1 has been amended to provide antecedent basis for the "machine controller." As such, withdrawal of this rejection is requested.

REMARKS CONCERNING REJECTIONS UNDER 35 U.S.C. 101

II. REJECTION OF CLAIMS 1 AND 9 UNDER 35 U.S.C. 101 BECAUSE THE CLAIMED INVENTION IS DIRECTED TO NON-STATUTORY SUBJECT MATTER

Claims 1 and 8 have been amended to clarify that the memory is "non-transitory." As such, withdrawal of this rejection is requested.

REMARKS CONCERNING REJECTIONS UNDER 35 U.S.C. 103

III. REJECTION OF CLAIMS 1-4, 8-11, AND 15-18 UNDER 35 U.S.C. 103 AS BEING UNPATENTABLE OVER RAN, IN VIEW OF KOLLS

Claims 1, 8, and 15 have been amended to include subject matter originally recited in claims 4-5, 11-12, and 18-19 and objected to as being allowability if rewritten in independent form. As such, withdrawal of this rejection is requested.

REMARKS CONCERNING ALLOWABLE SUBJECT MATTER

IV. OBJECTION TO CLAIMS 5-7, 12-14, AND 19-20 AS BEING DEPENDENT UPON A REJECTED BASE CLAIM, BUT WOULD BE ALLOWABLE IF REWRITTEN IN INDEPENDENT FORM

The Applicant thanks the Examiner for acknowledging the allowability of claims 5-7, 12-14, and 19-20.

CONCLUDING REMARKS

By responding in the foregoing remarks only to particular positions asserted by the Examiner, the Applicants do not necessarily acquiesce in other positions that have not been explicitly addressed. In addition, the Applicants' arguments for the patentability of a claim should not be understood as implying that no other reasons for the patentability of that claim exist.

In light of the above amendments and remarks, the Applicants respectfully request that the Examiner reconsider this application with a view towards allowance. The Examiner is invited to call the undersigned attorney at (650) 843-4000, if a telephone call could help resolve any remaining items.

Respectfully submitted,

Date: March 15, 2021

/Douglas J. Crisman/ 39,951

Douglas J. Crisman (Reg. No.)

MORGAN, LEWIS & BOCKIUS LLP
1400 Page Mill Road
Palo Alto, CA 94304
(650) 843-4000

Electronic Patent Application Fee Transmittal

Application Number:	16934933
Filing Date:	21-Jul-2020
Title of Invention:	DEVICE AND METHOD FOR PROVIDING EXTERNAL ACCESS TO MULTI-DROP BUS PERIPHERAL DEVICES
First Named Inventor/Applicant Name:	Paresh K. Patel
Filer:	Douglas James Crisman/Linda Quintana
Attorney Docket Number:	104402-5041-US

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 2 months with $0 paid	2252	1	320	320
Miscellaneous:				
			Total in USD ($)	**320**

Electronic Acknowledgement Receipt

EFS ID:	42186620
Application Number:	16934933
International Application Number:	
Confirmation Number:	1013
Title of Invention:	DEVICE AND METHOD FOR PROVIDING EXTERNAL ACCESS TO MULTI-DROP BUS PERIPHERAL DEVICES
First Named Inventor/Applicant Name:	Paresh K. Patel
Customer Number:	24341
Filer:	Douglas James Crisman/Linda Quintana
Filer Authorized By:	Douglas James Crisman
Attorney Docket Number:	104402-5041-US
Receipt Date:	15-MAR-2021
Filing Date:	21-JUL-2020
Time Stamp:	19:12:13
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$320
RAM confirmation Number	E20213EJ12401764
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		104402-5041-US_Amendment_15-MAR-2021.pdf	185198 6922e203c072e2242e63f7bdc1fa8cfb3516ea4d	yes	11

Multipart Description/PDF files in .zip description

Document Description	Start	End
Amendment/Req. Reconsideration-After Non-Final Reject	1	1
Claims	2	8
Applicant Arguments/Remarks Made in an Amendment	9	11

Warnings:

Information:

2	Fee Worksheet (SB06)	fee-info.pdf	31008 423e02c70e63f97bb7b84652339b25c826b74c2a	no	2

Warnings:

Information:

Total Files Size (in bytes):	216206

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/934,933	Filing Date 07/21/2020	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $50 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $230 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	03/15/2021	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 17	Minus	** 20	= 0		x $50 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0		x $240 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/VENESSA JONES/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/934,933	07/21/2020	Paresh K. Patel	104402-5041-US

CONFIRMATION NO. 1013

24341
Morgan, Lewis & Bockius LLP (PA)
1400 Page Mill Road
Palo Alto, CA 94304-1124

PUBLICATION NOTICE

OC000000121160298

Title:DEVICE AND METHOD FOR PROVIDING EXTERNAL ACCESS TO MULTI-DROP BUS PERIPHERAL DEVICES

Publication No.US-2020-0349571-A1
Publication Date:11/05/2020

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Public Records Division. The Public Records Division can be reached by telephone at (571) 272-3150 or (800) 972-6382, by facsimile at (571) 273-3250, by mail addressed to the United States Patent and Trademark Office, Public Records Division, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently https://portal.uspto.gov/pair/PublicPair. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/934,933	07/21/2020	Paresh K. Patel	104402-5041-US	1013

24341 7590 10/28/2020

Morgan, Lewis & Bockius LLP (PA)
1400 Page Mill Road
Palo Alto, CA 94304-1124

EXAMINER
HASSAN, AURANGZEB

ART UNIT	PAPER NUMBER
2184	

NOTIFICATION DATE	DELIVERY MODE
10/28/2020	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

padocketingdepartment@morganlewis.com
vskliba@morganlewis.com

Office Action Summary	Application No. 16/934,933	Applicant(s) Patel, Paresh K.	
	Examiner AURANGZEB HASSAN	Art Unit 2184	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 7/21/20.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-20 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1-4,8-11 and 15-18 is/are rejected.

8) ☑ Claim(s) 5-7,12-14 and 19-20 is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Claim Rejections - 35 USC § 112

2. The following is a quotation of 35 U.S.C. 112(b):

> (b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 1 is rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor (or for applications subject to pre-AIA 35 U.S.C. 112, the applicant), regards as the invention.

Claim 1 recites the limitation "the machine controller" in line 3. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 101

3. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1 and 9 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The claim(s) does/do not fall within at least

one of the four categories of patent eligible subject matter because the claims recite a memory which according to paragraphs 72 of the specification memory itself includes transitory memory. In order to overcome the rejection the Examiner suggests utilizing the phrase "non-transitory memory" to provide a clear distinction over non-statutory subject matter.

Claim Rejections - 35 USC § 103

4. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1 – 4, 8 – 11, and 15 – 18 are rejected under 35 U.S.C. 103 as being unpatentable over Ran (US Publication Number 20130332293) in view of Kolls (US Publication Number 2014/0143074).

6. As per claims 1, 8 and 15, Ran teaches an electronic device for retrofitting a machine to accommodate one or more electronic peripheral devices, the electronic device (212, figure 3) comprising: a slave interface (414, figure 4) configured to couple the electronic device to the machine controller (314, figure 4); and
a host interface (412, figure 4, handles the communication mechanism between the connected elements) configured to couple the electronic device to a first peripheral device (peripheral device, 318, paragraph 44) of the one or more electronic peripheral devices, wherein the first peripheral device is configured to communicate and is decoupled from the MDB of the machine (peripheral can handle virtual tokens where not necessarily connected to the machine, paragraph 44 – 45); one or more processors (410, figure 4); and memory (424, figure 4) storing one or more programs to be executed by the one or more processors (310, figure 4), the one or more programs comprising instructions for: registering the electronic device to the machine controller (paragraph 44, registering the possible objects the electronic device can handle); registering the first peripheral device to the electronic device (paragraph 44, peripheral device connectivity is handled by the driver, wherein registering is seen and initiating connectivity); receiving, at the slave interface of the electronic device, a first command from the machine controller, wherein the first command is directed to the first peripheral device (token management received by UPOS service, paragraph 44); and in response to receiving the first command from the machine controller: sending an acknowledgement to the machine controller via the slave interface in a manner as if originated from the first peripheral device (virtual barcode scanner management is seen as an emulation of a device, paragraph 44, for the virtual device, paragraph 22); and

relaying the first command to the first peripheral device via the host interface (payment processing relayed to the host interface, paragraphs 23 – 25).

Ran does not explicitly disclose the MDB functionality with explicitly characterizing and registering a device as a slave.

However, Kolls teaches coupling the electronic device to the machine controller via a multi-drop bus (MDB); wherein the first peripheral device is configured to communicate via MDB protocol and is decoupled from the MDB of the machine; registering the electronic device as a slave to the machine controller; registering the first peripheral device as a slave to the electronic device (slaves characterized with MDB functionality, paragraph 166).

Ran and Kolls are analogous art because they are from the same field of endeavor of sale based systems.

It would have been obvious to one of ordinary skill in the art before the effective filing date of the claimed invention, having the teachings of Ran and Kolls before him, to modify the characterization of Ran with that of Kolls as it would further allow for enhance connectivity and identification. The motivation for doing so would have been to enhance efficiency in the system (paragraphs 14 – 16). Therefore, it would have been obvious to combine Kolls with Ran to obtain the invention as specified in the instant claims.

(Examiner notes that the claims do not necessitate direct connectivity or presence of a first peripheral as it is seen to be decoupled from the system and no positive recitation of connectivity is in the claim language.)

7. Ran modified by the teachings of Kolls as seen in claim 1 above, as per claim 2, 9, and 16, Ran teaches, wherein the one or more programs further comprise instructions for: receiving, at the host interface of the electronic device, a first signal from the first peripheral device, wherein the first signal is directed to the machine controller (paragraph 27); and in response to receiving the first signal from the first peripheral device: sending an acknowledgement to the first peripheral device via the host interface in a manner as if originated from the machine controller (paragraphs 28, 45, and 47, figure 2 and 4); and relaying the first signal to the machine controller via the slave interface (figure 3, paragraphs 45 – 47).

8. Ran modified by the teachings of Kolls as seen in claim 1 above, as per claim 3, 10, and 17, Ran teaches, wherein the instructions for registering the electronic device as a slave to the machine controller comprise instructions for: identifying the elecironic device to the machine controller as the first peripheral device; and accepting registration of the electronic device as the first peripheral device (token handling, paragraph 18, 22 – 24).

9. Ran modified by the teachings of Kolls as seen in claim 1 above, as per claim 4, 11, and 18, Ran teaches, wherein: the electronic device further includes an internal peripheral device including a short- range communication capability corresponding to a short-range communication protocol (paragraph 18, 26, 27); and the one or more programs further comprise instructions for communicating, via the short-range communication capability, with a mobile device including (i) a complimentary short-

range communication capability and (ii) a long-range communication capability corresponding to a long-range communication protocol (paragraph 26, 27, 42, 46).

Allowable Subject Matter

10. Claims 5 – 7, 12 – 14, and 19 – 20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to AURANGZEB HASSAN whose telephone number is (571)272-8625. The examiner can normally be reached on 7 AM to 3 PM.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Henry Tsai can be reached on 571-272-4176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see https://ppair-my.uspto.gov/pair/PrivatePair. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AH

/HENRY TSAI/
Supervisory Patent Examiner, Art Unit 2184

Notice of References Cited	Application/Control No. 16/934,933	Applicant(s)/Patent Under Reexamination Patel, Paresh K.	
	Examiner AURANGZEB HASSAN	Art Unit 2184	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20130332293-A1	12-2013	Ran; Alexander S.	G06Q20/204	705/17
*	B	US-20140143074-A1	05-2014	Kolls; H. Brock	G06F7/08	705/16
	C					
	D					
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/934,933	Patel, Paresh K.
	Examiner	Art Unit
	AURANGZEB HASSAN	2184

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	09/28/2020								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	O								
	6	O								
	7	O								
	8	✓								
	9	✓								
	10	✓								
	11	✓								
	12	O								
	13	O								
	14	O								
	15	✓								
	16	✓								
	17	✓								
	18	✓								
	19	O								
	20	O								

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/934,933	Patel, Paresh K.
	Examiner	Art Unit
	AURANGZEB HASSAN	2184

CPC - Searched*		
Symbol	Date	Examiner
G06Q20/ (40,18,32,322,3226,327,3278,36,38,3821,3823,3829,401,405)	09/28/2020	AH
G06F13/00	09/28/2020	AH

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner
710	008	09/28/2020	AH

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
EAST Text Search CPC/Inventor/Interference	09/28/2020	AH
NPL/Google Search	09/28/2020	AH
G06Q20/ (40,18,32,322,3226,327,3278,36,38,3821,3823,3829,401,405)	09/28/2020	AH
G06F13/00	09/28/2020	AH

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/934,933	Patel, Paresh K.
	Examiner	Art Unit
	AURANGZEB HASSAN	2184

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
G06Q20	40/18/32/322/3226/327/3278/36/38/3821/3823/3829/401/405	09/28/2020	AH
G06F13	00	09/28/2020	AH

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	3	"20130332293" "20140143074"	US-PGPUB; USPAT	OR	ON	2020/09/28 23:11
L2	67,463	(g06q20/40 g07f9/002 g06f13/00 g06q20/18 g06q20/32 g06q/322 g06q20/3226 g06q20/327 g06q20/3278 g06q20/36 g06q20/38 g06q20/3821 g06q20/3823 g06q20/3829 g06q20/401 g06q20/405 g06q30/06 g07f9/023 g06q2220/00).cpc.	US-PGPUB; USPAT	OR	OFF	2020/09/28 23:54
L3	366	2 and (multi$drop near2 bus mdb)	US-PGPUB; USPAT	OR	OFF	2020/09/28 23:55
S1	0	16/934933	US-PGPUB; USPAT	OR	OFF	2020/09/28 20:12
S2	6	("20140025958" | "20140064116" | "20130191789" | "20130246171" | "20040117262" | "20140074714").PN.	US-PGPUB; USPAT	OR	OFF	2020/09/28 20:15
S3	0	S2 and (multi$drop near2 bus mdb)	US-PGPUB; USPAT	OR	OFF	2020/09/28 20:15
S4	5	15/406492	US-PGPUB; USPAT	OR	OFF	2020/09/28 20:16
S5	1	(15/406492).APP.	US-PGPUB; USOCR	OR	OFF	2020/09/28 20:16
S6	2	("2017/0193508").URPN.	USPAT	OR	OFF	2020/09/28 20:17
S7	2	("2017/0193508").URPN.	USPAT	OR	OFF	2020/09/28 20:17
S8	5	15/406492 and mdb	US-PGPUB; USPAT	OR	OFF	2020/09/28 20:17
S9	1	("8856045").PN.	US-PGPUB; USPAT	OR	OFF	2020/09/28 20:31
S10	1	"20140136301".PN.	US-PGPUB; USPAT	OR	OFF	2020/09/28 20:31

S11	40	14/214644 14/335762 14/320534 14/641236 15/406492 14/641236 16/029483 15/893514	US-PGPUB; USPAT	OR	OFF	2020/09/28 20:33
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9/28/2020 11:57:37 PM
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PLUS Search Results for S/N 16934933, Searched Tue Sep 29 08:46:14 EDT 2020

The Patent Linguistics Utility System (PLUS) is a USPTO automated search system for U.S. Patents from 1971 to the present PLUS is a query-by-example search system which produces a list of patents that are most closely related linguistically to the application searched. This search was prepared by the staff of the Scientific and Technical Information Center, SIRA.

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PLUS Search Results for S/N 16934933, Searched Tue Sep 29 08:43:31 EDT 2020

The Patent Linguistics Utility System (PLUS) is a USPTO automated search system for U.S. Patents from 1971 to the present PLUS is a query-by-example search system which produces a list of patents that are most closely related linguistically to the application searched. This search was prepared by the staff of the Scientific and Technical Information Center, SIRA.

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UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/934,933	07/21/2020	Paresh K. Patel	104402-5041-US	1013

24341 7590 08/05/2020

Morgan, Lewis & Bockius LLP (PA)
1400 Page Mill Road
Palo Alto, CA 94304-1124

EXAMINER
NIGH, JAMES D

ART UNIT	PAPER NUMBER
3685	

NOTIFICATION DATE	DELIVERY MODE
08/05/2020	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

padocketingdepartment@morganlewis.com
vskliba@morganlewis.com

Decision Granting Request for Prioritized Examination (Track I)	**Application No.** 16/934,933	**Applicant(s)** Patel, Paresh K.	
	Examiner APRIL M WISE	**Art Unit** OPET	**AIA (FITF) Status** Yes

1. THE REQUEST FILED 21 July 2020 IS **GRANTED** .

The above-identified application has met the requirements for prioritized examination

A. ☑ for an original nonprovisional application (Track I).
B. ☐ for an application undergoing continued examination (RCE).

2. **The above-identified application will undergo prioritized examination**. The application will be accorded special status throughout its entire course of prosecution until one of the following occurs:

A. filing a **petition for extension of time** to extend the time period for filing a reply;

B. filing an **amendment to amend the application to contain more than four independent claims, more than thirty total claims** , or a multiple dependent claim;

C. filing a **request for continued examination** ;

D. filing a notice of appeal;

E. filing a request for suspension of action;

F. mailing of a notice of allowance;

G. mailing of a final Office action;

H. completion of examination as defined in 37 CFR 41.102; or

I. abandonment of the application.

Telephone inquiries with regard to this decision should be directed to undersigned at (571)272-1642.

In his/her absence, calls may be directed to Petition Help Desk at (571) 272-3282.

/APRIL M WISE/ Paralegal Specialist, Office of Petitions	

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 16/934,933

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	75		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	330		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	380		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	20 minus 20 =	*	x 50 =	0.00	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x 230 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	785		TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)		RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
16/934,933	07/21/2020	2185	785	104402-5041-US	20	3

CONFIRMATION NO. 1013

FILING RECEIPT

24341
Morgan, Lewis & Bockius LLP (PA)
1400 Page Mill Road
Palo Alto, CA 94304-1124

OC000000118819378

Date Mailed: 07/30/2020

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

Paresh K. Patel, Portland, OR;

Applicant(s)

PAYRANGE INC., Portland, OR;

Power of Attorney: The patent practitioners associated with Customer Number 24341

Domestic Priority data as claimed by applicant

This application is a CIP of 15/406,492 01/13/2017 PAT 10719833
which is a CON of 14/335,762 07/18/2014 PAT 9547859
which is a CON of 14/214,644 03/14/2014 PAT 8856045
which claims benefit of 61/917,936 12/18/2013
and is a CIP of 29/477,025 12/18/2013 PAT D755183
This application 16/934,933
is a CIP of 16/029,483 07/06/2018
which is a CON of 14/611,065 01/30/2015 PAT 10019724
This application 16/934,933
is a CIP of 15/893,514 02/09/2018
which is a CON of PCT/US2017/015676 01/30/2017
which claims benefit of 62/289,158 01/29/2016
and said 15/893,514 02/09/2018
is a CIP of 14/641,236 03/06/2015 ABN
which claims benefit of 62/081,492 11/18/2014
and is a CIP of 14/320,534 06/30/2014 ABN

which is a CIP of 14/214,644 03/14/2014 PAT 8856045
which claims benefit of 61/917,936 12/18/2013
and is a CIP of 29/477,025 12/18/2013 PAT D755183

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: No

Permission to Access Search Results: No

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 07/29/2020

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/934,933**

Projected Publication Date: 11/05/2020

Non-Publication Request: No

Early Publication Request: No
**** SMALL ENTITY ****
Title

DEVICE AND METHOD FOR PROVIDING EXTERNAL ACCESS TO MULTI-DROP BUS PERIPHERAL DEVICES

Preliminary Class

710

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed

from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR § 1.53(b))

Attorney Docket No.	104402-5041-US
First Inventor	Paresh K. Patel
Title	DEVICE AND METHOD FOR PROVIDING EXTERNAL ACCESS TO MULTI-DROP BUS PERIPHERAL DEVICES
Electronically filed	July 20, 2020

APPLICATION ELEMENTS

See MPEP Chapter 600 concerning utility patent application contents.

1. ☐ Fee Transmittal Form *(with duplicate for fee processing)*
2. ☒ Applicant claims Small Entity status, see 37 C.F.R. § 1.27
3. ☒ Specification [Total Pages 81]
4. ☒ Drawing(s) *(35 USC § 113)* [Total Sheets 44]
5. ☒ Oath or Declaration [Total Pages 1]
   a. ☒ Newly executed *(original or copy)*
   b. ☐ Copy from a prior application *(37 CFR § 1.63(d))*
6. ☒ Application Data Sheet, see 37 C.F.R. § 1.76
7. ☐ CD-ROM or CD-R in duplicate, large table or Computer Program *(Appendix)*
   ☐ Landscape Table on CD
8. ☐ Nucleotide and/or Amino Acid Sequence Submission *(if applicable, all necessary)*
   a. ☐ Computer Readable Form (CRF)
   b. ☐ Specification Sequence Listing on
      i. ☐ CD-ROM or CD-R (2 copies); or
      ii. ☐ Paper
   c. ☐ Statement verifying identity of above copies

Address to: **Commissioner for Patents**
P.O. Box 1450
Alexandria, VA 22313-1450

ACCOMPANYING APPLICATION PARTS

9. ☐ Assignment Papers *(cover sheet & document(s))*
   Name of Assignee:
10. ☒ 37 CFR § 3.73(c) Statement
    a. ☒ Power of Attorney
11. ☐ English Translation Document *(if applicable)*
12. ☐ Information Disclosure Statement and PTO-1449
    a. ☐ Copies of citations attached
13. ☐ Preliminary Amendment
14. ☐ Return Receipt Postcard *(MPEP 503)*
15. ☐ Certified Copy of Priority Document(s) *(if foreign priority is claimed)*
16. ☐ Non-Publication Request under 35 U.S.C. § 122 (b)(2)(B)(i)
17. ☒ Other: **Certification and Request for Prioritized Examination Under 37 CFR 1.102(e)**

Note: (1) Benefit claims under 37 CFR 1.78 and foreign priority claims under 1.55 **MUST** be included in an Application Data Sheet (ADS).

(2) For applications filed under 35 U.S.C. 111, the application must contain an ADS specifying the applicant if the applicant is an assignee, person to whom the inventor is under an obligation to assign, or person who otherwise shows sufficient proprietary interest in the matter. See 37 CFR 1.46(b).

19. CORRESPONDENCE ADDRESS: Customer Number 24341

Signature	/Douglas J. Crisman/	Date	July 20, 2020
Name (Print/Type)	Douglas J. Crisman	Registration No. (Attorney/Agent)	39,951

UTILITY PATENT APPLICATION FEE TRANSMITTAL *(Only for new nonprovisional applications under 37 CFR § 1.53(b))*	Attorney Docket No.	104402-5041-US
	First Inventor	Paresh K. Patel
	Title	DEVICE AND METHOD FOR PROVIDING EXTERNAL ACCESS TO MULTI-DROP BUS PERIPHERAL DEVICES
	Electronically filed	July 20, 2020

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

BASIC FILING, SEARCH AND EXAMINATION FEES

Application Type	Filing Fees	Search Fees	Examination Fees	Fees Paid ($)
Utility	$ 75	$ 330	$ 380	$ 785

EXCESS CLAIM FEES

Type	No. Filed	Less	Extra	Extra Rate ($)	Fee ($)
Total Claims	20	- 20	0	$ 100 each	$0
Independent	3	- 3	0	$ 460 each	$0
			Multiple Dependency Fee If Applicable ($820)		$0

APPLICATION SIZE FEE (Specification and Drawings)

Total Sheets	Extra Sheets	No. of each add'l 50 or fraction thereof	Fee ($)
125 x .75- 100	0 / 50	0 (round up to whole no.) x $400	$0

Sub Total	$ 785
Request for Prioritized Examination (Track 1)	$2000
TOTAL FILING FEE	**$2785**

Please charge the total filing fee and any other additional fees to Morgan, Lewis & Bockius LLP Deposit Account 50-0310 (order no. 104402-5041-US).

Respectfully submitted,

Date: July 20, 2020

/Douglas J. Crisman/ 39,951

Douglas J. Crisman (Reg. No.)

MORGAN, LEWIS & BOCKIUS LLP
1400 Page Mill Road
Palo Alto, CA 94304
(650) 843-4000

Doc Code: TRACK1.REQ
Document Description: TrackOne Request

PTO/AIA/424 (04-14)

CERTIFICATION AND REQUEST FOR PRIORITIZED EXAMINATION UNDER 37 CFR 1.102(e) (Page 1 of 1)

First Named Inventor:	Paresh K. Patel	Nonprovisional Application Number (if known):	
Title of Invention:	DEVICE AND METHOD FOR PROVIDING EXTERNAL ACCESS TO MULTI-DROP BUS PERIPHERAL DEVICES		

APPLICANT HEREBY CERTIFIES THE FOLLOWING AND REQUESTS PRIORITIZED EXAMINATION FOR THE ABOVE-IDENTIFIED APPLICATION.

1. The processing fee set forth in 37 CFR 1.17(i)(1) and the prioritized examination fee set forth in 37 CFR 1.17(c) have been filed with the request. The publication fee requirement is met because that fee, set forth in 37 CFR 1.18(d), is currently $0. The basic filing fee, search fee, and examination fee are filed with the request or have been already been paid. I understand that any required excess claims fees or application size fee must be paid for the application.

2. I understand that the application may not contain, or be amended to contain, more than four independent claims, more than thirty total claims, or any multiple dependent claims, and that any request for an extension of time will cause an outstanding Track I request to be dismissed.

3. The applicable box is checked below:

I. ☑ **Original Application (Track One) - Prioritized Examination under § 1.102(e)(1)**

i. (a) The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a). This certification and request is being filed with the utility application via EFS-Web.

---OR---

(b) The application is an original nonprovisional plant application filed under 35 U.S.C. 111(a). This certification and request is being filed with the plant application in paper.

ii. An executed inventor's oath or declaration under 37 CFR 1.63 or 37 CFR 1.64 for each inventor, or the application data sheet meeting the conditions specified in 37 CFR 1.53(f)(3)(i) is filed with the application.

II. ☐ **Request for Continued Examination - Prioritized Examination under § 1.102(e)(2)**

i. A request for continued examination has been filed with, or prior to, this form.
ii. If the application is a utility application, this certification and request is being filed via EFS-Web.
iii. The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a), or is a national stage entry under 35 U.S.C. 371.
iv. This certification and request is being filed prior to the mailing of a first Office action responsive to the request for continued examination.
v. No prior request for continued examination has been granted prioritized examination status under 37 CFR 1.102(e)(2).

Signature /Douglas J. Crisman/	Date July 21, 2020
Name (Print/Typed) Douglas J. Crisman	Practitioner Registration Number 39,951

Note: *This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required.**

☑ *Total of 1 forms are submitted.

DEVICE AND METHOD FOR PROVIDING EXTERNAL ACCESS TO MULTI-DROP BUS PERIPHERAL DEVICES

PRIORITY CLAIM AND RELATED APPLICATIONS

[0001] The present application is a continuation-in-part of U.S. Patent Application No. 15/406,492, filed January 13, 2017, which is a continuation of U.S. Patent Application No. 14/335,762, filed July 18, 2014, issued as U.S. Patent No. 9,547,859 on January 17, 2017, which is a continuation of U.S. Patent Application No. 14/214,644, filed March 14 2014, issued as U.S. Patent No. 8,856,045 on October 7, 2014, which claims priority to U.S. Provisional Patent Application No. 61/917,936, filed December 18, 2013, and is a continuation-in-part of U.S. Design Patent Application No. 29/477,025, filed December 18, 2013, issued as U.S. Patent No. D755,183 on May 3, 2016, each of which is hereby incorporated by reference in its entirety.

[0002] The present application is a continuation-in-part of U.S. Patent Application No. 16/029,483, filed July 6, 2018, which is a continuation of 14/611,065, filed January 30, 2015, issued as U.S. Patent No. 10,019,724 on July 10, 2018, each of which is hereby incorporated by reference in its entirety.

[0003] The present application is a continuation-in-part of U.S. Patent Application No. 15/893,514, filed February 9, 2018, which claims priority to International Patent Application No. PCT/US2017/0015676, filed January 30, 2017, which claims priority to U.S. Provisional Patent Application No. 62/289,158, filed January 29, 2016. U.S. Patent Application No. 15/893,514 is also a continuation-in-part of U.S. Patent Application No. 14/641,236, filed March 6, 2015, which claims priority to U.S. Provisional Patent Application No. 62/081,492, filed November 18, 2014, and is a continuation-in-part of U.S. Patent Application No. 14/320,534, filed June 30, 2014, which is a continuation-in-part of U.S. Patent Application No. 14/214,644, filed March 14 2014, issued as U.S. Patent No. 8,856,045 on October 7, 2014, which claims priority to U.S. Provisional Patent Application No. 61/917,936, filed December 18, 2013, and is a continuation-in-part of U.S. Design Patent Application No. 29/477,025, filed December 18, 2013, issued as U.S. Patent No. D755,183 on May 3, 2016, each of which is hereby incorporated by reference in its entirety.

FIELD OF THE INVENTION

[0004] The present application relates to the field of electronic peripheral devices, and in particular, to a system for providing access to an electronic peripheral device over a non-persistent network connection.

BACKGROUND

[0005] Master/slave technology uses a model of dualistic communication where one device or process (the master) has control over one or more other devices (the slave(s)), sometimes referred to as peripheral devices.

[0006] Peripheral devices are often disposed at the functional interface between various internal components of a machine and a user of those components, thereby enabling human/machine interaction. While some types of peripheral devices may be removed and replaced (e.g., a Universal Serial Bus (USB) mouse or keyboard) or accessed by outside devices (e.g., a wireless printer), other types of peripheral devices, such as a bill acceptor or card reader, may be embedded in a machine and dependent on aspects of the machine (such as the machine's power supply, processing system, and physical housing) to operate.

[0007] As the number of people with Internet-connected mobile devices proliferates, so does the variety of uses for such devices. Some uses may be enhanced or even require certain types of peripheral devices which have traditionally only been accessible in embedded systems which do not necessarily provide access to outside devices.

SUMMARY

[0008] Disclosed herein is a system for providing external access to electronic peripheral devices disposed in a machine. The system enables an external device to access functionality provided by an electronic peripheral device of a machine by providing wireless communications between a mobile application and the electronic peripheral device. In order to provide this access, the system (i) communicatively decouples the electronic peripheral device from a machine controller which normally would function as the master of the electronic peripheral device, and (ii) communicatively couples the electronic peripheral device with the mobile application which functions as the master of the electronic peripheral device until the mobile application no longer requires access to the functionality provided by the electronic peripheral device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] Figure 1 is a schematic diagram that shows three zones: a "communication zone" (e.g., Bluetooth range), an "authorization zone," and a "payment zone" in accordance with some implementations.

[0010] Figure 2 is a schematic diagram that shows the three zones of Figure 1 with multiple users therein in accordance with some implementations.

[0011] Figure 3 is a table that illustrates the hands-free credit or alert user principle in accordance with some implementations.

[0012] Figure 4 is a flow chart showing the logging received signal strength indicator (RSSI) information in accordance with some implementations.

[0013] Figure 5 is a block schematic that shows elements of the payment processing system including, but not limited to, the adapter module, the machine, the mobile device, and servers, as well as communications therebetween in accordance with some implementations.

[0014] Figure 6 is a block schematic that shows three areas of encryption used (each is bi-directional) between the adapter module, the machine, the mobile device, and/or servers in accordance with some implementations.

[0015] Figure 7 is a block diagram that shows communications, messaging, vending sequence, and purchase flow between the adapter module, the mobile device, and a system management server in accordance with some implementations.

[0016] Figure 8A is a schematic process flow diagram that shows additional elements and features of the payment processing system (e.g., communications, messaging, vending sequence, and purchase flow) when the user enters the "communication zone" (e.g., Bluetooth range) in accordance with some implementations.

[0017] Figure 8B is a schematic process flow diagram that shows additional elements and features of the payment processing system (e.g., communications, messaging, vending sequence, and purchase flow) when the user enters the "authorization zone" in accordance with some implementations.

[0018] Figure 8C is a schematic process flow diagram that shows additional elements and features of the payment processing system (e.g., communications, messaging, vending sequence, and purchase flow) when the user enters the "payment zone" and, in particular,

detailing a hands-free mode embodiment and a swipe mode embodiment in accordance with some implementations.

[0019] Figure 8D is a schematic process flow diagram that shows additional elements and features of the payment processing system (e.g., communications, messaging, vending sequence, and purchase flow) in a vending transaction including a loop for multiple transactions in accordance with some implementations.

[0020] Figure 8E is a schematic process flow diagram that shows additional elements and features of the payment processing system (e.g., communications, messaging, vending sequence, and purchase flow) in the login mode in accordance with some implementations.

[0021] Figure 8F is a schematic process flow diagram that shows additional elements and features of the payment processing system (e.g., communications, messaging, vending sequence, and purchase flow) during boot-up of the adapter module in accordance with some implementations.

[0022] Figure 8G is a schematic process flow diagram that shows additional elements and features of the payment processing system (e.g., communications, messaging, vending sequence, and purchase flow) during an account check/update process in accordance with some implementations.

[0023] Figures 9A-9E are flow charts that show example steps and features of the payment processing system (e.g., communications, messaging, vending sequence, and purchase flow) in accordance with some implementations.

[0024] Figures 10A-10D show a mobile device with a graphical representation of a mobile application shown thereon, the mobile application being used as part of the mobile-device-to-machine payment processing system in accordance with some implementations.

[0025] Figure 11 is a perspective view of the in-line dongle adapter module in accordance with some implementations.

[0026] Figure 12 is a front plan view of the in-line dongle adapter module of Figure 11 in accordance with some implementations.

[0027] Figure 13 is a back plan view of the in-line dongle adapter module of Figure 11 in accordance with some implementations.

[0028] Figure 14 is a side view of the in-line dongle adapter module of Figure 11 in accordance with some implementations.

[0029] Figure 15 is a first end view of a connector receptacle of the in-line dongle adapter module of Figure 11 in accordance with some implementations.

[0030] Figure 16 is a second end view of a connector receptacle of the in-line dongle adapter module of Figure 11 in accordance with some implementations.

[0031] Figure 17 is a perspective view taken from the first end of the in-line dongle adapter module of Figure 11, the connectors and cables between which the in-line dongle adapter module is inserted being shown in broken lines for illustrative purposes in accordance with some implementations.

[0032] Figure 18 is a perspective view taken from the second end of the in-line dongle adapter module of Figure 11, the connectors and cables between which the in-line dongle adapter module is inserted being shown in broken lines for illustrative purposes in accordance with some implementations.

[0033] Figure 19 is a perspective view of the in-line dongle adapter module of Figure 11 within a vending machine in accordance with some implementations.

[0034] Figure 20 is a block diagram of an adapter module in accordance with some implementations.

[0035] Figure 21 is a block diagram of a mobile device in accordance with some implementations.

[0036] Figure 22 is a block diagram of a server in accordance with some implementations.

[0037] Figure 23 is a schematic flow diagram of a process for authenticating a user to perform a transaction in the payment processing system in accordance with some implementations.

[0038] Figure 24A is a block diagram of a packet of information broadcast by the payment module (sometimes also herein called the "adapter module") in accordance with some implementations.

[0039] Figure 24B is a block diagram of an authorization request in accordance with some implementations.

[0040] Figure 24C is a block diagram of an authorization grant token in accordance with some implementations.

[0041] Figure 24D is a block diagram of transaction information generated by the payment module in accordance with some implementations.

[0042] Figure 25 is a schematic flow diagram of a process for processing acknowledgment information in the payment processing system in accordance with some implementations.

[0043] Figure 26 is a block diagram of a device for retrofitting a payment accepting unit (e.g., machine 120) to accommodate a plurality of payment peripherals in accordance with some implementations.

[0044] Figure 27 is a schematic flow diagram of a payment peripheral registration process in accordance with some implementations.

[0045] Figures 28A-28B illustrate a schematic flow diagram of a payment process in accordance with some implementations.

[0046] Figure 29 illustrates a flowchart diagram of a method of retrofitting a payment accepting unit to accommodate a plurality of payment peripherals in accordance with some implementations.

[0047] Figure 30A-30B illustrate a block diagram of normal and intercept operations of a device for retrofitting a payment accepting unit (e.g., machine 120) to provide external access to an electronic peripheral device in accordance with some implementations.

[0048] Figures 31-34 illustrate schematic flow diagrams of a process for providing external access to an electronic peripheral device in accordance with some implementations.

[0049] Figures 35A-35B show a mobile device with a graphical representation of a mobile application shown thereon, the mobile application being used as part of a peripheral access system in accordance with some implementations.

[0050] Like reference numerals refer to corresponding parts throughout the several views of the drawings.

DETAILED DESCRIPTION

[0051] Disclosed herein is a payment processing system or, more specifically, a mobile-device-to-machine payment processing system for processing transactions over a non-persistent network connection. The mobile-device-to-machine payment processing system disclosed herein focuses on the unattended retail space (e.g., a payment accepting unit 120,

sometimes also herein called a "machine 120"). More specifically, the mobile-device-to-machine payment processing system disclosed herein allows a user (having a mobile device 150 with a mobile application 140 thereon) to make a cashless purchase from a payment accepting unit 120 (having an adapter module 100 associated therewith).

[0052] The mobile-device-to-machine payment processing system described herein can be implemented with one or more of the following features: easy installation feature, a non-persistent network connection feature; a manual (swipe to pay) mode feature; a hands-free mode feature; and a multiple vending transactions (multi-vend) feature.

[0053] Easy Installation: Installation is very easy, requires no tools, requires no configuration, and takes as little as 30 seconds. This is accomplished by using an adapter module 100 (sometimes also herein called "payment module 100") such as an in-line dongle (a hardware device with software thereon) design for in-line insertion within a multi-drop bus (MDB) of a payment accepting unit 120 (e.g., a vending machine) (sometimes also herein called 'the machine 120"). Installation is as simple as "powering down" (turning off) the machine 120, identifying the "wire" that connects with a payment receiving mechanism (e.g., the coin mechanism), disconnecting the wire (so that there are two loose ends, such as a male connection end or adapter of an MDB and a female connection end or adapter of an MDB), plugging (inserting) the adapter module 100 in serial ("in-line") with the wire (e.g., connecting the MDB female adapter to a male adapter of the adapter module 100 and connecting the MDB male adapter to a female adapter of the adapter module 100), tucking the wire and the installed adapter module 100 back into position, and "powering up" (turning on) the machine 120. Most vending machines made since 1995 have this industry standard MDB technology that would allow this easy 30-second installation. On machines without MDB technology, the adapter module 100 can be configured or designed to work with other serial protocols or activate a switch. In essence the adapter module 100 simulates establishing payment on payment accepting unit 120 in much the same manner as other alternative forms of payment (e.g., cash).

[0054] Non-persistent Network Connection: Although payment accepting units (or "machines") that accept only cash (e.g., paper currency and coins) may not require a connection (persistent or non-persistent) to a network, traditional payment accepting units that accept cashless payments (e.g., credit cards, debit cards, and alternative mobile device payment methods using, for example, smart phones) require a persistent connection to a network (wired or wireless) to facilitate the cashless payments. In other words, without a

persistent (ongoing or accessible on demand) network connection, traditional payment accepting units cannot accept cashless payments. Most traditional payment accepting units that accept cashless payments include the technology to accomplish this persistent network connection that allows them to connect to a remote server. If the network connection to a traditional machine is temporarily interrupted, cashless payments will be temporarily unavailable. If the machine is located in a location where no network connection is available, cashless payments is not possible. In addition to using a mobile device 150 as an intermediary between the payment accepting units 120 and the server 130, the mobile-device-to-machine payment processing system described herein minimizes (i.e., the manual mode) or eliminates (i.e., the hands-free mode) user interaction with the mobile device 150. Further, in some implementations, the mobile-device-to-machine payment processing system described herein facilitates the acceptance of cashless payments without requiring any network connection near the payment accepting unit 120. In some implementations, when the mobile-device-to-machine payment processing system described herein is located in a remote location where network connection is unavailable, the mobile-device-to-machine payment processing system, therefore, can still accept cashless payments.

[0055] Manual (Swipe-to-Pay) Mode: Using a "swipe-to-pay" feature (or just "swipe") refers to a user's action implemented on his/her mobile device 150 where he/she quickly brushes his/her finger (or other pre-determined interaction) on the mobile device's touch screen 152 (Figures 10A-10D) or other input devices associated with the mobile device 150. From the user's perspective, when the user is within range, a pre-installed mobile application 140 automatically connects to the payment accepting unit 120 (e.g., a vending machine). The mobile application 140 might display (on the touch screen 152) a prepaid balance that the user "swipes" to transfer payment to the payment accepting unit 120. The user could observe the transferred funds on the touch screen 152 of the mobile device 150 and/or on the display 122, 124 (Figure 19) of the payment accepting unit 120. The transaction is completed just as if cash was inserted in the machine 120 with the user inputting his selection on the payment accepting unit 120 and the payment accepting unit 120 dispensing the product or service. After the selection is made, the change is returned to the mobile device 150 and this may be shown on the touch screen 152 of the mobile device 150.

[0056] Hands-Free Mode: A "hands-free pay" feature (or just "hands-free") would most likely be used with "favorite" payment accepting units 120 (e.g., a frequently used vending machine at a user's work or school). From the user's perspective, he/she would

approach the favorite payment accepting unit 120 and notice that the display 122, 124 (Figure 19) of the payment accepting unit 120 shows funds available, he/she would select the product or service using the payment accepting unit's input mechanisms (e.g., buttons 126 or a touch screen display 124 shown in Figure 19), and he/she would retrieve dispensed services or products. It would be that simple. More specifically, when the user is within range, a pre-installed mobile application 140 automatically connects to the payment accepting unit 120 (e.g., a vending machine). The user may leave the mobile device 150 in a pocket, purse, briefcase, backpack, or other carrier. As the user approaches the payment accepting unit 120 and is in approximately "arm's-length" distance (e.g., 3 to 5 feet) of the payment accepting unit 120, the user could observe the transferred funds on the display 122, 124 (Figure 19) of the payment accepting unit 120. The transaction is completed just as if cash was inserted into the payment accepting unit 120 with the user inputting his/her selection on the payment accepting unit 120 and the payment accepting unit 120 dispensing the product or service. After the selection is made, the change is returned to the mobile device 150. Figure 3 details when the hands-free mode would be available.

[0057] Multiple Vending Transactions (Multi-Vend): Both the manual and hands-free modes could be used multiple times in sequence (implemented, for example, as a loop) so that a user may make multiple purchases. After making his/her first selection and receiving his product (or service), the user would observe that additional funds were available on the display 122, 124 (Figure 19) on the payment accepting unit 120. He/she could make another selection (or multiple selections) and receive additional product(s) (or service(s)). More specifically, the display 122, 124 (Figure 19) may reset as if the transaction is complete, but then, because the user is still standing in range, the mobile application 140 would send another credit to the payment accepting unit 120, allowing for a second purchase. When the user walks away, the system clears (e.g., returns unused funds to the application 140 on the mobile device 150).

[0058] The features described above, alone or in combination with other features described herein will revolutionize the hundred billion dollar automated retail industry. The hardware is very low cost and there are no reoccurring fees because no cellular connection is required on the machine 120. Using the mobile-device-to-machine payment processing system described herein, operators of machines 120 can increase frequency of visits by purchasers and items sold with each visit.

[0059] The mobile-device-to-machine payment processing system described herein may be implemented as an apparatus, system, and/or method for enabling payments to a machine 120 via a mobile device 150. The mobile-device-to-machine payment processing system may be better understood with reference to the drawings, but the shown mobile-device-to-machine payment processing system is not intended to be of a limiting nature.

DEFINITIONS

[0060] Before describing the mobile-device-to-machine payment processing system and the figures, some of the terminology should be clarified. Please note that the terms and phrases may have additional definitions and/or examples throughout the specification. Where otherwise not specifically defined, words, phrases, and acronyms are given their ordinary meaning in the art. The following paragraphs provide some of the definitions for terms and phrases used herein.

[0061] Adapter Module 100: As shown in Figures 1 and 2, the adapter module 100 (sometimes also herein called the "payment module 100") is a physical device that is installed in a machine 120 (a payment accepting unit 120). The shown adapter module 100 is an in-line dongle (a hardware device with software thereon) device that may be inserted in-line within a multi-drop bus (MDB) of a machine 120. The adapter module 100 bridges the communication between the machine 120 and a mobile device 150. Although described as a unique component, it should be noted that the adapter module 100 could be implemented as a plurality of devices or integrated into other devices (e.g., components of a machine 120). In its unique component form, the adapter module 100 can be easily inserted into a machine 120 so that the machine 120 is able to perform new features with the assistance of the adapter module 100. Figure 20 shows components associated with the adapter module 100. As shown in Figure 20, the communications unit 770 of the adapter module 100 includes short-range communication capability 776 (e.g., Bluetooth mechanisms).The shown example may be divided into multiple distinct components that are associated with each other or the example may be incorporated into or drawn from other technology (e.g., a computer or a payment accepting unit) as long as the components are associated with each other.

[0062] Mobile Device 150 and Application 140 (also referred to as a "mobile application," "mobile app," or "app"): In general, a mobile device 150 may be a user's personal mobile device 150. The mobile device 150 (with a mobile application 140 thereon) acts as a communication bridge between the adapter module 100 (associated with a payment

accepting unit 120) and the server 130. The mobile device 150 and the application 140, however, are not "trusted" in that the communications (transmissions) it passes are encrypted. Encrypted (secured) communications are undecipherable (unencryptable, unreadable, and/or unusable) by the mobile device 150. This keeps the communications passed between the adapter module 100 and the server 130 secured and safe from hacking. Mobile devices include, but are not limited to smart phones, tablet or laptop computers, or personal digital assistants (PDAs), smart cards, or other technology (e.g., a hardware-software combination) known or yet to be discovered that has structure and/or capabilities similar to the mobile devices described herein. The mobile device 150 preferably has an application (e.g., the application 140) running on it. The term "app" is used broadly to include any software program(s) capable of implementing the features described herein. Figures 10A-10D show user interfaces for the application 140 displayed by the mobile device 150. It should be noted that the phrase "mobile device" can be assumed to include the relevant app unless specifically stated otherwise. Similarly, it should be noted that an "app" can be assumed to be running on an associated mobile device unless specifically stated otherwise. Figure 21 shows components associated with the mobile device 150. The shown example may be divided into multiple distinct components that are associated with each other or the example may be incorporated into or drawn from other technology (e.g., the cell phone itself) as long as the components are associated with each other.

[0063] Payment Accepting Unit 120 (or Machine 120): A payment accepting unit 120 (or the machine 120) is equipment that requires payment for the dispensing of an product and/or service. Payment accepting units 120 may be vending machines, parking meters, toll booths, laundromat washers and dryers, arcade games, kiosks, photo booths, toll booths, transit ticket dispensing machines, and other known or yet to be discovered payment accepting units 120. Some payment accepting units 120 can accept cashless payments (payments other than cash (paper currency and coins)) by accepting payment from, for example, credit cards, debit cards, and mobile devices.

[0064] Network Connections: For purposes of this discussion, a persistent network connection is a wired or wireless communications connection that is ongoing (e.g., a dedicated connection, a dedicated online connection, and/or a hardwired connection) or accessible on demand (e.g., the ability for the machine to make a temporary connection to a server or the ability for the user to contact a server from his mobile device). Typically the persistent network connection has been conducted over "long-range communication

technology" or "long-range communication protocol" (e.g., hardwired, telephone network technology, cellular technology (e.g., GSM, CDMA, or the like), Wi-Fi technology, wide area network (WAN), local area network (LAN), or any wired or wireless communication technology over the Internet that is known or yet to be discovered). Traditionally, machines that accept payment other than cash require a persistent (ongoing or accessible on demand) connection to a network to facilitate payment. This is true for machines that accept, for example, credit cards and debit cards. The payment accepting units 120 described herein do not require a traditional persistent network connection. The user's mobile device 150 acts as a communication bridge between the adapter module 100 and the server 130. Communications between user mobile devices 150 and the servers (e.g., a system management server 130 and/or a funding source server 160) take place using long-range communication technology. Communications between user mobile devices 150 and the adapter module 100 of the payment accepting unit 120 take place using "short-range communication technology" or "short-range communication protocol" (e.g., Bluetooth (such as Bluetooth 4.0, Bluetooth Smart, Bluetooth Low Energy (BLE)), near-field communication (NFC), Ultra Wideband (UWB), radio frequency identification (RFID), infrared wireless, induction wireless, or any wired or wireless technology that could be used to communicate a small distance (approximately a hundred feet or closer) that is known or yet to be discovered). Therefore, neither the adapter module 100 nor the payment accepting unit 120 requires a traditional persistent long-range wireless network connection. The communications technology shown in the figures may be replaced with alternative like communications technology and, therefore, specific shown communications technologies are not meant to be limiting. For example, Wi-Fi technology could be replaced with another long-range communication technology.

[0065] Server: A server is the host processing server that may be operated by the company running the payment processing system. For each user, the server 130 preferably maintains at least one "virtual wallet" having at least one "balance" (which can be $0) of designated funds for which the server 130 keeps an accounting. The balance may represent, for example, "cash" or it may be a "promotional value" that represents funds that may be spent under certain circumstances. If these funds begin to be depleted, the user may be notified (e.g., via the application 140 on the mobile device 150) that additional funds need to be designated and/or transferred. Alternatively, funds from other sources (e.g., the funding source server 160) may be automatically transferred to restore a predetermined balance. The balance may also be increased based on a promotion (e.g., points earned or coupons). As

shown in Figure 22, the server includes appropriate processors 950, memory 960 (which would keep an accounting of the user's balance in a manner similar to a gift card), and communication systems 970. As shown in Figure 22, the communications unit 970 of the server 130 includes long-range communication capability 972 (e.g., cellular technology and/or Wi-Fi mechanisms). The server 130 also includes a security unit 955 for encrypting and decrypting messages. The server 130 receives an authorization request (sometimes also herein called an "AuthRequest") from the adapter module 100 (via a mobile device 150) and, if funds are available, returns an authorization grant (sometimes also herein called an "AuthGrant" or an "authorization grant token") for funds. Figure 22 shows components associated with the server 130. The shown example may be divided into multiple distinct components that are associated with each other or the example may be incorporated into or drawn from other technology (e.g., a computer or a main frame) as long as the components are associated with each other.

[0066] Advertise Presence: Each adapter module 100 advertises its presence by broadcasting signals (advertising broadcast signals) to mobile devices in the zones 102, 104, 106. Each adapter module 100 can listen to other adapter modules' advertisements.

[0067] Received Signal Strength Indicator (RSSI): The adapter module 100 may have a self-calibrating signal strength to determine zone thresholds (e.g., a payment zone threshold and an authentication zone threshold). At the time the user selects an item (product or service) from the payment accepting unit 120, the Received Signal Strength Indicator (RSSI) is logged. At this moment, it is presumed the user is within "arm's-length" (which may be a predetermined length approximating the distance of a user standing in front of a machine for the purpose of making a purchase) from the payment accepting unit 120. A mathematical computation (i.e., In-Range Heuristics) is conducted to derive the optimal RSSI threshold at which point payment should be triggered by an application 140 on a mobile device 150. The threshold may be payment accepting unit specific and can vary over a period of time. This optimal zone threshold is preferably reported to the mobile device 150 during an initial handshake.

[0068] In-Range Heuristics: A mathematical computation that determines the RSSI threshold to determine when a user is in the authorization zone 104 and/or the payment zone 102. This computation can take into consideration numerous historical data points as well as transaction specific information such as which the mobile device 150 is being used, payment accepting unit type, among other factors. Preferably the RSSI is logged while the user is

making his selection (this is the one time in the entire process that the user definitely will be "in range" (e.g., they will be arm's length from the machine 120 because they are physically interacting with the machine 120). The type of user mobile device 150, accelerometer data (e.g., is the user moving or stationary), and/or other information may also be logged while the user is making his selection. The adapter module 100 can give a reference RSSI for the payment zone 102 for the machine 120, and the application 140 can make a +/- adjustment based on the specific mobile device 150 on which it is installed. Over a period of time, the payment processing system continues to improve itself based on additional data points.

[0069] Authorization Request ("AuthRequest:): When a user enters the authorization zone 104, the mobile device 150 notifies the adapter module 100 and the adapter module 100 sends a secured authorization request (e.g., the encrypted authorization request) as a "message" (also referred to as a communication or transmissions) to the server 130 via the mobile device 150. Encryption may be performed by a security unit 755 (Figure 20) with security technology (e.g., encryption and decryption means) that may be associated with the processing unit 750 and/or the memory 760. Significantly, the AuthRequest is a request for authorization of funds, not a request for authorization of a transaction. The purpose of the funds is irrelevant to the server 130.

[0070] Authorization Grant Token ("AuthGrant"): This is a "message" (also referred to as a communication or transmissions) encrypted by the security unit 955 (Figure 22) with security technology (e.g., encryption and decryption means) of the server 130 with the unique private key corresponding to the adapter module 100. The secured authorization grant (e.g., the encrypted authorization grant) is passed from the server 130 to the adapter module 100 via the mobile device 150 in the form of a message. The mobile device 150, however, is not able to decrypt and/or read the message. The authorization grant is in response to the authorization request. The amount of the funds granted by the AuthGrant may be determined by factors including, but not limited to, the amount of funds available (or, if funds are not available, a mini-loan could be granted), a pre-authorized amount (e.g., set by the server, set by the user during set-up, set by the funding source, or a standard amount), limited by time (e.g., only a certain amount per hour, or a predetermined amount at specific times of the day), limited to the maximum amount of an item on the machine (or enough for two or three items in the machine), or one or more of these and other factors. Significantly, the AuthGrant makes the funds available, but does not authorize a transaction. The AuthGrant may have an associated expiration period in that it may expire if it is not used in a pre-determined time

period. The length of time before the AuthGrant expires may be determined by factors including, but not limited to, the trustworthiness of the user (e.g., the user has a long history with the payment processing system or some known provider (e.g., credit card provider, bank, or credit union), the user has a good credit rating, or the user has a large wallet balance), a pre-authorized time period (e.g., set by the server, set by the user during set-up, set by the funding source, or a standard time period), limited by time (e.g., predetermined time periods at specific times of the day such as longer times during breakfast, lunch, and dinner), limited by the machine or the products or services sold in the machine, limited by the number of other users near the machine (e.g., if it is a crowded machine, the AuthGrant may expire faster), or one or more of these and other factors. The AuthGrant remains valid until it expires or some other event occurs to end its validity (e.g., the user cancels it). This means that under normal circumstances the mobile device 150 will hold the AuthGrant authorizing use of funds for a pre-determined time period that will allow the user sufficient time to make a purchase. The authorized amount may be considered to be the "wallet balance" that is held in a virtual "wallet."

[0071] Synchronization: Time may be synchronized to the adapter module 100 from the server 130. The server 130 sends time information with encrypted messages and the adapter module 100 uses the time encoded in the messages for synchronization.

[0072] The mobile-device-to-machine payment processing system and components thereof may have associated hardware, software, and/or firmware (a variation, subset, or hybrid of hardware and/or software). The term "hardware" includes at least one "processing unit," "processor," "computer," "programmable apparatus," and/or other known or yet to be discovered technology capable of executing instructions or steps (shown as the processing unit 750 in Figure 20, the processing unit 850 in Figure 21, and the processing unit 950 in Figure 22). The term "software" includes at least one "program," "subprogram," "series of instructions," or other known or yet to be discovered hardware instructions or hardware-readable program code. Software may be loaded onto hardware (or firmware) to produce a "machine," such that the software executes on the hardware to create structures for implementing the functions described herein. Further, the software may be loaded onto the hardware (or firmware) so as to direct the mobile-device-to-machine payment processing system (and components thereof) to function in a particular manner described herein or to perform a series of operational steps as described herein. "Hardware" such as the adapter module 100, the mobile device 150, and the payment accepting unit 120 may have software

(e.g., programs and apps) loaded thereon. The phrase "loaded onto the hardware" also includes being loaded into memory (shown as the memory 760 in Figure 20, the memory 860 in Figure 21, and the memory 960 in Figure 22) associated with or accessible by the hardware. The term "memory" is defined to include any type of hardware (or other technology) -readable media (also referred to as computer-readable storage medium) including, but not limited to, attached storage media (e.g., hard disk drives, network disk drives, servers), internal storage media (e.g., RAM, ROM, EPROM, FLASH-EPROM, or any other memory chip or cartridge), removable storage media (e.g., CDs, DVDs, flash drives, memory cards, floppy disks, flexible disks), firmware, and/or other known or yet to be discovered storage media. Depending on its purpose, the memory may be transitory and/or non-transitory. Appropriate "messages," "communications," "signals," and/or "transmissions" (that includes various types of information and/or instructions including, but not limited to, data, commands, bits, symbols, voltages, currents, electromagnetic waves, magnetic fields or particles, optical fields or particles, and/or any combination thereof) over appropriate "communication paths," "transmission paths," and other means for signal transmission including any type of connection between two elements on the payment processing system (e.g., the adapter module 100, the mobile device 150, the payment accepting unit 120, hardware systems and subsystems, and memory) would be used as appropriate to facilitate controls and communications.

[0073] It should be noted that the terms "programs" and "subprograms" are defined as a series of instructions that may be implemented as software (i.e. computer program instructions or computer-readable program code) that may be loaded onto a computer to produce a "machine," such that the instructions that execute on the computer create structures for implementing the functions described herein or shown in the figures. Further, these programs and subprograms may be loaded onto a computer so that they can direct the computer to function in a particular manner, such that the instructions produce an article of manufacture including instruction structures that implement the function specified in the flow chart block or blocks. The programs and subprograms may also be loaded onto a computer to cause a series of operational steps to be performed on or by the computer to produce a computer implemented process such that the instructions that execute on the computer provide steps for implementing the functions specified in the flow chart block or blocks. The phrase "loaded onto a computer" also includes being loaded into the memory of the computer or a memory associated with or accessible by the computer. Separate, albeit interacting,

programs and subprograms may be associated with the adapter modules 100, the server 130, and the mobile device 150 (including the mobile application 140) and these programs and subprograms may be divided into smaller subprograms to perform specific functions.

[0074] The terms "messages," "communications," "signals," and/or "transmissions" include various types of information and/or instructions including, but not limited to, data, commands, bits, symbols, voltages, currents, electromagnetic waves, magnetic fields or particles, optical fields or particles, and/or any combination thereof. Appropriate technology may be used to implement the "communications," "signals," and/or "transmissions" including, for example, transmitters, receivers, and transceivers. "Communications," "signals," and/or "transmissions" described herein would use appropriate technology for their intended purpose. For example, hard-wired communications (e.g., wired serial communications) would use technology appropriate for hard-wired communications, short-range communications (e.g., Bluetooth) would use technology appropriate for close communications, and long-range communications (e.g., GSM, CDMA, Wi-Fi, or the like) would use technology appropriate for remote communications over a distance. Appropriate security (e.g., SSL or TLS) for each type of communication is included herein. The security units 755 and 955 include technology for securing messages. The security technology may be, for example, encryption/decryption technology (e.g., software or hardware). Although encryption/decryption is discussed primarily as being performed using a unique private key, alternative strategies include, but are not limited to encryption/decryption performed using public/private keys (i.e., asymmetric cryptography), or other encryption/decryption strategies known or yet to be discovered. Appropriate input mechanisms and/or output mechanisms, even if not specifically described, are considered to be part of the technology described herein. The communications unit 770 (shown in Figure 20) of the adapter module 100 is shown as including appropriate input and output mechanisms 772, 774 that may be implemented in association (e.g., directly or indirectly in functional communication) with male and female adapters 720, 730 of the adapter module 100. The communications unit 870 (shown in Figure 21) of the mobile device 150 includes mechanisms for both long-range communications (shown as the long-range communication capability 872 such as cellular and/or Wi-Fi mechanisms) for communicating with the server 130 and short-range communications (shown as the short-range communication capability 876 such as Bluetooth mechanisms) for communicating with the adapter module 100.

[0075] When used in relation to "communications," "signals," and/or "transmissions," the terms "provide" and "providing" (and variations thereof) are meant to include standard means of provision including "transmit" and "transmitting," but can also be used for non-traditional provisions as long as the "communications," "signals," and/or "transmissions" are "received" (that can also mean obtained). The terms "transmit" and "transmitting" (and variations thereof) are meant to include standard means of transmission, but can also be used for non-traditional transmissions as long as the "communications," "signals," and/or "transmissions" are "sent." The terms "receive" and "receiving" (and variations thereof) are meant to include standard means of reception, but can also be used for non-traditional methods of obtaining as long as the "communications," "signals," and/or "transmissions" are "obtained."

[0076] The term "associated" is defined to mean integral or original, retrofitted, attached, connected (including functionally connected), positioned near, and/or accessible by. For example, if the user interface (e.g., a traditional display 122 (Figure 19), a touch screen display 124 (Figure 19), a key pad 126 (Figure 19), buttons 126 (Figure 19, shown as part of the key pad 126), a keyboard (not shown), and/or other input or output mechanism) is associated with a payment accepting unit 120, the user interface may be original to the payment accepting unit 120, retrofitted into the payment accepting unit 120, attached to the payment accepting unit 120, and/or a nearby the payment accepting unit 120. Similarly, adapter modules 100 may be associated with payment accepting units 120 in that the adapter modules 100 may be original to the payment accepting unit 120, retrofitted into the payment accepting unit 120, attached to the payment accepting unit 120, and/or a nearby the payment accepting unit 120.

SYSTEM OVERVIEW

[0077] Figures 5, 6, and 7 together show major components of the mobile-device-to-machine payment system and the interactions there-between.

[0078] As shown, the adapter module 100 functionally connected bi-directionally to the payment accepting unit 120 via a wired serial connection such that no security is necessary. The adapter module 100 is also functionally connected bi-directionally to the mobile device 150 (and its installed mobile application 140) via short-range communication technology (e.g., a Bluetooth connection). Because the mobile device 150 is not a "trusted" link (e.g., it could be hacked by a user), only secured communications (transmissions) are

passed between the adapter module 100 and the mobile device 150. This keeps communications secured and safe from hacking. The mobile device 150 (and its installed mobile application 140) is also functionally connected bi-directionally to a system management server 130 and/or a funding source server 160 via long-range communication technology (e.g., Wi-Fi or Cellular connection) that preferably has appropriate security (e.g., SSL security). Security between the mobile device 150 and the system management server 130 has the advantage of protecting communications from the mobile device 150 to the system management server 130 that may include sensitive data and may not be encrypted. The system management server 130 and the funding source server 160 may be connected via a wired Internet connection with SSL security. The system management server 130 may be connected via a wired Internet connection with SSL security to an operators' server 170. Although not necessary to implement a purchase transaction, for other purposes (e.g., inventory), the operators' server 170 may be connected to the payment accepting unit 120 using a handheld computer sync or a cellular connection.

[0079] Also, a unique private key may be used to securely transmit encrypted messages between the adapter module 100 and the system management server 130 (although the encrypted transmissions would most likely be routed through the mobile device 150). The server 130 stores a private key for each adapter module 100, and this key is only known to the adapter module 100 and the server 130. No intermediary is privy to this key (especially not the mobile device 150). When the adapter module 100 and the server 130 communicate messages (e.g., AuthRequest and AuthGrant), the security unit 755 of the adapter module 100 encrypts the message with its private key and passes the message to the mobile device 150. The mobile device 150 (which preferably cannot decrypt the message) passes the encrypted message to the server 130. The server 130 is able to decrypt the message using the security unit 955 of the adapter module 100 and the unique private key. The security unit 955 of the server 130 uses this same unique private key to encrypt messages to the adapter module 100 and sends the message to the mobile device 150 to relay to the adapter module 100 that is able to decrypt the message using the security unit 755 of the adapter module 100 and the unique private key.

[0080] Figure 7 shows specific communications and messaging with a vending sequence (the numbers to the left of the communications and messaging) between the adapter module 100, the mobile device 150, and the system management server 130. These

communications are discussed in more detail in the discussion pertaining to the schematic flow diagrams (Figures 8A-8G) and the flow charts (Figures 9A-9E).

[0081] It should be noted that Figures 5, 6, and 7 are examples, and are meant to help in the understanding of the mobile-device-to-machine payment system. For example, the shown long-range communications technology may be replaced with alternative long-range communications technology known or yet to be discovered, the shown short-range communication technology may be replaced with alternative short-range communication technology known or yet to be discovered, and the shown security may be replaced with alternative security known or yet to be discovered. The shown connections are meant to be examples, and there may be intermediaries that are not shown. The shown components have been simplified in that, for example, only one mobile device 150 (or machine 120, adapter module 100, or server 130) is shown where many may be included. Finally, the order of the steps may be changed and some steps may be eliminated.

ADAPTER MODULE

[0082] Figures 11-18 show views of adapter module 100a (referred to generally as adapter module 100). Adapter module 100 is a relatively low cost hardware component that is pre-configured to work with the industry standard multi-drop bus (MDB). On machines without MDB technology, the adapter module 100 can be configured or designed to work with other serial protocols or activate a switch. In essence the adapter module 100 simulates establishing payment on payment accepting unit 120 in much the same manner as other alternative forms of payment (e.g., cash).

[0083] The shown adapter modules 100 are preferably designed to be used as an in-line dongle for in-line insertion within, for example, a MDB of a machine 120. The wire used in MDB technology uses male and female connection ends or adapters to allow the attachment of peripherals. In the case of a vending machine, the wire with the connection ends or adapters would be present to allow the attachment of a payment receiving mechanism (e.g., a coin mechanism). The MDB male and female adapters 700, 710 may be separated (as shown in Figures 17-18). The adapter module 100a in Figures 11 and 17-18 has a male adapter 720 and a female adapter 730. The adapter module 100a may be plugged (inserted) in serial ("in-line") with the wire. For example, the MDB female adapter 710 may be connected to the male adapter 720 of the adapter module 100 and the MDB male adapter 700 may be connected to the female adapter 730 of the adapter module 100. The resulting in-line

configuration is shown in Figure 19. It should be noted that the adapter modules 100 are designed to allow pass-through communications so that if the mobile-device-to-machine payment processing system is not enabled (e.g., for a particular purchase or simply turned off) the MDB functions as though the adapter module 100 is not there and the machine 120 can function normally.

HANDS-FREE MODE

[0084] Summarily, if it is available, a hands-free mode, from the user's perspective, would allow the user to approach a favorite payment accepting unit 120 and notice that the display (e.g., the displays 122 or 124 shown in Figure 19) associated with the payment accepting unit 120 shows funds available (e.g., the wallet balance), he would select the product or service using input mechanisms (e.g., buttons 126 or a touch screen display 124 shown in Figure 19) associated with the payment accepting unit 120, and he would retrieve his dispensed services or products.

[0085] During an initial handshake with the mobile device 150 (when the user is within range), the adapter module 100 reports to the mobile device 150 whether or not hands-free mode is available. If it is available, the installed mobile application 140 automatically connects to the payment accepting unit 120 without the user having to interact with the mobile device 150. The user observes that funds are available on the display 122, 124 of the payment accepting unit 120 and completes the purchase transaction as if cash was inserted in the machine 120 by inputting his selection on the payment accepting unit 120. The payment accepting unit 120 dispenses the product or service. After the selection is made, the change is returned to the mobile device 150.

[0086] Whether hands-free payment is available is determined by factors including, but not limited to whether if other mobile devices 150 are in range, if other adapter modules 100 are in range, if there are any alerts, if the payment trigger threshold is having wide variances and so deemed unstable, or if the payment accepting unit operator (e.g., a vending machine operator) has opted to disable hands-free mode for the payment accepting unit 120. In the latter instance, operators can disable via a maintenance mobile device 150, as well as through the operators' server 170 and/or the system management server 130.

[0087] Figure 3 is a table that shows considerations, conditions, or factors that may be used to determine whether the hands-free pay feature is available. Starting at the "Favorite?" column, this indicates whether the payment accepting unit 120 is a favorite machine.

Preferably the hands-free pay feature is only available for use with "favorite" payment accepting units 120 (e.g., a vending machine at work or school). The "Alert" column has to do with whether there is some reason (e.g., there are too many users in range) that the hands-free pay feature should not work and, if there is such a reason, the user will be notified (alerted) and may be able to use the manual mode to resolve the alert and/or complete the transaction. Figure 3 shows situations in which a user is or is not able to make hands-free purchases from a machine 120 using a mobile application 140 on his mobile device 150. It should be noted that the shown interface is an example. For example, some of the features could be automated or pre-selected. (It should be noted that the left hand column, the "Tab" column, relates to whether the selected tab on the mobile application 140 is "all" or "favorite." Figures 10A-10D all show these tabs. Unlike the other columns in Figure 3, this column has more to do with the functionality and view of the application 140 than specifically with the hands-free feature. The tabs would allow a user to select whether he wanted to be alerted when he was in range of all payment accepting units 120 or just "favorite" payment accepting units 120 and the application 140 would show the appropriate view.)

[0088] Balance Display: An optional feature of the mobile-device-to-machine payment system that is particularly helpful in the hands-free mode (although it may be available in the manual mode and/or in a multiple-vend scenarios) is when the user's mobile device 150 sends "credit" to the payment accepting unit 120 (either via hands-free payment or through a manual swipe), the wallet balance is sent to the payment accepting unit 120 that is then displayed to the user on a display 122, 124 of the machine 120. This is particularly beneficial during hands-free mode when the user does not retrieve the mobile device 150 and, therefore, may not know the balance. Also, in a multiple-vend scenario the user would not have to calculate a remaining balance.

[0089] An example of a hands-free, multiple-vend scenario where a balance is displayed by the payment accepting unit 120, follows: The user has $5.00 in his/her virtual wallet as that is the amount that has been authorized (the AuthGrant being stored on the mobile device 150). The user walks up to the payment accepting unit 120 and $5.00 is displayed on the display 122, 124 of the payment accepting unit 120 since hands-free mode was enabled and credit was sent (e.g., via the short-range communication capability) to the payment accepting unit 120. The user makes a selection of $1.50 by interacting (e.g., pressing buttons) with the machine 120. The item (product or service) is dispensed and the "change" is

"returned" (e.g., via the short-range communication capability) to the virtual wallet. But since the user is still standing in the payment zone 102, the remaining wallet balance of $3.50 is sent to the payment accepting unit 120 and displayed so that the user can now see that he/she has a $3.50 balance. (It should be noted that the authorized funds may remain on the machine 120 and not be transferred back to the mobile device 150 between transactions.) The user decides to purchase a $1.50 item, and the transaction is completed as usual (e.g., by interacting with the machine 120). Now the user is still standing in the payment zone 102 and he/she sees the wallet balance of $2.00 on the display 122, 124 of the payment accepting unit 120. The user decides that he/she does not wish to purchase anything else and simply walks away. As he/she walks out of the payment zone 102, the credit is cleared from the machine 120, but he/she is left with the knowledge that his wallet balance is $2.00 even though he/she never touched the mobile device 150. Communications between the payment accepting unit 120 and the adapter module 100 (via the mobile device 150) handle the accounting incidental to the transaction. The remaining balance ($2.00) is technically stored on the server 130, and may be reflected on the application 140 on the mobile device 150.

MULTIPLE DISTINCT ZONES

[0090] As shown in Figures 1-2, the functions performed by the adapter module 100 can be divided into distinct zones: a first "communication zone" (e.g., "Bluetooth range" 106), a second "authorization zone" 104, and a third "payment zone" 102. The payment zone 102 is smaller than or equal to (overlapping completely) the authorization zone 104. Put another way, the payment zone 102 is within or coextensive with the authorization zone 104. The payment zone 102 is a subset of the authorization zone 104 with a ratio of the payment zone 102 to the authorization zone 104 ranging from 0.01:1 to 1:1. It is not necessarily a fixed ratio and can vary between different payment accepting units 120, different mobile devices 150, different users, and over time. While the zones 102, 104, 106 are depicted as having a uniform shape, the zones may not necessarily be uniform (or constant over time) in that the shape can vary. For example, the shape of the Bluetooth range 106 may vary depending on environmental conditions such as obstacles in the room and payment accepting unit 120 door/wall materials.

[0091] Bluetooth Range 106 (sometimes also herein called the "communication zone"): The outermost range is the Bluetooth range 106 (shown in Figures 1-2). This is the area in which the adapter module 100 is able to broadcast its presence. In most situations, the

Bluetooth range 106 is a passive range in that no actual data is exchanged between the mobile device 150 and the adapter module 100. While in the Bluetooth range 106, the mobile device 150 monitors the RSSI (Received Signal Strength Indicator).

[0092] Authorization Zone 104: The middle region is the authorization zone 104 (shown in Figures 1-2). This is a computed area based on the RSSI. As mentioned, the mobile device 150 monitors the RSSI while it is in the Bluetooth range 106. When the RSSI reaches a certain predetermined threshold based on In-Range Heuristics, the mobile device 150 can be considered to be in the authorization zone 104. In the authorization zone 104 the mobile device 150 establishes a connection to the adapter module 100 (e.g., a Bluetooth connection (Figure 5) with SSL protection (Figure 6)) and informs the adapter module 100 of its presence. After a successful handshake with the adapter module 100, the mobile device 150 registers the adapter module 100 and the adapter module 100 requests an authorization to the server 130 via the mobile devices' network connection (e.g., a Wi-Fi or cellular connection (Figure 5) with SSL protection (Figure 6)). It is important to note the mobile device 150 and the adapter module 100 have a non-exclusive relationship at this point. The adapter module 100 may collect registrations for all mobile devices 150 that are within the authorization zone 104.

[0093] An authorization occurs in preparation for when the user enters the payment zone 102 (shown in Figures 1-2). An authorization expires in a set period of time (for example, five minutes), so if the mobile device 150 is still in the authorization zone 104 at the time of expiration, the adapter module 100 submits for and receives another authorization. This will continue for a set number of times (for example, the limit may be three times to limit cases of numerous authorizations for a mobile device that may remain in the authorization zone 104 for an extended period of time without completing a transaction). Should authorization fail (for instance if the limit had been reached) prior to the user entering the payment zone 102, the adapter module 100 will request authorization when the mobile device 150 enters the payment zone 102 (which adds a few seconds to the experience).

[0094] Payment Zone 102: As a user enters the payment zone 102, the mobile device 150 establishes exclusive control of the adapter module 100. Once established, any other user in the payment zone 102 is put into a "waiting" status.

[0095] In the payment zone 102, the payment can be triggered automatically if the payment processing system has and is in hands-free mode. In such instances, the mobile

device 150 is running the application 140 in background mode and will send credit to the payment accepting unit 120 without any explicit user interaction. The user completes the transaction on the payment accepting unit 120 in much the same manner as if cash had been inserted into the payment accepting unit 120 to establish credit. After the user completes the transaction (that may include one or more purchases), details of the transaction are preferably returned to the mobile device 150 and server 130 in separate messages. The message to the server 130 is preferably encrypted with the adapter module's 100 private key (Figure 6) to ensure data integrity. As shown in Figure 7, the "private key" coded message (Encrypted VendDetails) is preferably sent via the mobile device 150. The message to the mobile device 150 may be sent solely for the purpose of closing the transaction. The transaction history and balance are updated server-side via the encrypted message sent to the server 130.

[0096] The other mode of operation is manual mode. In manual mode, the user launches the mobile device 150 and is able to swipe to send payment to the payment accepting unit 120. The user can also swipe back to cancel the payment. Like in hands-free mode, the purchase transaction is completed on the payment accepting unit 120 in the same manner as if cash were inserted into the payment accepting unit 120. The mobile device 150 is only used to send payment. Selection is made directly on the payment accepting unit 120.

[0097] Self-Calibrating Zone Threshold: A key, but optional feature, of the payment processing system is a self-calibrating payment zone RSSI threshold. Because RSSI can vary machine to machine, environment to environment, and device to device, having a fixed threshold at which payment is triggered can be problematic. The approach suggested herein is the creation of a self-calibrating threshold. When the user is interacting with the payment accepting unit 120 (such as when he makes his selection on the payment accepting unit 120), the payment accepting unit 120 notifies the adapter module 100 and the adapter module 100 logs the conditions such as RSSI, type of user mobile device 150, accelerometer data, and other information. It is at this point that it can be ascertained safely that the user is within arm's-length from the payment accepting unit 120 (by necessity the user is arm's-length because he is making some physical interaction with the payment accepting unit 120). This is the only point in the entire transaction in which it can be certain that the user is within arm's-length from the payment accepting unit 120.

[0098] Figure 4 shows a simplified set of steps involved when users enter the payment zone 102. Specifically, Figure 4 shows that credit is established 200 (this may have been done in the authorization zone 104, but if not it would be handled in the payment zone

102), that the user makes a selection using the machine 202, that the machine notifies the adapter module of the selection 204, that the adapter module (optionally) logs the RSSI 206, and that the purchase process(es) continues 208. Using the historically logged RSSI data, the adapter module 100 calculates one of several "average" RSSI using various mathematical models. This "average" could be a traditional average, a moving average, a weighted average, a median, or other similar summary function. The adapter module 100 could pre-process the historical data before running the function, such as to eliminate top and bottom data points, suspect data points, etc.

[0099] Optionally, during the handshake between the mobile device 150 and the adapter module 100, the information transmitted to the adapter module 100 may include, for example, the model of the mobile device 150. Using the received information pertaining to the mobile device models, the adapter module 100 can create multiple payment thresholds, one for each mobile device model. This allows for variances that may be inherent in different types of Bluetooth radios. An alternative to this method is for the adapter module 100 to broadcast a baseline payment zone threshold, and the mobile device 150 can use an offset from this baseline based on its specific model type. The payment zone thresholds (or baseline offsets) can be unique to specific types of mobile devices (e.g., by manufacturer, operating system, or component parts), models of mobile devices, or individual mobile devices (unique to each user).

[00100] In a typical scenario in which the payment zone threshold has been calibrated, the adapter module 100 advertises its presence along with the threshold at which it considers any mobile device 150 to be in the authorization zone 104. This is a one-way communication from adapter module 100 to mobile device 150. Once the mobile device 150 enters the authorization zone 104, there is a handshake that is established between the adapter module 100 and the mobile device 150. During this handshake, the mobile device 150 can share its model information with the adapter module 100, and the adapter module 100 can return the payment zone 102 threshold for that specific model.

[00101] Optionally, in addition to calibrating the payment zone threshold, the adapter module 100 can apply the self-calibrating model to the authorization zone 104 to calibrate the authorization zone threshold. As with the payment zone thresholds, the authorization zone thresholds can be unique to specific types of mobile devices, models of mobile devices, or individual mobile devices. In this scenario, the adapter module 100 would broadcast multiple thresholds by device type and the mobile device 150 would determine which threshold to

apply (or alternatively broadcast a baseline and the mobile device 150 uses an offset based on its device model). Even in this scenario, the authorization zone 104 is a one-way communication.

[00102] Optionally, along with the threshold that is calculated (in the payment and/or the authorization zone(s)), a safety margin can be added to minimize scenarios in which a user is within range, but the mobile-device-to-machine payment processing system does not recognize it because the threshold may not have been reached. For example, if the calculated RSSI for an iPhone™ 5 on machine 4567 is -68 db, the mobile-device-to-machine payment processing system may add a safety margin of -5 db, and establish the threshold at -73 db. So when a user's phone is communicating with the adapter module 100 at an RSSI of -73 db or better, the mobile-device-to-machine payment processing system will allow the mobile device 150 to credit the payment accepting unit 120. The safety margin can be set on the server 130 and downloaded to the adapter module 100, or set on the mobile device 150, or set on the adapter module 100 itself.

[00103] Optionally, in the payment zone threshold, the mobile device 150 can use other data to determine when to cancel the exclusive control of the payment accepting unit 120, to identify when the user is moving out of the payment zone 102. External data could include accelerometer data from the mobile device 150. Using that data, the mobile device 150 can determine whether the user is standing relatively still in front of the payment accepting unit 120, or if the user is in motion – effectively walking away from the payment accepting unit 120.

SIGNAL UNAVAILABILITY ADAPTATION

[00104] The mobile-device-to-machine payment processing system described herein uses a mobile device's 150 short-range communication technology (e.g., Bluetooth mechanisms) (shown as short-range communication capability 876 in Figure 21) and a mobile device's 150 long-range communications technology (e.g., cellular and/or Wi-Fi mechanisms) (shown as long-range communication capability 872 in Figure 21). The short-range communication capability 876 communicates with the adapter module's 100 short-range communication technology (e.g., Bluetooth mechanisms) (shown as short-range communication capability 776 in Figure 20). The long-range communication capability 872 communicates with the server's 130 long-range communications technology (e.g., cellular and/or Wi-Fi mechanisms) (shown as long-range communication capability 972 in Figure

22). The mobile device 150 (with a mobile application 140 thereon) acts as a communication bridge between the adapter module 100 (associated with a payment accepting unit 120) and the server 130. This process is described herein and works properly if there is cellular or Wi-Fi coverage within the payment zone 102.

[00105] One option if there is no cellular or Wi-Fi coverage within the payment zone 102 is to determine whether there is cellular or Wi-Fi coverage within the authorization zone 104 or the Bluetooth range 106. If there is, then the sizes of the zones 102, 104, 106 could be adapted and the timing could be adapted. For example, if the mobile devices 150 detected problems with the cellular or Wi-Fi coverage within the payment zone 102, the user could carry his mobile device 150 into the other zones (or the mobile device 150 could use short-range communication technology to communicate with other mobile devices 150 within the authorization zone 104 or the Bluetooth range 106) to determine whether the zones have cellular or Wi-Fi coverage. If they do have coverage, communication between the mobile device 150 and the server 130 can be advanced (conducted earlier when the mobile device 150 is further from the machine 120) or delayed (conducted later when the mobile device 150 is further from the machine 120). This can be thought of as changing the size or shapes of the zones 102, 104, 106. The timing would also have to be adjusted so that the authorization of funds (AuthGrant) does not expire before the user has a chance to make a purchase. It also means that balance updates to the server 130 may happen after the user has moved away from the machine 120 and has cellular or Wi-Fi coverage again.

[00106] Another option if there is no cellular or Wi-Fi coverage within any of the zones 102, 104, 106 is for the user to obtain authorization while outside of the zones in a place with cellular or Wi-Fi coverage. This may occur, for example, if a user knows that he will be going to a place with a payment accepting unit 120 equipped with an adapter module 100 (perhaps to a favorite payment accepting unit 120) that does not have (or rarely has) cellular or Wi-Fi coverage. A user may also use the mobile application 140 to query payment accepting units 120 in a given range (e.g., within 50 miles) or at a given location (e.g., at a campground or in a particular remote city) to determine whether there is cellular or Wi-Fi coverage within the zones 102, 104, 106. The user can then obtain pre-authorization from the server 130 using the mobile application 140. Again, the timing would also have to be adjusted so that the authorization of funds (AuthGrant) does not expire before the user has a chance to make a purchase. It also means that balance updates to the server 130 may happen after the user has moved away from the machine 120 and has cellular or Wi-Fi coverage

again. A mobile-device-to-machine payment system having the ability to implement this option would be able to accept cashless payments without requiring any network connection near the payment accepting unit 120. In some implementations, the mobile-device-to-machine payment processing systems described herein is located in a remote location where no signal is available, therefore, can accept cashless payments.

[00107] As an example of a situation in which there might be no cellular or Wi-Fi coverage within any of the zones 102, 104, 106 of a particular payment accepting unit 120, the user (a teenager) may be traveling to a remote location to attend summer camp where there is no cellular or Wi-Fi coverage. The camp may have several payment accepting units 120 (e.g., a machine that creates a dedicated "hot spot" that requires payment for use, vending machines, or machines for renting equipment such as bikes, kayaks, or basketballs). The camp facility might notify parents that the mobile-device-to-machine payment system is available. The parents, while at home, could obtain authorization for a particular amount (that could be doled out a certain amount per day or limited to type of machine or location) to be authorized and "loaded" into the user's mobile device 150 and specify that the authorization will not expire for a certain period or until a certain date. Thereafter, while at camp, the user could use the mobile application 140 on his mobile device 150 in a manner similar to those discussed elsewhere herein. Short-range communications may be used for communications between the adapter modules 100 (associated with the machines 120) and users' mobile devices 150.

[00108] One subtle but powerful component of the payment processing system described herein is that it requires a long-range communication capability (e.g., an Internet or cellular network connection) only in the authorization zone 104 and only for the time period required to send the AuthRequest and receive the AuthGrant. Once a valid AuthGrant is received by the mobile device 150, the long-range communication capability (e.g., an Internet or cellular network connection) is not required by either the mobile device 150 or the adapter module 100 in the payment zone 102 as long as the AuthGrant is valid (unexpired). This mechanism allows the system to seamlessly handle authenticated transactions in (temporary) offline mode, with the deferred acknowledgement and transaction messages performing the bookkeeping and cleanup when network connection is regained. The alternatives described above provide a unique way to artificially extend the authorization zone to include any location where the mobile device 150 can communicate with the server 130.

MULTIPLE USER RESOLUTION

[00109] As shown in Figure 2, in one practical scenario, multiple users are in the zones 102, 104, 106. As shown in Figure 2, users 1, 2, and 3 are in the payment zone 102 near the machine 120; users 5 and 6 are shown as positioned between the authorization zone 104 and the Bluetooth range 106; users 4 and 7 are in the Bluetooth range 106, user 10 is positioned on the edge of the Bluetooth range 106; and users 8 and 9 are positioned outside of Bluetooth range 106. In some implementations, the mobile-device-to-machine payment processing system manages and resolves issues pertaining to multiple users.

[00110] Users 4 and 7 are within the Bluetooth range 106 and the user 10 is either entering or leaving the Bluetooth range 106. Within the Bluetooth range 106 the users' mobile devices 150 are able to see the adapter module's 100 advertisement. In this zone, the mobile device 150 preferably does not initiate a connection. The adapter module 100 is preferably unaware of the users in the Bluetooth range 106. All the adapter module 100 is doing is advertising its presence to any multitude of users that may be in Bluetooth range 106.

[00111] The adapter module 100 begins to log users as the users (and their respective mobile devices 150) enter the authorization zone 104 (shown in Figure 2 as users 5 and 6). At this point, there is a non-exclusive connection initiated by the mobile device 150 to the adapter module 100. It does a handshake (e.g., to exchange information needed to obtain authorization and, optionally, to log information needed for a self-calibrating authorization zone threshold) and the mobile device 150 contacts the server 130 for an authorization (e.g., sending an AuthRequest and receiving an AuthGrant). The adapter module 100 registers all mobile devices 150 that have requested and received AuthGrants. The adapter module 100 continues communicating with any other mobile device 150 that enters the authorization zone 104. After initial contact, the adapter module 100 may provide the mobile device 150 with a deferral delay of when to check back in with the adapter module 100 allowing opportunity for other mobile devices 150 to communicate with the adapter module 100.

[00112] If there is only one user in the payment zone 102, a purchase transaction may be performed. If there are multiple users in the payment zone 102, the mobile-device-to-machine payment system must handle the situation.

[00113] One optional solution for handling the situation of the multiple users in the payment zone 102 is queuing users in the payment zone 102. Once any mobile device 150

enters the payment zone 102, it establishes exclusivity to a particular mobile device 150 (e.g., in a first-come-first-serve manner). Technically, however, the adapter module 100 is not establishing an exclusive connection to the mobile device 150. The adapter module 100 can still perform a round-robin poll and communicate with and advertise to other mobile devices 150. Instead, the adapter module 100 establishes a queue prioritized by RSSI and time (e.g., who was first and whether the authorization has expired) and it notifies (e.g., alerts) other mobile devices 150 to wait. The earliest valid (unexpired) authorization takes precedence when there is any tie in the RSSI. Otherwise, for example, the strongest average RSSI takes priority. Preferably the queue is not a static measure of the RSSI but an averaged measure over the period of time in the queue. This compensates for a scenario in which a user may be walking around in the queue and then shows up at the payment accepting unit 120 just as the previous user is finishing. If another user was also in the payment zone 102 and stood there the entire time, but may have newer authorization, he could win out.

[00114] Anytime that the adapter module 100 cannot determine exactly which user is in the payment zone 102 in front of the payment accepting unit 120, the adapter module 100 will disable hands-free payment. The mobile device 150 will send an alert to the user and he can use swipe to pay (manual mode). All users in payment zone 102 will show "Connected" and the first to swipe payment to the payment accepting unit 120 then locks out other users.

MULTIPLE MODULE RESOLUTION

[00115] In the scenario where there are multiple modules present, determining which payment accepting unit 120 a user is in front of can be a challenge. In some implementations, the mobile-device-to-machine payment processing system described herein allows adapter modules 100 to communicate to other adapter modules 100 in range via Bluetooth. Each user receives authorization grants for specific payment accepting units 120. This means if there are multiple adapter modules 100 within the same authorization zone 104, there will be multiple authorization grants for the user. When the user enters the payment zone 102, it can be difficult to differentiate which payment accepting unit 120 the user is in front of if the payment zones 102 overlap.

[00116] To solve this problem, when the user enters the payment zone 102, the adapter modules 100 communicate with each other to determine the RSSI for the particular user (based on the signal from his mobile device 150) to triangulate which adapter module 100 (and the associated payment accepting unit 120) is closer to the user. Optionally, the inter-

module communications can restrict the user to establishing an exclusive connection with only one payment accepting unit 120.

[00117] Optionally, when the user connects to a payment accepting unit 120, the mobile device 150 can send a communication to the payment accepting unit 120 for momentary display to the user on the display 122, 124 of the payment accepting unit 120. For example, the mobile device 150 can send a communication (e.g., "connected" or "Fred's Mobile Device Connected") to the payment accepting unit's display 122, 124 for a predetermined period of time (e.g., 1-3 seconds) so when the user is in payment zone 102, it is clear which payment accepting unit 120 the user is connected to prior to making a purchase (either in hands-free or manual mode).

[00118] In addition, when the user is in manual mode, the mobile device 150 can display (e.g., on the touch screen 152 as shown in Figures 10A-10D) a visual indication of the payment accepting unit 120 (e.g., a picture and/or a payment accepting unit ID of the payment accepting unit 120) for visual confirmation. If the user is in manual mode, the user can manually change the payment accepting unit 120.

DESCRIPTIVE SCENARIO

[00119] Figure 7, Figures 8A-8G, and 9A-9E (as well as other figures) can be used to understand a detailed scenario of the mobile-device-to-machine payment processing system described herein. A flow of communications and steps are loosely described below with reference to these (and other figures). It should be noted that alternative scenarios could include, for example, a modified order of the steps performed.

[00120] Prior to vending transactions, a user downloads a mobile application 140 onto his mobile device 150, creates an account, and configures a funding source via, for example, a funding source server 160. A funding source may be, for example, a debit card, a credit card, campus cards, rewards points, bank accounts, payment services (e.g., PayPal™) or other payment option or combination of payment options known or yet to be discovered. The funding sources may be traditional and/or nontraditional payment sources that are integrated into the ecosystem described herein and then used indirectly as a source of funds. Funds from the funding source are preferably held on the server 130 such that when an AuthRequest is received by the server 130, the server 130 can send an AuthGrant authorizing funds for a purchase.

[00121] The user can specify one or more "favorite" adapter module(s) 100 (that has a one-to-one relationship to the payment accepting unit 120) that he may visit regularly, such as a vending machine at school or work. Favorite adapter modules 100 appear on a pre-filtered list and allow for additional rich features such as hands-free payment.

[00122] The payment accepting unit 120 may be equipped with an adapter module 100 that is constantly advertising its availability via Bluetooth (or other "signals," "communications," and/or "transmissions"). This ongoing advertising and scanning for adapter modules is shown in Figure 8A. As shown, the mobile device 150 is continuously scanning for any adapter module 100 within Bluetooth (or other "signal," "communication," and/or "transmission") range. When the user is within range of that adapter module 100, the mobile device 150 tracks and monitors the signal strength until a predetermined "authorization zone" threshold is achieved.

[00123] Figures 8B and 9A generally show that when the authorization zone threshold is reached, the mobile device 150 enters the authorization zone (block 302) and registers the adapter module 100. The mobile device 150 connects to the server 130 (block 304). The application 140 on the mobile device 150 creates a request for authorization (AuthRequest) and passes the AuthRequest to the server 130 using appropriate communication technology (e.g., GSM, CDMA, Wi-Fi, or the like) (block 306). The server 130 responds with an authorization grant (AuthGrant) encrypted with the specific adapter module's private key (block 306). This authorization token may minimally include the User identifier (ID), Apparatus ID (for the adapter module 100), authorization amount, and expiration time. The mobile device 150 receives the AuthGrant from the server 130, and retains it until the mobile device 150 is ready to issue payment to an adapter module 100. The mobile device 150 collects all pending AuthGrants that may be one or more depending on how many adapter modules 100 are in-range. Unused AuthGrants that expire are purged from the mobile device 150 and the server 130. It is important to note that the mobile device 150 is unable to read the AuthGrant because it is encrypted with the adapter module's unique private key that is only known to server 130 and adapter module 100. This provides a preferred key element of security in the system as the adapter module 100 only trusts AuthGrants that are issued by the server 130, and the AuthGrants cannot be read or modified by the mobile device 150 or any other party in between the server and the adapter module 100. Additional mobile devices 150 may enter the authorization zone 104 (block 308).

[00124] As the user approaches a specific adapter module 100, the user enters the payment zone 102 and an event threshold is triggered based on heuristics performed by the mobile device 150. Blocks 310 and 312 show the loop steps of waiting for a mobile device 150 from the authorization zone 104 to enter the payment zone 102. If the user leaves the authorization zone 104 without entering the payment zone 102, the adapter module 100 returns to advertising its presence (block 300).

[00125] Figures 8C and 9B generally show the user entering the payment zone. The mobile device 150 verifies that it has an unexpired and valid AuthGrant. If the AuthGrant is not good, it may be requested again, repeating the Authorization Request process (block 315). If the AuthGrant is good, the mobile device 150 sends the valid AuthGrant (including the wallet balance (block 322)) to the adapter module 100 to initiate a transaction. The mobile device 150 may issue the AuthGrant automatically without specific user interaction if the hands-free mode is supported (and the device is a favorite (block 318), there is only one device in the payment zone 102 (block 318), and (optionally) there is only one user in the authorization zone 104 (block 320). If any of these factors are not present, the mobile device 150 will prompt and/or wait for the user to begin the transaction manually (block 324).

[00126] Figures 8D, 9C, and 9D generally show the transaction process. As shown in Figure 9C, the adapter module 100 runs through a series of questions to determine if there are any issues that would prevent vending including: has the user canceled in-app? (block 326), has the user walked away? (block 328), is the coin return pressed? (block 330), has more than a predetermined period of time elapsed? (block 332). If the answer to any of these questions is "yes," the transaction does not proceed. If the answers to all of these questions is "no," the user makes a selection (block 334) on the payment accepting unit 120 in the same or similar manner as compared to if cash or credit were presented to the payment accepting unit 120. If the machine 120 is able to vend (block 336), it attempts to release the product. If the vend fails (block 338) it is reported by the machine (block 340) and a credit is returned to the virtual wallet (block 342). If the vend is successful (block 338) it is reported by the machine (block 344). Put another way, after the transaction is complete, the adapter module 100 returns to the mobile device 150 the details of the transaction as well as an encrypted packet containing the vend details to be sent to the server 130 via the mobile device 150. Optionally, the adapter module 100 can pass additional information not directly related to the transaction such as payment accepting unit health, sales data, error codes, etc.

[00127] Figures 8D and 9E generally show the multi-vend function. If the machine has enabled multi-vend capabilities (block 350) and the multi-vend limit has not been reached, the process returns to the question of whether the user is in the payment zone (block 310 of Figure 9A). If the machine does not have enabled multi-vend capabilities (block 350) or the multi-vend limit has been reached, the wallet is decremented by the vend amount(s) and "change" is returned to the virtual wallet (block 354) and the process ends (block 356).

[00128] Figure 8E is a schematic flow diagram of an example login process. Figure 8F is a schematic flow diagram of an example boot-up process. Figure 8G is a schematic flow diagram of an example account check/update process.

[00129] Several of the figures are flow charts (e.g., Figures 9A-9E) illustrating methods and systems. It will be understood that each block of these flow charts, components of all or some of the blocks of these flow charts, and/or combinations of blocks in these flow charts, may be implemented by software (e.g., coding, software, computer program instructions, software programs, subprograms, or other series of computer-executable or processor-executable instructions), by hardware (e.g., processors, memory), by firmware, and/or a combination of these forms. As an example, in the case of software, computer program instructions (computer-readable program code) may be loaded onto a computer to produce a machine, such that the instructions that execute on the computer create structures for implementing the functions specified in the flow chart block or blocks. These computer program instructions may also be stored in a memory that can direct a computer to function in a particular manner, such that the instructions stored in the memory produce an article of manufacture including instruction structures that implement the function specified in the flow chart block or blocks. The computer program instructions may also be loaded onto a computer to cause a series of operational steps to be performed on or by the computer to produce a computer implemented process such that the instructions that execute on the computer provide steps for implementing the functions specified in the flow chart block or blocks. Accordingly, blocks of the flow charts support combinations of steps, structures, and/or modules for performing the specified functions. It will also be understood that each block of the flow charts, and combinations of blocks in the flow charts, may be divided and/or joined with other blocks of the flow charts without affecting the scope of the invention. This may result, for example, in computer-readable program code being stored in whole on a single memory, or various components of computer-readable program code being stored on more than one memory.

ADDITIONAL IMPLEMENTATIONS

[00130] Figure 23 illustrates a schematic flow diagram of a process 1000 of authenticating a user to perform a transaction in the payment processing system in accordance with some implementations. In some implementations, the payment processing system includes one or more payment modules 100 (e.g., each associated with a respective payment accepting unit 120 such an automatic retailing machine for dispensing goods and/or services), one or more mobile devices 150 (e.g., each executing the application 140 for the payment processing system either as a foreground or background process), and the server 130. The server 130 manages the payment processing system and, in some cases, is associated with an entity that supplies, operates, and/or manufactures the one or more payment modules 100. For brevity, the process 1000 will be described with respect to a respective payment module 100 and a respective mobile device 150 in the payment processing system.

[00131] The payment module 100 broadcasts (1002), via a short-range communication capability (e.g., BLE), a packet of information (sometimes also herein called "advertised information"). The packet of information at least includes an authorization code and an identifier associated with the payment module 100 (module ID). In some implementations, the packet of information further includes a firmware version of the payment module 100 and one or more status flags corresponding to one or more states of the payment module 100 and/or the payment accepting unit 120. The information included in the packet broadcast by the payment module 100 is further discussed below with reference to Figure 24A.

[00132] In some implementations, the payment module 100 sends out a unique authorization code every X seconds (e.g., 100 ms, 200 ms, 500 ms, etc.). In some implementations, the unique authorization codes are randomly or pseudo-randomly generated numbers. In some implementations, the payment module 100 stores broadcasted authorization codes until a received authorization grant token matches one of the stored authorization codes. In some implementations, the payment module 100 stores broadcasted authorization codes for a predetermined amount of time (e.g., Y minutes) after which time an authorization code expires and is deleted. In some implementations, the authorization code is encrypted with a shared secret key known by the server 130 but unique to the payment module 100. In some implementations, the payment module 100 initializes a random number and then the authorization codes are sequential counts from this random number. In such implementations, the payment module 100 stores the earliest valid (unexpired) counter without a need to store

every valid authorization code. In some implementations, the authentication code included in the broadcast packet of information is a hash value of the randomly or pseudo-randomly generated number or the sequential number.

[00133] The mobile device 150 receives the broadcasted packet of information, and the mobile device 150 sends (1004), via a long-range communication capability (e.g., GSM, CDMA, Wi-Fi, or the like), an authorization request to the server 130. For example, an application 140 that is associated with the payment processing system is executing as a foreground or background process on the mobile device 150. In this example, the application 140 receives the broadcasted packet of information when the mobile device 150 is within the communication zone of the payment module 100 (i.e., BLE range) and either automatically sends the authorization request to the server 130 or sends the authorization request to the server 130 when the mobile device 150 is within the authorization zone of the payment module 100. In some implementations, the broadcasted packet of information includes a baseline authorization zone threshold (i.e., an authorization zone criterion) indicating a baseline RSSI that the mobile device 150 (or the application 140) is required to observe before being within the authorization zone of the payment module 100. In some implementations, the mobile device 150 (or the application 140) offsets the baseline authorization zone threshold based on the strength and/or reception of the short-range communication capability (e.g., BLE radio/transceiver) of the mobile device 150. In some implementations, the authorization request at least includes the authorization code which was included in the broadcasted packet of information, an identifier associated with the user of the mobile device 150 or the user account under which the user of the mobile device 150 is logged into the application 140 (user ID), and the identifier associated with the payment module 100 (module ID). In some implementations, the authentication code included in authorization request is the hash value in cleartext. The authorization request is further discussed below with reference to Figure 24B.

[00134] After receiving the authorization request, the server 130 processes (1006) the authorization request. In some implementations, the server 130 decrypts the authorization code included in the authorization request with the shared secret key corresponding to the payment module 100. In some implementations, the server 130 determines whether the user associated with the user ID in the authorization request has sufficient funds in his/her account for the payment processing system to perform a transaction at the machine 120 that is

associated with the payment module 100 corresponding to the module ID in the authorization request.

[00135] The server 130 sends (1008), via a long-range communication capability (e.g., GSM, CDMA, Wi-Fi, or the like), an authorization grant token to the mobile device 150. In some implementations, the server 130 does not send the authorization grant token if the authorization code in the authorization request cannot be decrypted with the shared secret key corresponding to the payment module 100 (e.g., the authorization code is corrupted or hacked). In some implementations, the server 130 does not send the authorization grant token if the user associated with the user ID in the authorization request does not have sufficient funds in his/her account. In some implementations, in addition to the authorization grant token, the server 130 sends a message directly to the mobile device 150 which is not encrypted with the shared secret key corresponding to the payment module 100. After receiving the message, the mobile device 150 displays an appropriate message to the user such as insufficient balance or declined authorization. In some implementations, the server 130 sends an authorization grant token for an amount equal to zero; in which case, the payment module 100 interprets this as a declined or failed authorization which can result for any number of reasons including, but not limited to, insufficient balance or credit.

[00136] The mobile device 150 receives the authorization grant token, and, subsequently, the mobile device 150 detects (1010) a trigger condition. In some implementations, the mobile device 150 (or the application 140) detects the trigger condition via the hand-free mode (e.g., upon entrance into the payment zone of the payment module 100) or manual mode (e.g., interacting with the user interface of the application 140 to initiate a transaction with the payment accepting unit associated with the payment module 100).

[00137] In some implementations, unused authorization grants (e.g., if there was no trigger condition or it expired) are canceled by the mobile device 150 by sending a cancellation message to the server 130 corresponding to the unused authorization grant. In some implementations, the server 130 denies or limits the number of authorization grants sent to the mobile device 150 until it has received transaction information or cancellation of authorization outstanding authorization grants sent to the mobile device 150.

[00138] In response to detecting the trigger condition, the mobile device 150 sends (1012), via a short-range communication capability (e.g., BLE), the authorization grant token to the payment module 100. Subsequently, the machine 120 displays credit to the user (e.g.,

via one of the displays 122 or 124 shown in Figure 19) and the user interacts with the input mechanisms of the machine 120 (e.g., via the buttons 126 or a touch screen display 124 shown in Figure 19) to purchase products and/or services.

[00139] Figure 24A illustrates a block diagram of a packet 1100 of information broadcast by the payment module 100 (e.g., in step 1002 of the process 1000 in Figure 23) in accordance with some implementations. In some implementations, the packet 1100 at least includes: module ID 1102 and authorization code 1104. In some implementations, the packet 110 additional includes: a firmware version 1106 and one or more status flags 1108.

[00140] In some implementations, the module ID 1102 is a unique identifier corresponding to the payment module 100 (sometimes also herein called the "adapter module 100") that broadcast the packet 1100.

[00141] In some implementations, the authorization code 1104 is a hash value in cleartext. In some implementations, the payment module 100 randomly or pseudo-randomly generates a number or determines a sequential number (*See* step 1002 of process 1000 in Figure 23) and performs a predetermined hash function (e.g., SHA-256) on the number to produce the hash value as the authorization code 1104. In some implementations, the authorization code 1104 is a unique code that is encrypted with a secret encryption key corresponding to the payment module 100. The secret encryption key is shared with the server 130, which enables the server 130 to decrypt the authorization code 1104 and encrypt the authorization grant token but not the mobile device 150. In some implementations, the encryption between server 130 and payment module 100 is accomplished by two pairs of public/private keys.

[00142] In some implementations, the firmware version information 1106 identifies a current firmware version 1112 of the payment module 100. In some implementations, the firmware version information 1106 also includes update status information 1114 indicating one or more packets received by the payment module 100 to update the firmware or one or more packets needed by the payment module 100 to update the firmware. See Figures 26A-26B and 30A-30D and the accompanying text for further discussion regarding updating the firmware of the payment module 100.

[00143] In some implementations, the one or more status flags 1108 indicate a state of the payment module 100 and/or the payment accepting unit 120 associated with the payment module 100. In some implementations, the one or more status flags 1108 indicate a state of

the payment module 100 such upload information indicator 1116 indicating that that the payment module 100 has information to be uploaded to the server 130 (e.g., transaction information for one or more interrupted transactions). In some implementations, upload information indicator 1116 triggers the mobile device 150 to connect to payment module 100 immediately (e.g., if it has interrupted transaction information to be uploaded to the server 130). See Figures 25A-25B and 29 and the accompanying text for further discussion regarding interrupted transactions. In some implementations, the one or more status flags 1108 indicate a state of the payment accepting unit 120 including one or more of an error indicator 1118 (e.g., indicating that a bill and/or coin acceptor of the payment accepting unit 120 is experiencing a jam, error code, or malfunction), a currency level indicator 1120 (e.g., indicating that the level of the bill and/or coin acceptor reservoir of the payment accepting unit 120 is full or empty), and/or inventory level(s) indicator 1122 (e.g., indicating that one or more products of the payment accepting unit 120. In some implementations, the one or more status flags 1108 are error codes issued by payment accepting unit 120 over the MDB.

[00144] In some implementations, the zone criteria information 1110 specifies an authorization zone criterion 1124 (e.g., a baseline authorization zone threshold indicating a baseline RSSI that the mobile device 150 (or the application 140) is required to observe before being within the authorization zone of the payment module 100) and/or a payment zone criterion 1126 (e.g., a baseline payment zone threshold indicating a baseline RSSI that the mobile device 150 (or the application 140) is required to observe before being within the payment zone of the payment module 100). In some implementations, the baseline authorization zone threshold and the baseline payment zone threshold are default values determined by the server 130 or stored as variables by the application 140, in which case the authorization zone criterion 1124 and payment zone criterion 1126 are offsets to compensate for the strength and/or reception of the short-range communication capability (e.g., BLE radio/transceiver) of the payment module 100. Alternatively, zone criteria information 1110 includes a spread between the baseline authorization zone threshold and the baseline payment zone threshold. Thus, the mobile device 150 (or the application 140) determines the baseline authorization zone threshold and the baseline payment zone threshold based on the spread value and a default value for either the baseline authorization zone threshold or the baseline payment zone threshold. For example, the spread indicates -10 db and the default baseline payment zone threshold is -90 db; thus, the baseline authorization zone threshold is -80 db. Continuing with this example, after determining the baseline authorization zone threshold and

the baseline payment zone threshold, the mobile device 150 (or the application 140) may further adjust the authorization zone threshold and/or the payment zone threshold based on the strength and/or reception of its short-range communication capability (i.e., BLE radio/transceiver).

[00145] Figure 24B is a block diagram of an authorization request 1130 sent by the mobile device 150 to the server 130 (e.g., in step 1004 of the process 1000 in Figure 23) in accordance with some implementations. In some implementations, the authorization request 1130 at least includes: a module ID 1102, a user ID 1134, and an authorization code 1104.

[00146] In some implementations, the module ID 1102 is a unique identifier corresponding to the payment module 100 that broadcast the 1100 that included the authorization code 1104.

[00147] In some implementations, the user ID 1134 is an identifier associated with the user of the mobile device 150 sending the authorization request 1130 to the server 130. In some implementations, the user ID 1134 is associated with the user account under which the user of the mobile device 150 is logged into the application 140.

[00148] In some implementations, the authorization code 1130 includes the authorization code 1104 included in the packet 1100 of information that was broadcast by the payment module 100.

[00149] Figure 24C is a block diagram of an authorization grant token 1140 sent by the server 130 to the mobile device 150 (e.g., in step 1008 of the process 1000 in Figure 23) in accordance with some implementations. In some implementations, in accordance with a determination that the authorization code 1136 included in the authorization request 1130 from the mobile device 150 is valid and that the user associated with the mobile device 150 has sufficient funds in his/her account for the payment processing system, the server 130 generates the authorization grant token 1140. In some implementations, the authorization grant token 1140 at least includes: a module ID 1102, a user ID 1134, an authorized amount 1146, (optionally) an expiration period offset 1148, and (optionally) the authorization code 1104.

[00150] In some implementations, the module ID 1102 is a unique identifier corresponding to the payment module 100 that broadcast the packet 1100 that included the authorization code 1104.

[00151] In some implementations, the user ID 1134 is an identifier associated with the user of the mobile device 150 that sent the authorization request 1130 to the server 130.

[00152] In some implementations, the authorized amount 1146 indicates a maximum amount for which the user of the mobile device 150 is authorized for a transaction using the authorization grant token 1140. For example, the authorized amount 1146 is predefined by the user of the mobile device 150 or by the server 130 based on a daily limit or based on the user's total account balance or based on a risk profile of the user correspond to the user ID 1134.

[00153] In some implementations, the expiration period 1148 offset indicates an offset to the amount of time that the payment module 100 holds the authorization grant token 1140 valid for initiation of a transaction with the machine 120 associated with the payment module 100. For example, the expiration period offset 1148 depends on the history and credit of the user of mobile device 150 or a period predefined by the user of mobile device 150.

[00154] In some implementations, the authorization grant token 1140 further includes the authorization code 1104 that was included in the authorization request 1130. In some implementations, when the authorization code 1104 is the hash value, the server 130 encrypts the authorization grant token 1140 including the hashed value with the shared secret encryption key associated with payment module 100. Subsequently, when mobile device 150 sends the authorization grant token 1140 to payment module 100 after detecting a trigger condition, the payment module 100 decrypts the authorization grant token 1140 using the secret key known only to server 130 and payment module 100 (which authenticates the message and the authorization grant), and then matches the hash value included in the decrypted authorization grant token 1140 to previously broadcast valid (unexpired) hash values (i.e., auth codes) to determine validity of the (which was known only by payment module 100).

[00155] Figure 24D illustrates a block diagram of transaction information 1150 generated by the payment module 100 (e.g., in step 1204 of the process 1200 in Figure 25A) in accordance with some implementations. In some implementations, the transaction information 1150 includes: a transaction ID 1152 for the respective transaction, a module ID 1154, a user ID 1156, (optionally) the authorization code 1158, transaction status information 1160, the transaction amount 1162, and other information 1164.

[00156] In some implementations, the transaction ID 1152 is a unique identifier corresponding to the respective transaction. In some implementations, the transaction ID 1152 is encoded based on or associated with the time and/or date on which and the location at which the respective transaction took place.

[00157] In some implementations, the module ID 1154 is a unique identifier corresponding to the payment module 100 that performed the respective transaction.

[00158] In some implementations, the user ID 1156 is an identifier associated with the user of the mobile device 150 that initiated the respective transaction.

[00159] In some implementations, the authorization code 1158 corresponds to the original authorization code (e.g., auth code 1104, Figures 24 A-24C) and/or authorization grant token (e.g., auth grant token 1140, Figure 24C) that was used to initiate the respective transaction. In some implementations, the authorization code 1156 is encrypted with a unique encryption key corresponding to the payment module 100.

[00160] In some implementations, the transaction status information 1160 includes an indication whether the respective transaction was completed, not-completed, or aborted. For example, the respective transaction is incomplete if a jam occurred at the payment accepting unit 120 and the user did not receive the product associated with the respective transaction. For example, if the user walks away from the payment accepting unit 120 after money was credited for the respective transaction, the respective transaction is aborted. In another example, if respective transaction times out after a predetermined time period because the user failed to select a product at the payment accepting unit 120, the respective transaction is aborted. In another example, if the user actuates a bill or coin return mechanism of the payment accepting unit 120, the respective transaction is aborted.

[00161] In some implementations, the transaction amount 1162 indicates the amount of the respective transaction or the amount of each of multiple transactions (e.g., in a multi-vend scenario). In some implementations, the transaction amount 1162 is encrypted with a unique encryption key corresponding to the payment module 100.

[00162] In some implementations, the other information 1164 includes other information related to the respective transaction such as the items dispensed by the payment accepting unit 120 and the type of transaction (e.g., coins, bills, credit card, manual mode, hands-free mode, etc.). In some implementations, the other information 1164 includes other information related to the payment module 100 and/or the payment accepting unit 120

associated with the payment module 100. For example, the other information 1164 includes a verification request to the server 130 in order to implement new firmware. See Figures 26A-26B and the accompanying text for further discussion of the verification request. In another example, the other information 1164 includes transaction information from one or more previous interrupted transactions. In another example, the other information 1164 includes transaction information for one or more transactions paid via bills and/or coins. In another example, the other information 1164 includes inventory information as to one or more products of the payment accepting unit 120.

[00163] Figure 25 illustrates a schematic flow diagram of a process 1200 of processing acknowledgement information in accordance with some implementations. In some implementations, the payment processing system includes one or more payment modules 100 (e.g., each associated with a respective payment accepting unit 120 such an automatic retailing machine for dispensing goods and/or services), one or more mobile devices 150 (e.g., each executing the application 140 for the payment processing system either as a foreground or background process), and the server 130. The server 130 manages the payment processing system and, in some cases, supplies, operates, and/or manufactures the one or more payment modules 100. For brevity, the process 1200 will be described with respect to a respective payment module 100 associated with a respective payment accepting unit 120 (machine 120) and a respective mobile device 150 in the payment processing system. In the process 1200, the payment module 100 receives first acknowledgment information for a first transaction via the mobile device 150 that initiated the first transaction.

[00164] The payment module 100 obtains (1202) a first notification indicating completion of a first transaction from the machine 120. For example, after the process 1000 in Figure 23, the user of the mobile device 150 selects a product to purchase from the machine 120 by interacting with one or more input mechanisms of the machine 120 (e.g., buttons 126 or a touch screen display 124 shown in Figure 19), and the machine 120 dispenses the selected product. Continuing with this example, after the product is dispensed, the transaction is complete and the payment module 100 obtains a notification from the machine of the completed transaction. In some implementations, the notification includes the amount of the transaction and (optionally) machine status information associated with the machine 120 such as inventory information as to one or more products of the payment accepting unit 120 and/or the like.

[00165] After obtaining the first notification, the payment module 100 generates (1204) first transaction information based on the first notification, and the payment module 100 stores the first transaction information. In some implementations, the transaction information includes a transaction ID for the first transaction, a module ID corresponding to payment module 100, a user ID corresponding to the mobile device 150, transaction status information indicating that the first transaction is complete, and the transaction amount indicated by the first notification. In some implementations, the payment module 100 retains the authorization code included in the original broadcasted packet and/or the authorization grant token and includes the authorization code in the first transaction information. In some implementations, the authorization code is encrypted with a secret key corresponding to the payment module 100, which is shared with the server 130 but not the mobile device 150. In some implementations, the first transaction information further includes other information such as the machine status information included in the first notification or transaction information corresponding to previous interrupted transaction(s). See Figure 24D and the accompanying text for further discussion regarding transaction information 1150.

[00166] The payment module 100 sends (1206), via a short-range communication capability (e.g., BLE), the first transaction information to the mobile device 150.

[00167] The mobile device 150 sends (1208), via a long-range communication capability (e.g., GSM, CDMA, Wi-Fi, or the like), the first transaction information to the server 130.

[00168] The server 130 processes (1210) the first transaction information. For example, the server 130 debits the account of the user associated with the user ID in the first transaction information in the amount indicated by the first transaction information.

[00169] The server 130 sends (1212), via a long-range communication capability (e.g., GSM, CDMA, Wi-Fi, or the like), first acknowledgment information to the mobile device 150. In some implementations, the first acknowledgment information acknowledges that the server 130 received the first transaction information. In some implementations, the first acknowledgment information includes the user ID, the module ID, the transaction ID, and (optionally) the authorization grant included in the transaction information (e.g., auth grant 1158, Figure 24D).

[00170] After receiving the first acknowledgement information, the mobile device 150 sends (1214), via a short-range communication capability (e.g., BLE), the first acknowledgment information to the payment module 100.

[00171] After receiving the first acknowledgment information, the payment module 100 deletes (1216) the stored first transaction information.

PERIPHERAL EXPANSION AND ROUTING

[00172] Figure 26 is a block diagram of an electronic device 1300 for retrofitting a machine 120 (also referred to herein as a payment accepting unit, vending machine, or retail machine) to accommodate a plurality of electronic peripheral devices 1330 (also referred to herein as peripherals) in accordance with some implementations. The device 1300 is similar to and adapted from adapter module 100 (also referred to herein as a payment module) as shown in Figure 20 in that the device 1300 connects to a multi-drop bus (MDB) of a machine 120 and, optionally, provides the payment processing functionalities discussed in Figures 7, 8A-8G, 9A-9E, and 23 (e.g., via the internal peripheral 1340).

[00173] In some implementations, during normal operation, the machine 120 includes a multi-drop bus (MDB) connecting a machine controller 1360 (also referred to herein as a payment accepting unit controller) of the machine 120 with payment peripherals (e.g., other payment peripheral(s) 1350, 1355 including coin acceptors, bill acceptors, cashless payment devices such as a payment card reader, and/or the like). In some implementations, the device 1300 is connected in-line to the MDB as shown in Figures 17 and 18. In some implementations, the MDB protocol or the machine 120 is configured to support a limited number of payment peripherals or does not support particular payment peripherals. For example, in some circumstances, the machine 120 supports a maximum of two cashless payment devices, or the machine 120 only supports a bill acceptor and a coin acceptor but not cashless payment devices or other payment peripherals. The device 1300 expands the number of payment peripherals connected to the machine 120 beyond this limited number and enables support for a plurality of payment peripherals, which may or may not be compliant with the machine 120 and/or the MDB protocol.

[00174] In Figure 26, the device 1300 is configured (i) to perform as a virtual payment peripheral of the machine controller 1360 of the machine 120 and (ii) to perform as a virtual machine controller (also referred to herein as a master, or a virtual master) for the one or more payment peripherals 1330. As such, in some implementations, the machine controller

1360 views the device 1300 as another payment peripheral connected to the MDB, where the device 1300 sends signals to the machine controller 1360 in a manner as if originated by a peripheral 1330. In some implementations, sending a signal to the machine controller 1360 in a manner as if originated by a peripheral 1330 includes labeling the signal, or including a label with the signal, wherein the label includes the peripheral device's registration information and/or identification information (e.g., an address of the peripheral device). Stated another way, the device 1300 identifies itself to the machine controller 1360 as a peripheral 1330 by using the peripheral device's registration or identification information. Moreover, in some implementations, the one or more payment peripherals 1330 view the device 1300 as the machine controller 1360, where signals are sent to the one or more payment peripherals 1330 in a manner as if originated by the machine controller 1360. In some implementations, sending a signal to a peripheral 1330 in a manner as if originated by the machine controller 1360 includes labeling the signal, or including a label with the signal, wherein the label includes the machine controller's identification information (e.g., an address of the machine controller). Stated another way, the device 1300 identifies itself to the peripheral device(s) 1330 as a machine controller 1360 by using the machine controller's identification information. To accomplish this, the device 1300 (in its role as a virtual machine controller) manages and hosts the one or more payment peripherals 1330. Additionally, the device 1300 translates addresses and modifies the communications as necessary to ensure the machine controller 1360 understands the traffic that is coming through to it as a singular virtual payment peripheral.

[00175] In Figure 26, the device 1300 includes a slave interface 1302 (e.g., the male adapter 720, Figure 20) and an additional interface 1304 (e.g., the female adapter 730, Figure 20) for connecting the device 1300 to the MDB. The device 1300 also includes a device controller 1310 with a processing unit 1312 (e.g., including one or more processors, cores, microcontrollers, microprocessors, or the like) and memory 1314 storing one or more programs for execution by the processing unit 1312. In some implementations, the one or more programs cause the device 1300 to perform as a virtual payment peripheral of the machine controller 1360 and to perform as a virtual machine controller for the one or more payment peripherals 1330. In Figure 26, the device 1300 also includes one or more host interfaces 1320 (e.g., MDB ports or non-MDB ports) for connecting the device 1300 with one or more payment peripherals 1330 (e.g., payment peripherals 1330-A to 1330-N).

[00176] In some implementations, the machine 120 further includes one or more other payment peripherals 1350, 1355 coupled with the MDB. Example payment peripherals of the one or more other payment peripherals include a bill acceptor, coin acceptor, or payment card reader. In these implementations, the device 1300 further includes an additional interface 1304 configured to couple the device with the one or more other payment peripherals 1355 of the machine. For example, with reference to Figure 26, the other payment peripheral(s) 1350 (e.g., acceptors, coin acceptors, payment card readers, etc.) are connected to the MDB before the device 1300 (e.g., prior to the slave interface 1302) and the other payment peripheral(s) 1355 (e.g., acceptors, coin acceptors, payment card readers, etc.) are connected to the MDB after the device 1300 (e.g., after the additional interface 1304).

[00177] In some implementations, the device 1300 further includes a pass-through channel configured to pass through signals from the one or more other payment peripherals 1355 to the machine controller 1360. For example, with reference to Figure 26, the device 1300 includes a pass-through channel to enable signals from the machine controller 1360 to reach the other payment peripheral(s) 1355 and to enable signals from the other payment peripheral(s) 1355 to reach the machine controller 1360.

[00178] In some implementations, the device 1300 optionally includes an internal payment peripheral 1340 with hardware, software, firmware, or a combination thereof for providing one or more of the payment processing functionalities described above with reference to Figures 7, 8A-8G, 9A-9E, and 23 (e.g., including the security unit 755 and the communications unit 770 shown in Figure 20).

[00179] Figure 27 illustrates a schematic flow diagram of a payment peripheral registration process 1400 in accordance with some implementations. As a result of process 1400, the device 1300 is registered as a slave (e.g., as a payment peripheral) to the machine controller 1360, and the payment peripheral(s) 1330 are registered as slaves to the device 1300, for example, in accordance with MDB protocol. Stated another way, the device 1300 acts (i) as a slave to the machine controller 1360 (e.g., with respect to operations 1402-1408), and (ii) as a master (machine controller) to the payment peripheral(s) 1330 (e.g., with respect to operations 1412-1428).

[00180] In some implementations, the machine controller 1360 (Figure 26) polls (1402) the device 1300. For example, the machine controller 1360 sends a poll command to the device 1300.

[00181] In some implementations, in response to the poll command, the device 1300 sends (1404) a reset signal to the machine controller 1360. For example, the device 1300 sends the reset signal to the machine controller 1360 if the device 1300 has not yet been registered as a slave (e.g., a payment peripheral). In another example, the device 1300 sends the reset signal to re-register itself as a slave. In some implementations, the device 1300 identifies itself as a coin acceptor, a bill acceptor, or a cashless payment device to the machine controller 1360 via the reset signal.

[00182] In some implementations, in response to the reset signal, the machine controller 1360 sends (1406) a setup signal to the device 1300. In some implementations, the setup signal includes an address assigned to the device 1300.

[00183] In some implementations, after receiving and processing the setup signal, the device 1300 sends (1408) an acknowledgement to the machine controller 1360 confirming registration as a slave.

[00184] Upon sending the acknowledgement, the device 1300 has been registered as a slave (e.g., a payment peripheral) to the machine controller 1360.

[00185] In some implementations, the device 1300 polls (1412) the payment peripheral 1330-A.

[00186] In some implementations, in response to the poll command, the payment peripheral 1330-A sends (1414) a reset signal to the device 1300. For example, the payment peripheral 1330-A sends the reset signal to the device 1300 if it has not yet been registered as a slave (e.g., a payment peripheral) to the device 1300. In another example, the payment peripheral 1330-A sends the reset signal to re-register itself as a slave. In some implementations, the payment peripheral 1330-A identifies itself as a coin acceptor, a bill acceptor, or a cashless payment device to the device 1300 via the reset signal.

[00187] In some implementations, in response to the reset signal, the device 1300 sends (1416) a setup signal to the payment peripheral 1330-A. In some implementations, the setup signal includes an address assigned to the payment peripheral 1330-A.

[00188] In some implementations, after receiving and processing the setup signal, the payment peripheral 1330-A sends (1418) an acknowledgement to device 1300 confirming registration as a slave.

[00189] In some implementations, the device 1300 polls (1422) the payment peripheral 1330-N.

[00190] In some implementations, in response to the poll command, the payment peripheral 1330-N sends (1424) a reset signal to the device 1300. For example, the payment peripheral 1330-N sends the reset signal to the device 1300 if it has not yet been registered as a slave (e.g., a payment peripheral). In another example, the payment peripheral 1330-N sends the reset signal to re-register itself as a slave. In some implementations, the payment peripheral 1330-N identifies itself as a coin acceptor, a bill acceptor, or a cashless payment device to the device 1300 via the reset signal.

[00191] In some implementations, in response to the reset signal, the device 1300 sends (1426) a setup signal to the payment peripheral 1330-N. In some implementations, the setup signal includes an address assigned to the payment peripheral 1330-N.

[00192] In some implementations, after receiving and processing the setup signal, the payment peripheral 1330-N sends (1428) an acknowledgement to the device 1300 confirming registration as a slave.

[00193] Figures 28A-28B illustrate a schematic flow diagram of a payment process 1500 in accordance with some implementations. In some implementations, (i) the device 1300 has already been registered as a slave (e.g., a payment peripheral) to the machine controller 1360, and (ii) the payment peripherals 1330-A, 1330-N have already been registered as slaves (e.g., as payment peripherals) to the device 1300 according to process 1400 (Figure 27). Stated another way, the device 1300 acts (i) as a slave to the machine controller 1360 (e.g., with respect to operations 1502-1504, 1520-1528, 1540-1548, and 1554-1556), and (ii) as a master (machine controller) to the payment peripheral(s) 1330 (e.g., with respect to operations 1506-1518, 1530-1538, 1550-1552, and 1558-1564).

[00194] In some implementations, the machine controller 1360 polls the device 1300, along with other payment peripherals connected to the MDB and registered as slaves (e.g., other payment peripherals 1350, 1355 (Figure 26)), according to a predetermined time period (e.g., 5 ms). For example, the predetermined time period is assigned by the MDB protocol or specification (e.g., versions 1.0 to 3.0 or higher), which is incorporated herein by reference in its entirety. In response to the poll commands, all slave devices (e.g., at least including the device 1300) respond with an acknowledgment (e.g., indicating that it is still present on the MDB) or with another signal (e.g., indicating another state). In some implementations, in

response to a command from the machine controller 1360, the device 1300 immediately responds to the command and asynchronously relays the command to at least one of the payment peripheral(s) 1330.

[00195] In some implementations, in a manner similar to the machine controller 1360, the device 1300 also polls the payment peripheral(s) 1330 according to the predetermined time period (e.g., 5 ms). For example, the device 1300 polls the payment peripheral(s) 1330 whenever the device 1300 is polled by the machine controller 1360.

[00196] In some implementations, the machine controller 1360 polls (1502) the device 1300.

[00197] In response to the polling command in operation 1502, the device 1300 sends (1504) an acknowledgment to the machine controller 1360.

[00198] In response to or independent of the polling command in operation 1502, the device 1300 polls (1506) the payment peripheral 1330-N. In response to the polling command in operation 1506, the payment peripheral 1330-N sends (1508) an acknowledgment to the device 1300.

[00199] In response to or independent of the polling command in operation 1502, the device 1300 polls (1510) the payment peripheral 1330-A. In response to the polling command in operation 1510, the payment peripheral 1330-A sends (1512) a request to begin a payment session. For example, the request to begin the payment session is sent in response to a user inserting payment (e.g., a bill(s) or coin(s)) into the payment peripheral 1330-A prior to the polling command in operation 1510.

[00200] In response to the request to begin the payment session, the device 1300 sends (1514) an acknowledgment to the payment peripheral 1330-A.

[00201] In response to the request to begin the payment session, the device 1300 also sends (1516) a disable command to the payment peripheral 1330-N so as to disable the payment peripheral 1330-N while processing the payment session for the payment peripheral 1330-A. In response to the disable command, the payment peripheral 1330-N sends (1518) an acknowledgment to the device 1300.

[00202] The machine controller 1360 polls (1520) the device 1300.

[00203] In response to the polling command in operation 1520, the device 1300 sends (1522) a request to begin a payment session to the machine controller 1360. For example, the

request to begin the payment session (sent to the machine controller 1360 in operation 1522) mirrors the request to begin the payment session (received from the payment peripheral 1330-A in operation 1512).

[00204] In response to the request to begin the payment session in operation 1522, the machine controller 1360 sends (1524) an acknowledgement to the device 1300 and also sends (1526) a vend request to the device 1300. In process 1500, vending of a service or product is taken as a non-limiting example.

[00205] In response to receiving the vend request, the device 1300 sends (1527) an acknowledgment to the machine controller 1360.

[00206] In some implementations, the machine controller 1360 polls (1528) the device 1300 N times prior to the device 1300 sending a vend approved signal in operation 1540. In some implementations, the device 1300 responds to the N polling commands with acknowledgments indicating that the device 1300 is still present and processing the vend request.

[00207] In response to receiving the vend request in operation 1526, the device 1300 relays (1530) the vend request to the payment peripheral 1330-A.

[00208] In response to the vend request in operation 1530, the payment peripheral 1330-A sends (1532) an acknowledgement to the device 1300.

[00209] Subsequently, the device 1300 polls (1534) the payment peripheral 1330-A. In response to the polling command in operation 1534, the payment peripheral 1330-A sends (1536) a vend approved signal to the device 1300. For example, the vend approved signal indicates that the payment inserted by the user was not refunded and was used to purchase a service or product.

[00210] In response to receiving the vend approved signal in operation 1536, the device 1300 sends (1538) an acknowledgment to the payment peripheral 1330-A and also relays (1540) the vend approved signal to the machine controller 1360.

[00211] In response to receiving the vend approved signal in operation 1540, the machine controller 1360 sends (1542) an acknowledgment to the device 1300 and also sends (1544) a request to the device 1300 to indicate whether the vend was a success or a failure.

[00212] In response to receiving the request in operation 1544, the device 1300 sends (1546) a response to the machine controller 1360 indicating that the vend was a success or a

failure and also relays (1550) the request to the payment peripheral 1330-A to indicate whether the vend was a success or a failure.

[00213] In response to the request in operation 1550, the payment peripheral 1330-A sends (1552) an acknowledgement to the device 1300.

[00214] In response to receiving the response in operation 1546, the machine controller 1360 sends (1548) an acknowledgement to the device 1300 and also sends (1554) a command to end the payment session to the device 1300.

[00215] In response to receiving the command to end the payment session in operation 1554, the device 1300 sends (1556) an acknowledgment to the machine controller 1360 and relays (1558) the command to end the payment session to the payment peripheral 1330-A.

[00216] In response to the command to end the payment session in operation 1558, the payment peripheral 1330-A sends (1560) an acknowledgment to the device 1300.

[00217] After receiving the acknowledgment from the payment peripheral 1330-A in operation 1560, the device 1300 sends (1562) an enable command to the payment peripheral 1330-N so as to enable the payment peripheral 1330-N after completion of the payment session for the payment peripheral 1330-A. In response to the enable command received in operation 1562, the payment peripheral 1330-N sends (1564) an acknowledgment to the device 1300.

[00218] Figure 29 illustrates a flowchart diagram of a method 1600 of retrofitting a machine controller 1360 (also referred to herein as a payment accepting unit; vending machine; retail machine; and/or a processor or controller of a payment accepting unit, vending machine, or retail machine) to accommodate a plurality of payment peripherals 1330 (also referred to herein as electronic peripheral devices, peripheral devices, or peripherals) in accordance with some implementations. In some implementations, the method 1600 is performed at a device controller 1310 of an electronic device 1300 with one or more processing units 1312 (processors), memory 1314, a slave interface 1302 configured to couple the device 1300 with the machine controller 1360 via a multi-drop bus (MDB), and one or more host interfaces 1320 configured to couple the device 1300 with one or more payment peripherals 1330 (e.g., a coin acceptor, a bill acceptor, a cashless payment device such as a payment card reader, and the like), where a respective payment peripheral 1330 is decoupled from an MDB interface of the machine controller 1360 and coupled with a respective host interface 1320, and where the payment peripheral(s) 1330 are configured to

communicate via MDB protocol. For example, in some implementations, the method 1600 is performed by the device 1300 or a component thereof (e.g., device controller 1310). In some implementations, the method 1600 is governed by instructions that are stored in a non-transitory computer readable storage medium (e.g., memory 1314) and the instructions are executed by one or more processors (e.g., processing unit(s) 1312) of the device. Optional operations are indicated by dashed lines (e.g., boxes with dashed-line borders).

[00219] The device 1300 performs (1602) as a virtual payment peripheral (slave) for the machine controller 1360 by registering itself as a slave to the machine controller 1360, and the device 1300 performs as a virtual machine controller (master) for the one or more payment peripherals 1330 by registering the one or more payment peripherals 1330 as slaves to the device 1300 using the MDB protocol. In some implementations, the MDB protocol supports a limited number of payment peripherals 1330. The device 1300 expands the number of payment peripherals 1330 that can be connected to the machine controller 1360 beyond this limited number by (i) emulating the machine controller 1360 to the payment peripheral(s) 1330 coupled with the host interface(s) 1320 and (ii) emulating a payment peripheral 1330 to the machine controller 1360. As such, in some implementations, the machine controller 1360 views the device 1300 as another payment peripheral 1330 connected to the MDB, where the device 1300 sends signals to the machine controller 1360 in a manner as if originated by the device 1300 that is functioning as a singular virtual payment peripheral 1330 (in other words, in a manner as if originated by a payment peripheral 1330). Moreover, in some implementations, the payment peripheral(s) 1330 view the device 1300 as the machine controller 1360, where the device 1300 sends signals to the payment peripheral(s) 1330 in a manner as if originated by the machine controller 1360.

[00220] In some implementations, registering the device 1300 as a slave to the machine controller 1360 further comprises (1602a): identifying the device 1300 to the machine controller 1360 as a cashless payment peripheral; and accepting registration of the device 1300 with the machine controller 1360 as a cashless payment peripheral. For example, the device 1300 identifies itself to the machine controller 1360 as a cashless payment device (e.g., a payment card reader) when sending the reset signal to the machine controller 1360 in operation 1404, and the device 1300 accepts registration as a cashless payment device when receiving the setup signal from the machine controller 1360 in operation 1406 (see Figure 27).

[00221] In some implementations, registering the device 1300 as a slave to the machine controller 1360 further comprises (1602b): identifying the device 1300 to the machine controller 1360 as a coin acceptor peripheral; and accepting registration of the device 1300 with the machine controller 1360 as a coin acceptor peripheral. For example, the device 1300 identifies itself to the machine controller 1360 as a coin acceptor when sending the reset signal to the machine controller 1360 in operation 1404, and the device 1300 accepts registration as a coin acceptor when receiving the setup signal from the machine controller 1360 in operation 1406 (see Figure 27).

[00222] In some implementations, registering the device 1300 as a slave to the machine controller 1360 further comprises (1602c): identifying the device 1300 to the machine controller 1360 as a bill acceptor peripheral; and accepting registration of the device 1300 with the machine controller 1360 as a bill acceptor peripheral. For example, the device 1300 identifies itself to the machine controller 1360 as a bill acceptor/validator when sending the reset signal to the machine controller 1360 in operation 1404, and the device 1300 accepts registration as a bill acceptor/validator when receiving the setup signal from the machine controller 1360 in operation 1406 (see Figure 27).

[00223] The device 1300 receives (1604) a command (in the form of a signal) from the machine controller 1360 via the slave interface 1302, where signals from the machine controller 1360 are sent in a manner as if sent to a singular payment peripheral 1330. For example, with reference to process 1500, the machine controller 1360 sends a command to the device 1300 to end the payment session in operation 1554 (see Figure 28B).

[00224] In response to receiving the command from the machine controller 1360, the device 1300 sends (1604) an acknowledgement to the command to the machine controller 1360 via the slave interface 1302, where signals are sent to the machine controller 1360 in a manner as if originated by the device 1300 that is functioning as a singular virtual payment peripheral 1330 (in other words, as if originated by a payment peripheral 1330); and relays the command to the respective payment peripheral 1330 via the respective host interface 1320 corresponding to the respective payment peripheral 1330, where the device 1300 sends signals to and receives signals from the machine controller 1360 asynchronous of the device 1300 sending signals to and receiving signals from the one or more payment peripherals 1330 (in other words, communications between the device 1300 and the machine controller 1360 are not necessarily synchronized to communications between the device 1300 and the payment peripheral(s) 1330). Continuing with the example above, with reference to process

1500, in response to receiving the command to end the payment session in operation 1554, the device 1300 sends an acknowledgment to the machine controller 1360 in operation 1556 in a manner as if originated by the device that is functioning as a singular virtual payment peripheral 1330 (in other words, in a manner as if originated by the payment peripheral 1330). Continuing with this example, in response to receiving the command to end the payment session in operation 1554, the device 1300 also asynchronously relays the command to end the payment session to the payment peripheral 1330-A in operation 1558. As such, the command is relayed to the payment peripheral 1330-A asynchronous of sending the acknowledgment to the machine controller 1360 (in other words, the signals 1556 and 1558 are not necessarily synchronized).

[00225] In some implementations, in response to relaying the command, the device 1300 receives (1608) via the respective host interface 1320 corresponding to the respective payment peripheral 1330 a response from the respective payment peripheral 1330. Continuing with the example above, with reference to process 1500, in response to the relayed complete session command in operation 1558, the payment peripheral 1330-A sends an acknowledgment to the device 1300 in operation 1560.

[00226] In some implementations, in response to receiving the response from the respective payment peripheral 1330, the device 1300: sends an acknowledgement to the respective payment peripheral 1330, where signals are sent to the one or more payment peripherals 1330 in a manner as if originated by the machine controller 1360; and relays the response to the machine controller 1360 via the slave interface 1302, where the device 1300 sends signals to and receives signals from the machine controller 1360 asynchronous of the device sending signals to and receiving signals from the one or more payment peripherals 1330 (in other words, communications between the device 1300 and the machine controller 1360 are not necessarily synchronized to communications between the device 1300 and the payment peripheral(s) 1330). In some implementations, in response to receiving the response from the respective payment peripheral 1330, the device forgoes the above steps (e.g., the device 1300 does not relay the acknowledgement 1560 to the machine controller 1360 because the device 1300 had already acknowledged the machine controller 1360's session complete command in operation 1556).

[00227] In some implementations, the device 1300 receives (1610) a command from a respective payment peripheral 1330 via the respective host interface 1320 corresponding to the respective payment peripheral 1330, where signals from the payment peripheral(s) 1330

are sent to the device 1300 in a manner as if sent to the machine controller 1360, and, in response to receiving the command from the respective payment peripheral 1330, the device 1300 sends (1612) an acknowledgement to the command to the respective payment peripheral 1330, where signals are sent from the device 1300 to the payment peripheral(s) 1330 in a manner as if originated by the machine controller 1360; and relays the command to the machine controller 1360 via the slave interface 1302, where the device 1300 sends signals to and receives signals from the machine controller 1360 asynchronous of the device 1300 sending signals to and receiving signals from the payment peripheral(s) 1330 (in other words, communications between the device 1300 and the machine controller 1360 are not necessarily synchronized to communications between the device 1300 and the payment peripheral(s) 1330). For example, with reference to process 1500, when polled in operation 1534, the payment peripheral 1330-A sends a vend approved signal to the device 1300 in a manner as if sent to the machine controller 1360 in operation 1536. Continuing with this example, in response to receiving the vend approved signal in operation 1536, the device 1300 sends an acknowledgement to the payment peripheral 1330-A in a manner as if originated by the machine controller 1360 in operation 1538. Continuing with this example, in response to receiving the vend approved signal in operation 1536, the device 1300 also asynchronously relays the vend approved signal to the machine controller 1360 in operation 1540. As such, the command is relayed to the machine controller 1360 asynchronous of sending the acknowledgment to the payment peripheral 1330-A (in other words, the signals 1538 and 1540 are not necessarily synchronized).

[00228] In some implementations, in response to relaying the command, the device 1300 receives (1614) via the slave interface 1302 a response from the machine controller 1360. Continuing with the example above, with reference to process 1500, in response to the relayed vend approved signal in operation 1540, the machine controller 1360 sends an acknowledgment to the device 1300 in operation 1542.

[00229] In some implementations, the device 1300 further includes an internal payment peripheral 1340 including a short-range communication capability corresponding to a short-range communication protocol, where the short-range communication capability is configured to communicate with one or more mobile devices, and where each of the one or more mobile devices is configured with (i) a complimentary short-range communication capability and (ii) a long-range communication capability corresponding to a long-range communication protocol. For example, with reference to Figure 26, the device 1300 includes

the internal payment peripheral 1340 which includes hardware, software, firmware, or a combination thereof for providing the payment processing functionalities discussed in Figures 7, 8A-8G, 9A-9E, and 23 (e.g., the security unit 755 and the communications unit 770 as shown in Figure 20). For example, the respective mobile device corresponds to mobile device 150 (Figure 21) with long-range communication capability 872 and short-range communication capability 876.

[00230] In some implementations, the device 1300 receives (1616) a transaction request via the short-range communication capability from a respective mobile device to perform a transaction with the machine controller 1360, the device 1300 validates the transaction request, where validation of the transaction request indicates that the respective mobile device is authorized to initiate payment for the transaction by a remote server via the respective mobile device's long-range communication capability, and, in accordance with a determination that the transaction request is valid, the device 1300 causes the machine controller 1360 to perform the requested transaction by, for example, issuing a signal to perform the transaction to the machine controller 1360 via the slave interface 1302. In some implementations, the device 1300 or a component thereof (e.g., internal payment peripheral 1340, Figure 26) receives a transaction request via the short-range communication capability (e.g., BLE, NFC, or the like) from the respective mobile device 150 (Figures 7, 8A-8G, 9A-9E, and 21), and the device 1300 or a component thereof (e.g., internal payment peripheral 1340, Figure 26; or the device controller 1310, Figure 26) validates the transaction request from the respective mobile device 150 by determining whether an AuthGrant or authorization grant token associated with the transaction request includes a valid authorization code. In some implementations, in accordance with a determination that the transaction request is associated with a valid authorization code, the device 1300 or a component thereof (e.g., internal payment peripheral 1340, Figure 26; or the device controller 1310, Figure 26) issues a command to the machine controller 1360 to perform the requested transaction via the slave interface 1302 in a manner as if originated by the device 1300 that is functioning as a singular virtual payment peripheral 1330 or 1340 (in other words, in a manner as if originated by a payment peripheral 1330 or 1340).

[00231] In some implementations, in accordance with a determination that a command received from the respective payment peripheral 1330 corresponds to a transaction, the device 1300 stores (1618) transaction information at least including an amount of the transaction associated with an identifier for the respective payment peripheral 1330; after

storing the transaction information, the device 1300 sends the transaction information to the respective mobile device via the short-range communication capability; and issues a command to the respective mobile device to send the transaction information to the remote server via the respective mobile device's long-range communication capability.

[00232] In some implementations, the device 1300 or a component thereof (e.g., the internal payment peripheral 1340, Figure 26; or the device controller 1310, Figure 26) monitors commands and signals from the one or more payment peripherals 1330 that are relayed to the machine controller 1360 and, in accordance with a determination that a command or signal is associated with a transaction, stores transaction information such as the transaction amount and the respective payment peripheral 1330 associated with the transaction. For example, the device 1300 stores transaction information for each of the one or more payment peripherals 1330 in a table that associates the transaction information with a payment peripheral type (e.g., bill acceptor, coin acceptor, payment card reader, etc.). In some implementations, the device 1300 or a component thereof (e.g., the internal payment peripheral 1340, Figure 26; or the device controller 1310, Figure 26) sends the table of transaction information or a portion thereof to the respective mobile device 150 that sent the transaction request (or another mobile device 150 that performs a transaction with the device 1300) via the short-range communication capability. In some implementations, the device 1300 or a component thereof (e.g., the internal payment peripheral 1340, Figure 26; or the device controller 1310, Figure 26) commands the respective mobile device 150 to send the table of transaction information or the portion thereof to the server 130 via the mobile device's long-range communication capability. As such, the device 1300 uses the respective mobile device 150 as a communication bridge to the server 130.

[00233] In some implementations, the device 1300 or a component thereof (e.g., the internal payment peripheral 1340, Figure 26; or the device controller 1310, Figure 26) also monitors the commands and signals from the one or more payment peripherals 1330 that are relayed to the machine controller 1360 and, in accordance with a determination that a command or signal is associated with an error code (e.g., a coin jam, low coin or bill count, etc.) or other information associated with the operation of the one or more payment peripherals 1330, stores corresponding operation information. In some implementations, the device 1300 also sends the operation information along with the table of transaction information or the portion thereof to the server 130 using the respective mobile device 150 as a communication bridge to the server 130.

[00234] The particular order in which the operations in Figure 29 have been described is merely exemplary and is not intended to indicate the only order in which the operations could be performed. One of ordinary skill in the art would recognize various ways to reorder the operations described herein. Additionally, details of other processes described herein with respect to other methods described herein are also applicable in an analogous manner to the method 1600 described above with respect to Figure 29.

PROVIDING EXTERNAL ACCESS TO PERIPHERALS

[00235] In some implementations, the electronic device 1300 receives, from a mobile device 150 via the short-range communication capability of the internal peripheral 1340, a request to access one or more of the peripherals 1330. In response to this request, the device 1300 intercepts signals received from peripheral(s) 1330 via respective host interface(s) 1320 (e.g., a payment signal reporting an amount of money received at a bill acceptor peripheral or a coin acceptor peripheral). Instead of relaying the signals to the machine controller 1360, the device 1300 relays the signals (or data based on the signals) to the mobile device 150 through the internal peripheral 1340. While the device 1300 is intercepting signals received from the peripheral(s) 1330 (i.e., relaying the signals to the internal peripheral 1340 instead of the machine controller 1360), the device 1300 responds to commands that are addressed to the peripheral(s) 1330 (e.g., poll commands sent from the machine controller 1360) with acknowledgements (e.g., merely reporting presence), rather than relaying the commands to the peripheral(s) 1330.

[00236] By intercepting signals as described herein, the device 1300 can provide external access to the peripheral(s) 1330 (also referred to as providing peripheral access to an external device). More specifically, the device 1300 may be configured to enable an external device (e.g., a mobile device 150, or any device that is physically external to the machine 120 and in communication with the device 1300) to access functionality provided by the peripheral(s) 1330 of the machine 120. As used herein, the term "access" may refer to provision of data based on functionality of a peripheral 1330, but does not require direct communication between the external device and the peripheral 1330 being accessed. By providing an external device with access to a peripheral 1330, the external device is provided with the benefit of functionality of the peripheral 1330. For example, if the peripheral 1330 is a bill collector, an external device with access to functionality of the bill collector may be provided with data indicating a state of the bill collector or any other data associated with

functionality of the bill collector (e.g., an indication that the bill collector has just received a $1 bill).

[00237] In one example scenario, an application executing on a mobile device 150 in communication with the device 1300 may be provided access to a bill accepter peripheral 1330 of a machine 120, thereby providing a way for the application to accept cash payments. As such, capabilities of the mobile device 150 (and, therefore, applications executing on the mobile device 150) are augmented when given access to functionality provided by the peripheral(s) 1330 of a machine 120 as described herein. Such an application executing on a mobile device 150 (referred to herein as a mobile application) may be configured to sell products and/or services that are not necessarily stocked by the machine 120 of the peripheral 1330 being accessed, but benefit from the availability of the option to pay for the product and/or service with cash. For example, an application executing on a mobile device 150 may sell lottery tickets, which, according to the laws of some jurisdictions, can only be purchased using cash. Example products may include physical products that are available at a location associated with the machine 120 (e.g., provided by a store attendant or bank teller), or may include virtual products that are not required to be picked up or otherwise physically delivered (e.g., lottery tickets associated with virtual lottery applications that do not require delivery or use of a physical scratch card). Example services include banking (e.g., using a bill acceptor peripheral 1330 of a machine 120 to deposit cash to an account of a bank or credit union, regardless of whether the bank or credit union has a physical location), or any other service requiring or otherwise providing the option to deposit cash to an account (e.g., a gaming service with add-on functionality purchasable with cash, a peer-to-peer money transfer service enabling a sender to deposit cash into the bill acceptor of a machine 120 and a receiver to withdraw cash by accessing the cash return module of another machine 120, or any other service accepting cash payments). Such products and/or services may be related to products and/or services vended or advertised by the machine 120, or they may be independent of products and/or services vended or advertised by the machine 120 (e.g., functionality of the bill acceptor of a soda machine may be accessed by a mobile application selling lottery tickets, or functionality of the coin acceptor of a laundry machine may be accessed by a mobile gaming application configured to accept payments in return for in-game add-on features).

[00238] Figure 30A-30B illustrate block diagrams of normal operations 3002 and intercept operations 3004 of a device 1300 for retrofitting a machine 120 to provide external

access to an electronic peripheral 1330 in accordance with some implementations. The device 1300 and related components (1302-1360) correspond to similarly numbered features as described above with reference to Figure 26, and some are not further discussed for purposes of brevity. Further, while some features depicted in Figure 26 are not depicted in Figures 30A-30B (for purposes of clarity), each of the concepts described above with regard to Figures 26-29 equally apply to the implementations recited herein with regard to Figures 30A-30B, 31-34, and 35A-35B.

[00239] In Figure 30A, the device 1300 is configured to relay signals between the machine controller 1360 and the peripheral 1330. For example, the device 1300 receives a payment received signal (3118) from the peripheral 1330 (e.g., upon receiving a $1 bill) and relays the signal (3124) to the machine controller 1360. Regarding polling in normal operations, the device 1300 is configured to respond to polls received from the machine controller 1360 and asynchronously send polls to the peripheral 1330. As described above with reference to Figures 28A-28B, the device 1300 responds to polls received from the machine controller 1360 based on poll responses received from the peripheral 1330. As such, while performing normal operations, the device 1300 acts as a signal router bridging the peripheral 1330 and the machine controller 1360 as described above with reference to Figures 28A-28B and as described in more detail below with reference to Figures 31-32.

[00240] In Figure 30B, the device 1300 is configured to acknowledge signals received from the machine controller 1360 (e.g., acknowledge polls), but not relay those signals (or otherwise send any signals based on those received signals) to the peripheral 1330. Further, instead of relaying signals received from the peripheral 1330 (e.g., a payment received signal 3306) to the machine controller 1360, the device 1300 instead relays signals received from the peripheral 1330 (or sends signals based on the received signals, such as a transmit transaction signal 3312) to an external device (e.g., a mobile device 150) via the internal peripheral 1340. For example, the device 1300 receives a payment received signal 3306 from the peripheral 1330 (e.g., upon receiving a $1 bill), and relays the payment received signal 3306, or a signal based on the payment received signal (e.g., a transmit transaction signal 3312), to a mobile device 150 via the internal peripheral 1340. This disclosure refers to the operation of relaying a signal received from the peripheral 1330 to an external device, instead of to the machine controller 1360, as intercepting the signal, or as an intercept operation. While performing intercept operations, the device 1300 acts as a signal router bridging the

peripheral 1330 and an external device (e.g., a mobile device 150) as described in more detail below with reference to Figure 33-34.

[00241] In some implementations, signals received at the device controller 1310 include at least (i) a destination address, and (ii) message data. More specifically, signals received at the device 1300 from a peripheral 1330 include the address of a specified master (referred to herein as a master address), and signals received at the device 1300 from the machine controller 1360 include the address of a specified peripheral 1330 (referred to herein as a peripheral address). The master and peripheral addresses may be identified or otherwise assigned during a registration process (e.g., during setup operations 1406, 1416, and 1426 in Figure 27, setup operations 3102 and 3106 in Figure 31, setup operation 3208 in Figure 32, and setup operation 3416 in Figure 34). The message data may include a representation of the state of the originating module (e.g., a signal received from a particular peripheral 1330 may include a representation of a state of the particular peripheral 1330), or any other data related to a function of the originating module. As used herein, the term "originating module" refers to the module (e.g., peripheral 1330 or machine controller 1360) that sent the signal including the destination address or message data being described.

[00242] For example, when a signal sent by the peripheral 1330 to the device 1300 specifies the address of the machine controller 1360 as the master address, the device controller 1310 relays the signal, including the signal's message (e.g., indicating receipt of a $1 bill) to the machine controller 1360 as depicted in Figure 30A. On the other hand, when a signal sent by the peripheral 1330 to the device 1300 specifies the address of the device 1300 as the master address, the device controller 1310 relays the signal, including the signal's message (e.g., indicating receipt of a $1 bill), or processes the signal and sends a signal with a message based at least in part on the originally received message (e.g., indicating a $1 bill was received and not refunded within a threshold amount of time) to an external device (e.g., a mobile device 150) as depicted in Figure 30B.

[00243] Figures 31-34 illustrate schematic flow diagrams of a process for providing external access to an electronic peripheral 1330 of a machine 120 in accordance with some implementations. Figure 31 depicts a method 3100 of normal operations (e.g., 3002 in Figure 30A), Figure 32 depicts a method 3200 of a transition from normal operations to intercept operations (e.g., 3004 in Figure 30B), Figure 33 depicts a method 3300 of intercept operations, and Figure 34 depicts a method 3400 of a transition from intercept operations to normal operations.

[00244] The operations in Figures 31-34 are governed by instructions that are stored in a computer memory or non-transitory computer readable storage medium of any combination of a machine controller 1360, an electronic device 1300 (e.g., memory 1314 in Figure 26), an electronic peripheral 1330, a mobile device 150, and a server 130. The instructions are executed by one or more processors of any combination of the machine controller 1360, the electronic device 1300 (e.g., processing unit 1312 in Figure 26), the electronic peripheral 1330, the mobile device 150, and the server 130. Each computer readable storage medium may include a magnetic or optical disk storage device, solid state storage devices such as Flash memory, or other non-volatile memory device or devices. The instructions stored on each computer readable storage medium may include one or more of: source code, assembly language code, object code, or other instruction format that is interpreted by one or more processors. Some operations in Figures 31-34 may be combined and/or the order of some operations in Figures 31-34 may be changed.

[00245] While the methods 3100-3400 depict an implementation including one peripheral 1330 (for purposes of brevity and clarity of the concepts described herein), the concepts described herein also apply to implementations including a plurality of peripherals 1330 (for example, peripherals 1330-A through 1330-N as described above with reference to Figures 26-29). Specifically, for implementations in which a machine 120 includes a plurality of peripherals 1330, the device 1300 (i) polls each of the plurality of peripherals 1330, (ii) processes a signal received from a particular peripheral 1330 of the plurality of peripherals 1330 as described in methods 3100-3400, and (iii) responds to the particular peripheral 1330 from which the signal was received as described in methods 3100-3400. For example, a machine 120 may include a bill acceptor as a first peripheral 1330 and a coin acceptor as a second peripheral 1330. In such a scenario, a mobile device 150 would be provided with data related to signals received from the bill acceptor according to the concepts described in methods 3100-3400, and signals received from the coin acceptor according to the concepts described in methods 3100-3400.

[00246] Further, while the methods 3100-3400 refer to the peripheral 1330 as a bill acceptor, the concepts described herein also apply to other types of peripherals 1330. As described above, example peripherals 1330 include bill acceptors, coin acceptors, and cashless payment devices such as payment card readers. Example peripherals 1330 may also include any other type of electronic peripheral device related to or unrelated to accepting payments.

[00247] Lastly, the operations of methods 3100-3400 are depicted in a particular order, and at particular vertical offsets (spacing) with respect to each other. Regarding the particular order, unless the description for a particular operation states otherwise, the operations may be implemented out of the order depicted in the figures, especially with respect to operations in different columns, and especially with respect to operations described as being asynchronous. For example, the acknowledgement in operation 3104 is described (in more detail below) as being sent in response to the poll signal sent in operation 3102; as such, this pair of operations and those similarly described must be implemented in the order depicted in the figures. However, the poll signal in operation 3106 may be sent before, at the same time as, or after the poll signal sent in operation 3102, since the description of these operations does not state a particular order or include any temporal limitations. Regarding the particular vertical offsets with respect to the operations, these offsets are provided for purposes of clarity and are not to temporal scale. As such, relative spacing sizes between operations have no effect on relative amounts of time that must pass between execution of such operations.

[00248] As described above with reference to Figure 30A, normal operations may be characterized by the device 1300 relaying signals between the peripheral 1330 and the machine controller 1360. Figure 31 depicts example normal operations in accordance with some implementations. Referring to Figure 31, the machine controller 1360 polls (3102) the device 1300, which responds (3104) with an acknowledgement. Asynchronously (compared to operations 3102 and 3104), the device 1300 polls (1306) the peripheral 1330, which responds (3108) with an acknowledgement. If the device 1300 is not registered as a slave to the machine controller 1360 when being polled in operation 3102, the machine controller 1360 registers the device 1300 with a setup signal as described above with reference to Figure 27 (operations 1404-1408). Similarly, if the peripheral 1330 is not registered as a slave to the device 1300 when being polled in operation 3106, the device 1300 registers the peripheral 1330 with a setup signal as described above with reference to Figure 27 (operations 1414-1418).

[00249] The machine controller 1360 continues to poll the device 1300 at a frequency determined by the particular implementation of the MDB protocol, and the device 1300 proceeds to poll the peripheral 1330 at a frequency determined either by the particular implementation of the MDB protocol, or at any other predetermined frequency. Eventually, a payment event (3114) occurs at the peripheral 1330 (e.g., a $1 bill is received). Until the device 1300 receives a signal indicating the payment event from the peripheral 1330, the

device 1300 responds to polls from the machine controller 1360 with acknowledgements. As such, when the machine controller 1360 polls (3110) the device 1300 again, the device 1300 responds (3112) with an acknowledgement. Subsequent to the payment event, the device 1300 polls (3116) the peripheral 1330, and the peripheral 1330 responds (3118) with a payment received signal, indicating the payment event 3114. For example, the payment received signal is addressed to the machine controller 1360 and includes a message indicating a $1 bill was received at the peripheral 1330 (as depicted in Figure 30A).

[00250] In response to receiving the payment received signal from the peripheral 1330, the device 1300 (i) responds (3120) to the peripheral 1330 with an acknowledgement, and after receiving (3122) the next poll from the machine controller 1360, (ii) sends (3124) a payment received signal to the machine controller 1360 (e.g., including the $1 received message). As described above with reference to Figures 28A-28B, the device 1300 may respond to the peripheral 1330 with the acknowledgement in operation 3120 without waiting for any other operations or events to take place, but the device 1300 must wait for the next poll to be received (depicted in operation 3122) before having an opportunity to send the payment received signal to the machine controller 1360 in operation 3124.

[00251] As described above with reference to Figure 30B, intercept operations may be characterized by the device 1300 relaying signals between the peripheral 1330 and an external device (e.g., a mobile device 150) via the internal peripheral 1340 (rather than between the device 1300 and the machine controller 1360). Figure 32 depicts a transition from normal operations to intercept operations in accordance with some implementations. Referring to Figure 32, an application executing on the mobile device 150 may require access to an electronic peripheral device (e.g., peripheral 1330) in order to perform a function requested by a user. For example, the application receives (3202) a user request to process a cash transaction (e.g., in order to pay for a product or service, in order to deposit money into an account, or for any of the other reasons described above). In response to the user request, the mobile device 150 establishes (3204) a connection with the device 1300 (e.g., via the internal peripheral 1340 as described above). In some implementations, as part of the connection process, the mobile device 150 sends to the device 1300 a request to access functionality associated with the peripheral 1330. In some implementations, as part of the connection process, the device 1300 validates the request, wherein validation of the request indicates that the mobile device 150 is authorized, by a remote server (e.g., server 130) via a communication capability of the mobile device (e.g., a long-range communication

capability), to access the signals generated by the peripheral 1330. Features of the implementations of the device validation process and the connection process (between a mobile device 150 and the device 1300) are described in more detail above with reference to Figures 7, 8A-8G, 9A-9E, and 23 (e.g., including the security unit 755 and the communications unit 770 shown in Figure 20).

[00252] In response to connecting to the mobile device 150 and/or to the request to access functionality associated with the peripheral 1330, the device 1300 sends a reset signal (3206) and/or a setup signal (3208) to the peripheral 1330 in order to reconfigure the peripheral 1330 to communicate with the device 1300 (rather than with the machine controller 1360). As described above, the device 1300 reconfigures the peripheral 1330 to communicate with the device 1300 by resetting the master address (the signal destination address) of the peripheral 1330 to be the address of the device 1300. Upon resetting the master address of the peripheral 1330 to the address of the device 1300, the device 1300 effectively becomes the master to the peripheral 1330. As a result, the machine controller 1360 is no longer the master to the peripheral 1330 (see Figure 30B). By becoming the master to the peripheral 1330, the device 1300 appears to be the machine 120. In other words, the peripheral 1330 communicates with the device 1300 as if the device 1300 were the machine 120 or the machine controller 1360 (e.g., the peripheral 1330 addresses signals to the device 1300 instead of to the machine controller 1360). For example, upon receiving $1 bill, a bill collector peripheral 1330 reports the receipt of the $1 bill to the device 1300 rather than to the machine controller 1360. As a result, the machine controller 1360 never receives any indications that a $1 bill was inserted into the bill collector of the machine 120, and therefore does not proceed with internal vending operations (does not allow a person to purchase any products stocked in the machine or otherwise apply a credit for purchasing any products, even though the person inserted money into the machine). Stated another way, any signals reporting the receipt of the $1 bill at the bill collector are intercepted by the device 1300 and are not relayed to the machine controller 1360. Following the reset and/or setup signals, the device 1300 receives (3210) an acknowledgement from the peripheral 1330.

[00253] Once the signal destination address of the peripheral 1330 is updated to be that of the device 1300, the device 1300 continues to poll the peripheral 1330 (3212, 3216) and receive acknowledgements from the peripheral 1330 (3214, 3218). Polls received at the device 1300 from the machine controller 1360 (3222, 3226) during this time are not relayed to the peripheral 1330. Instead, the device 1300 merely acknowledges (3224, 3228) the polls

so that the machine controller 1360 does not remove the device 1300 from its list of registered devices. Stated another way, the device 1300 normally passes signals received from the machine controller 1360 to the peripheral 1330, but while performing intercept operations (as a result of the mobile device 150 connecting to the device 1300 and the device 1300 resetting the peripheral 1330), the device 1300 still responds to polls received from the machine controller 1360, but does not pass any messages through to the peripheral 1330. Instead, the device 1300 just acknowledges messages received from the machine controller 1360. Accordingly, the device 1300 remains registered with the machine controller 1360 and appears to be in an idle state (from the point of view of the machine controller 1360). While performing intercept operations, communications between (i) the device 1300 and the machine controller 1360 and (ii) the device 1300 and the peripheral 1330 continue to be asynchronous. The device 1300 continues to perform intercept operations until transitioning back to normal operations (described in more detail below with reference to Figure 34).

[00254] Figure 33 depicts intercept operations in accordance with some implementations. Referring to Figure 33, a payment event (3302) occurs at the peripheral 1330 (e.g., a $1 bill is inserted into a bill acceptor peripheral 1330). In response to the next poll (3304) received from the device 1300, the peripheral 1330 sends a payment received signal (3306) to the device 1300 with a message indicating or otherwise associated with the payment event (e.g., $1 received). The device 1300 acknowledges (3308) the payment received signal and creates (3310) a transaction based on the payment received signal. The transaction may include the same message as that included in the payment received signal (e.g., $1 received) and/or any related message optionally including additional information (e.g., $1 received and not refunded).

[00255] The device 1300 transmits (3312) the transaction (more specifically, a signal including a message describing or otherwise associated with the transaction) to the mobile device 150. The mobile device 150 forwards (3314) the transaction to the server 130 for further processing. The server 130 processes (3316) the transaction. For example, the server 130 adds an amount of funds to the user's account in accordance with the amount of cash that was deposited as part of the payment event 3302 (e.g., adds $1 to the user's account). As another example, the server 130 sends an amount of funds to a recipient in accordance with the amount of cash that was deposited as part of the payment event 3302 (e.g., sends $1 to the recipient). As another example, the server 130 associates a specified product or service with the user's account in accordance with a requested purchase (e.g., associates a virtual lottery

ticket with the user's account in return for an amount of funds associated with the amount of cash that was deposited as part of the payment event 3302).

[00256] As a result of the processing of the transaction, the server 130 sends (3318) a notification to the mobile device 150 indicating the payment was processed and/or a result of the payment being processed (e.g., a purchase confirmation or a deposit confirmation). In some implementations, the mobile device 150 (more specifically, an application executing on the mobile device) displays information related to the received notification (e.g., an alert indicating a successful purchase or deposit, or an updated user interface indicating a new account balance).

[00257] Returning to the bill collector example, in some implementations, operations 3302 through 3312 are repeated each time a person inserts a bill into the peripheral 1330. Optionally, the mobile device 150 groups successive transactions (e.g., successive $1 insertions) into a single transaction message and sends the transaction message in operation 3314 for processing at the server 130. Alternatively, the mobile device 150 sends transaction messages in operation 3314 for processing at the server 130 for each successive transaction (e.g., successive $1 insertions). In such implementations, operations 3302 through 3316 (or operations 3302 through 3318, or operations 3302 through 3320) are repeated each time a person inserts a bill into the peripheral 1330.

[00258] As the device 1300 performs the intercept operations described above with reference to Figure 33, the device 1300 responds to polls (3322, 3326) received from the machine controller 1360 with acknowledgements (3324, 3328) in order to remain registered with the machine controller 1360 as described above with reference to Figure 32.

[00259] Figure 34 depicts a transition from intercept operations back to normal operations in accordance with some implementations. Referring to Figure 34, the mobile device 150 receives or otherwise obtains (3402) an indication (e.g., via user input on the application executing on the mobile device 150) that the mobile device 150 no longer requires access to the peripheral 1330 (or functionality provided by the peripheral 1330). For example, the user selects an affordance on a user interface of the application indicating that the transaction or deposit is complete (e.g., the user selects a "no" option when asked if the user would like to purchase any more lottery tickets, or when asked if the user would like to make any more deposits). In response to the access complete notification 3402, the mobile device sends (3404) an access complete notification to the device 1300 indicating that the

mobile device 150 no longer requires access to the peripheral 1330 (or functionality provided by the peripheral 1330).

[00260] In response to receiving the access complete notification, the device 1300 sends (3406) a reset signal to the peripheral 1330, thereby causing the peripheral to no longer address signals to the device 1300. The device 1300 proceeds to reset the signal destination address of the peripheral 1330 to be that of the machine controller 1360, for example, by sending (3416) a setup signal. As a result, subsequent messages sent by the peripheral 1330 to the device 1300 are addressed to the machine controller 1360. Stated another way, the machine controller 1360 once again functions as the master and the device 1300 once again functions as a router of messages between the machine controller 1360 (master) and the peripheral 1330 (slave).

[00261] As a result of the signal destination address of the peripheral 1330 being reset to that of the machine controller 1360, the device 1300 proceeds with normal operations as described above with reference to Figures 30A, 31, and 32. For example, the device 1300 acknowledges (3414) polls (3412) received from the machine controller 1360, and asynchronously polls (3416) the peripheral 1330. The device 1300 receives acknowledgements (3418) from the peripheral 1330 and relays messages received from the peripheral 1330 to the machine controller 1360.

[00262] Figures 35A-35B show a mobile device 150 with a graphical representation of a mobile application shown thereon, the mobile application being used as part of a peripheral access system in accordance with some implementations.

[00263] Figure 35A depicts an example scenario in which the mobile device 150 accesses a peripheral 1330 of a machine 120 in order to accept a cash payment for the purchase of a virtual product (e.g., a lottery ticket) unrelated to any products stocked in the machine 120. In this example, the user's account has a balance of $3, and a user interface 3502 of the mobile application prompts the user to insert $2 into the machine 120 (e.g., after having connected to the machine 120 as a result of operation 3204, Figure 32) in order to make a $5 purchase. When the user inserts $2 into the machine 120 and the transaction is processed as described above with reference to operations 3302-3320 (Figure 33), a user interface 3504 of the mobile application notifies the user that the $5 purchase was successful, and the new balance is $0. The notification corresponds with the acknowledgement in operation 3320 (Figure 33).

[00264] Figure 35B depicts an example scenario in which the mobile device 150 accesses a peripheral 1330 of a machine 120 in order to accept a cash payment for a deposit into the user's account. In this example, the user's account has a balance of $3, and a user interface 3512 of the mobile application prompts the user to insert $2 into the machine 120 (e.g., after having connected to the machine 120 as a result of operation 3204, Figure 32) as a result of the user selecting an option to deposit $2. When the user inserts $2 into the machine 120 and the transaction is processed as described above with reference to operations 3302-3320 (Figure 33), a user interface 3514 of the mobile application notifies the user that the $2 was successfully deposited, and the new balance is $5. The notification corresponds with the acknowledgement in operation 3320 (Figure 33).

[00265] The implementations described with reference to Figures 30A-35B use specific examples for illustration (e.g., the peripheral 1330 being a bill acceptor, and the peripheral 1330 being accessed in order to support cash purchases or deposits). Other scenarios may be implemented by providing a mobile application access to an electronic peripheral device of a machine, the machine being otherwise unrelated to a device executing the mobile application. For example, a mobile application may access a cash return peripheral of a machine 120 (e.g., a module for processing refunds at a vending machine 120 using, for example, a quarter return slot to provide quarter(s) or the bill acceptor to output $1 bill(s)) in order to support a function of the mobile application that makes cash available to a user (e.g., receiving a peer-to-peer cash payment, withdrawing cash from an account, receiving a cash refund for a product or service provided by the mobile application, receiving a cash reward as a result of an accomplishment in a gaming application, receiving a cash payment as a result of a winning virtual lottery ticket, and so forth).

[00266] Further, implementations need not be limited to scenarios involving cash transactions. Other types of electronic peripheral devices may be accessed from a machine 120 in order to extend functionality of a mobile application that would not otherwise have direct access to the hardware necessary to support such functionality. Stated another way, the device 1300 enables a mobile device 150 to access functionality provided by an electronic peripheral device 1300 of a machine 120 by providing wireless communications between an application executing on the mobile device 150 and the electronic peripheral device 1330, by (i) communicatively decoupling the electronic peripheral device 1300 from the machine controller 1360 which normally would function as the master of the electronic peripheral device 1330, and (ii) communicatively coupling the electronic peripheral device 1300 with

the mobile application which functions as the master of the electronic peripheral device until the mobile application no longer requires access to the functionality provided by the electronic peripheral device 1330.

MISCELLANEOUS

[00267] The foregoing description has been described with reference to specific implementations. However, the illustrative discussions above are not intended to be exhaustive or to limit the claims to the precise forms disclosed. Many variations are possible in view of the above teachings. The implementations were chosen and described in order to best explain principles of operation and practical applications, to thereby enable others skilled in the art.

[00268] The various drawings illustrate a number of elements in a particular order. However, elements that are not order dependent may be reordered and other elements may be combined or separated. While some reordering or other groupings are specifically mentioned, others will be obvious to those of ordinary skill in the art, so the ordering and groupings presented herein are not an exhaustive list of alternatives.

[00269] As used herein: the singular forms "a", "an," and "the" include the plural forms as well, unless the context clearly indicates otherwise; the term "and/or" encompasses all possible combinations of one or more of the associated listed items; the terms "first," "second," etc. are only used to distinguish one element from another and do not limit the elements themselves; the term "if" may be construed to mean "when," "upon," "in response to," or "in accordance with," depending on the context; and the terms "include," "including," "comprise," and "comprising" specify particular features or operations but do not preclude additional features or operations. Lastly, as used herein, the terms "master" and "host" are synonymous unless clearly stated otherwise.

What is claimed is:

1. An electronic device for retrofitting a machine to accommodate one or more electronic peripheral devices, the electronic device comprising:

a slave interface configured to couple the electronic device to the machine controller via a multi-drop bus (MDB); and

a host interface configured to couple the electronic device to a first peripheral device of the one or more electronic peripheral devices, wherein the first peripheral device is configured to communicate via MDB protocol and is decoupled from the MDB of the machine;

one or more processors; and

memory storing one or more programs to be executed by the one or more processors, the one or more programs comprising instructions for:

registering the electronic device as a slave to the machine controller;

registering the first peripheral device as a slave to the electronic device;

receiving, at the slave interface of the electronic device, a first command from the machine controller, wherein the first command is directed to the first peripheral device; and

in response to receiving the first command from the machine controller:

sending an acknowledgement to the machine controller via the slave interface in a manner as if originated from the first peripheral device; and

relaying the first command to the first peripheral device via the host interface.

2. The electronic device of claim 1, wherein the one or more programs further comprise instructions for:

receiving, at the host interface of the electronic device, a first signal from the first peripheral device, wherein the first signal is directed to the machine controller; and

in response to receiving the first signal from the first peripheral device:

sending an acknowledgement to the first peripheral device via the host interface in a manner as if originated from the machine controller; and

relaying the first signal to the machine controller via the slave interface.

3. The electronic device of claim 1, wherein the instructions for registering the electronic device as a slave to the machine controller comprise instructions for:

identifying the electronic device to the machine controller as the first peripheral device; and

accepting registration of the electronic device as the first peripheral device.

4. The electronic device of claim 1, wherein:

the electronic device further includes an internal peripheral device including a short-range communication capability corresponding to a short-range communication protocol; and

the one or more programs further comprise instructions for communicating, via the short-range communication capability, with a mobile device including (i) a complimentary short-range communication capability and (ii) a long-range communication capability corresponding to a long-range communication protocol.

5. The electronic device of claim 4, wherein:

the machine controller is associated with a controller address;

the electronic device is associated with a device address;

the first peripheral device is configured to send signals to a signal destination address; and

the one or more programs further comprise instructions for:

receiving, from the mobile device via the short-range communication capability, a request to access signals generated by the first peripheral device;

validating the request, wherein validation of the request indicates that the first mobile device is authorized, by a remote server via the long-range communication capability of the mobile device, to access the signals generated by the first peripheral device; and

sending a first reset command to the first peripheral device via the host interface, wherein the first reset command includes a directive to update, at the first peripheral device, the signal destination address from the controller address to the device address.

6. The electronic device of claim 5, wherein the one or more programs further comprise instructions for:

receiving, at the host interface of the electronic device, a second signal from the first peripheral device, wherein the second signal is directed to the electronic device in accordance with the updated signal destination address;

in response to receiving the second signal from the first peripheral device:

sending an acknowledgement to the first peripheral device via the host interface;

transmitting a third signal to the mobile device via the short-range communication capability for forwarding to the server via the long-range communication capability, wherein the third signal includes data associated with the received second signal; and

forgoing provision of the second signal to the machine controller.

7. The electronic device of claim 5, wherein the one or more programs further comprise instructions for:

receiving, from the mobile device via the short-range communication capability, a notification to cease interaction with the mobile device;

in response to receiving the notification to cease interaction with the mobile device:

sending a second reset command to the first peripheral device via the host interface, wherein the second reset command includes a directive to update, at the first peripheral device, the signal destination address from the device address to the controller address.

8. A method of retrofitting a machine to accommodate one or more electronic peripheral devices, the method comprising:

at an electronic device coupled to (i) a machine controller and (ii) a first of the one or more electronic peripheral devices, the electronic device including:

one or more processors;

memory;

a slave interface configured to couple the electronic device to the machine controller via a multi-drop bus (MDB); and

a host interface configured to couple the electronic device to the first peripheral device;

wherein the first peripheral device is configured to communicate via MDB protocol and is decoupled from the MDB of the machine:

registering the electronic device as a slave to the machine controller;

registering the first peripheral device as a slave to the electronic device;

receiving, at the slave interface of the electronic device, a first command from the machine controller, wherein the first command is directed to the first peripheral device; and

in response to receiving the first command from the machine controller:

sending an acknowledgement to the machine controller via the slave interface in a manner as if originated from the first peripheral device; and

relaying the first command to the first peripheral device via the host interface.

9. The method of claim 8, further comprising:

receiving, at the host interface of the electronic device, a first signal from the first peripheral device, wherein the first signal is directed to the machine controller; and

in response to receiving the first signal from the first peripheral device:

sending an acknowledgement to the first peripheral device via the host interface in a manner as if originated from the machine controller; and

relaying the first signal to the machine controller via the slave interface.

10. The method of claim 8, wherein registering the electronic device as a slave to the machine controller includes:

identifying the electronic device to the machine controller as the first peripheral device; and

accepting registration of the electronic device as the first peripheral device.

11. The method of claim 8, wherein:

the electronic device further includes an internal peripheral device including a short-range communication capability corresponding to a short-range communication protocol; and

the method further comprises communicating, via the short-range communication capability, with a mobile device including (i) a complimentary short-range communication capability and (ii) a long-range communication capability corresponding to a long-range communication protocol.

12. The method of claim 11, wherein:

the machine controller is associated with a controller address;

the electronic device is associated with a device address;

the first peripheral device is configured to send signals to a signal destination address; and

the method further comprises:

receiving, from the mobile device via the short-range communication capability, a request to access signals generated by the first peripheral device;

validating the request, wherein validation of the request indicates that the first mobile device is authorized, by a remote server via the long-range communication capability of the mobile device, to access the signals generated by the first peripheral device; and

sending a first reset command to the first peripheral device via the host interface, wherein the first reset command includes a directive to update, at the first peripheral device, the signal destination address from the controller address to the device address.

13. The method of claim 12, further comprising:

receiving, at the host interface of the electronic device, a second signal from the first peripheral device, wherein the second signal is directed to the electronic device in accordance with the updated signal destination address;

in response to receiving the second signal from the first peripheral device:

sending an acknowledgement to the first peripheral device via the host interface;

transmitting a third signal to the mobile device via the short-range communication capability for forwarding to the server via the long-range communication capability, wherein the third signal includes data associated with the received second signal; and

forgoing provision of the second signal to the machine controller.

14. The method of claim 12, further comprising:

receiving, from the mobile device via the short-range communication capability, a notification to cease interaction with the mobile device;

in response to receiving the notification to cease interaction with the mobile device:

sending a second reset command to the first peripheral device via the host interface, wherein the second reset command includes a directive to update, at the first peripheral device, the signal destination address from the device address to the controller address.

15. A non-transitory computer readable storage medium storing one or more programs, the one or more programs comprising instructions, which, when executed by an electronic

device (i) coupled to a machine controller and a first of one or more electronic peripheral devices and (ii) including:

one or more processors;

a slave interface configured to couple the electronic device with the machine controller via a multi-drop bus (MDB); and

a host interface configured to couple the electronic device with the first peripheral device, wherein the first peripheral device is configured to communicate via MDB protocol and is decoupled from the MDB of the machine;

cause the electronic device to perform operations comprising:

registering the electronic device as a slave to the machine controller;

registering the first peripheral device as a slave to the electronic device;

receiving, at the slave interface of the electronic device, a first command from the machine controller, wherein the first command is directed to the first peripheral device; and

in response to receiving the first command from the machine controller:

sending an acknowledgement to the machine controller via the slave interface in a manner as if originated from the first peripheral device; and

relaying the first command to the first peripheral device via the host interface.

16. The non-transitory computer readable storage medium of claim 15, wherein the one or more programs further comprise instructions for:

receiving, at the host interface of the electronic device, a first signal from the first peripheral device, wherein the first signal is directed to the machine controller; and

in response to receiving the first signal from the first peripheral device:

sending an acknowledgement to the first peripheral device via the host interface in a manner as if originated from the machine controller; and

relaying the first signal to the machine controller via the slave interface.

17. The non-transitory computer readable storage medium of claim 15, wherein the instructions for registering the electronic device as a slave to the machine controller comprise instructions for:

identifying the electronic device to the machine controller as the first peripheral device; and

accepting registration of the electronic device as the first peripheral device.

18. The non-transitory computer readable storage medium of claim 15, wherein:

the electronic device further includes an internal peripheral device including a short-range communication capability corresponding to a short-range communication protocol; and

the one or more programs further comprise instructions for communicating, via the short-range communication capability, with a mobile device including (i) a complimentary short-range communication capability and (ii) a long-range communication capability corresponding to a long-range communication protocol.

19. The non-transitory computer readable storage medium of claim 18, wherein:

the machine controller is associated with a controller address;

the electronic device is associated with a device address;

the first peripheral device is configured to send signals to a signal destination address; and

the one or more programs further comprise instructions for:

receiving, from the mobile device via the short-range communication capability, a request to access signals generated by the first peripheral device;

validating the request, wherein validation of the request indicates that the first mobile device is authorized, by a remote server via the long-range communication capability of the mobile device, to access the signals generated by the first peripheral device; and

sending a first reset command to the first peripheral device via the host interface, wherein the first reset command includes a directive to update, at the first peripheral device, the signal destination address from the controller address to the device address.

20. The non-transitory computer readable storage medium of claim 19, wherein the one or more programs further comprise instructions for:

receiving, at the host interface of the electronic device, a second signal from the first peripheral device, wherein the second signal is directed to the electronic device in accordance with the updated signal destination address;

in response to receiving the second signal from the first peripheral device:

sending an acknowledgement to the first peripheral device via the host interface;

transmitting a third signal to the mobile device via the short-range communication capability for forwarding to the server via the long-range communication

capability, wherein the third signal includes data associated with the received second signal; and

forgoing provision of the second signal to the machine controller;

receiving, from the mobile device via the short-range communication capability, a notification to cease interaction with the mobile device; and

in response to receiving the notification to cease interaction with the mobile device:

sending a second reset command to the first peripheral device via the host interface, wherein the second reset command includes a directive to update, at the first peripheral device, the signal destination address from the device address to the controller address.

DEVICE AND METHOD FOR PROVIDING EXTERNAL ACCESS TO MULTI-DROP BUS PERIPHERAL DEVICES

ABSTRACT OF THE DISCLOSURE

A method and device for retrofitting a machine controller to accommodate one or more electronic peripheral devices is disclosed herein. A device with processor(s), memory, a slave interface, and host interface(s) performs as a virtual peripheral by registering itself as a slave to the machine controller coupled with the slave interface and performs as a virtual machine controller by registering peripheral(s) coupled with the host interface(s) as slaves to the device. The device receives a command from the machine controller via the slave interface and, in response to receiving the command: sends an acknowledgement to the machine controller via the slave interface; and relays the command to a respective peripheral via a respective one of the host interface(s), where the device sends signals to and from the machine controller asynchronous of sending signals to and from the peripheral(s).

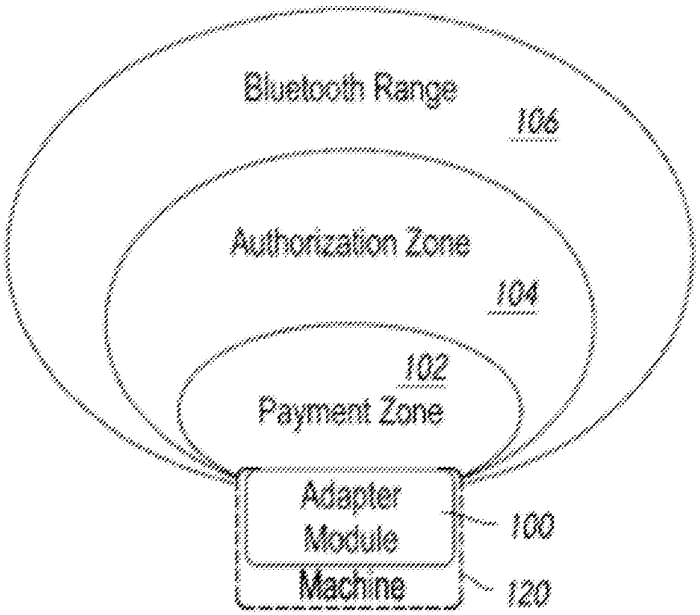


Figure 1

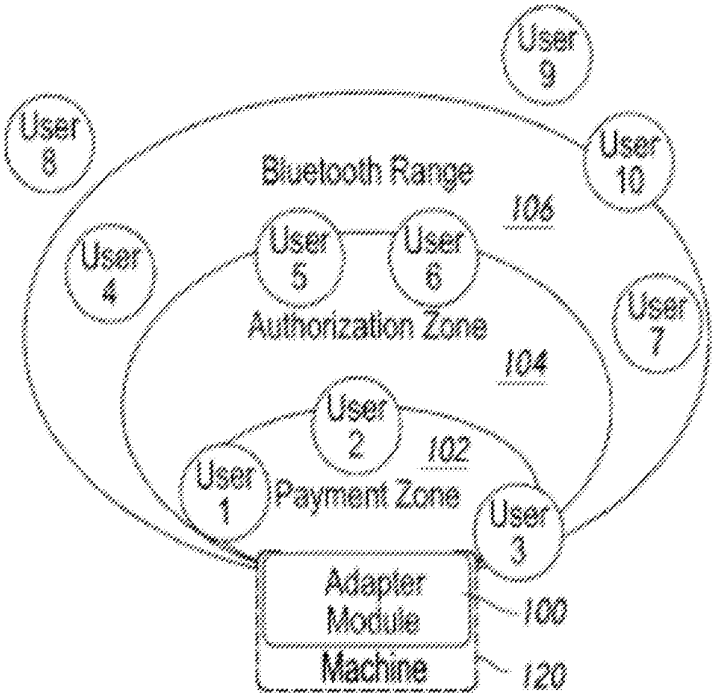


Figure 2

Tab	Favorite?	Alert	View to User
All	Yes	No	User can make Hands-free Credit with the connected vending machine
All	No	Yes	User needs to launch Mobile Device and then swipe to make transaction manually
Favorite	Yes	No	Hands-free transction will be available to the user via vending machine
Favorite	No	No	User is not alerted for the vending machine which is not a favorite machine. Hands-free mode will not work, manual swipe for transaction required by user.
Either All or Favorite	Yes	Yes	BUT Hands-free Credit is not available (disabled by module, expired AuthGrant, insufficient balance, or other issue), then user will get an alert so that user can swipe credit manually.

Figure 3

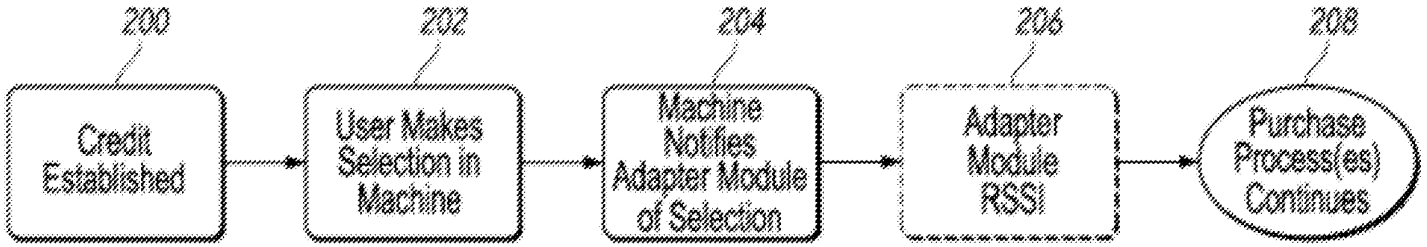


Figure 4

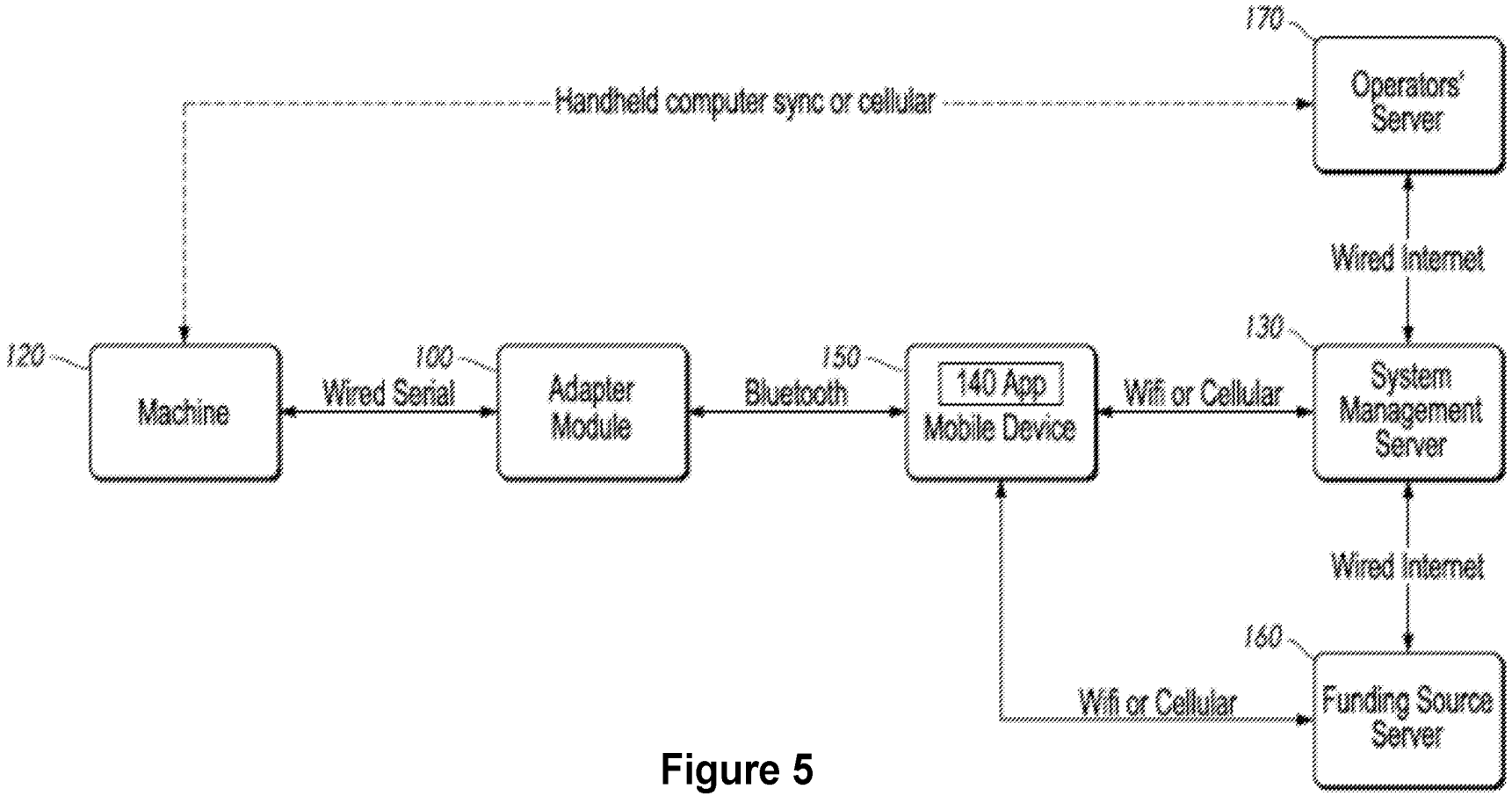


Figure 5

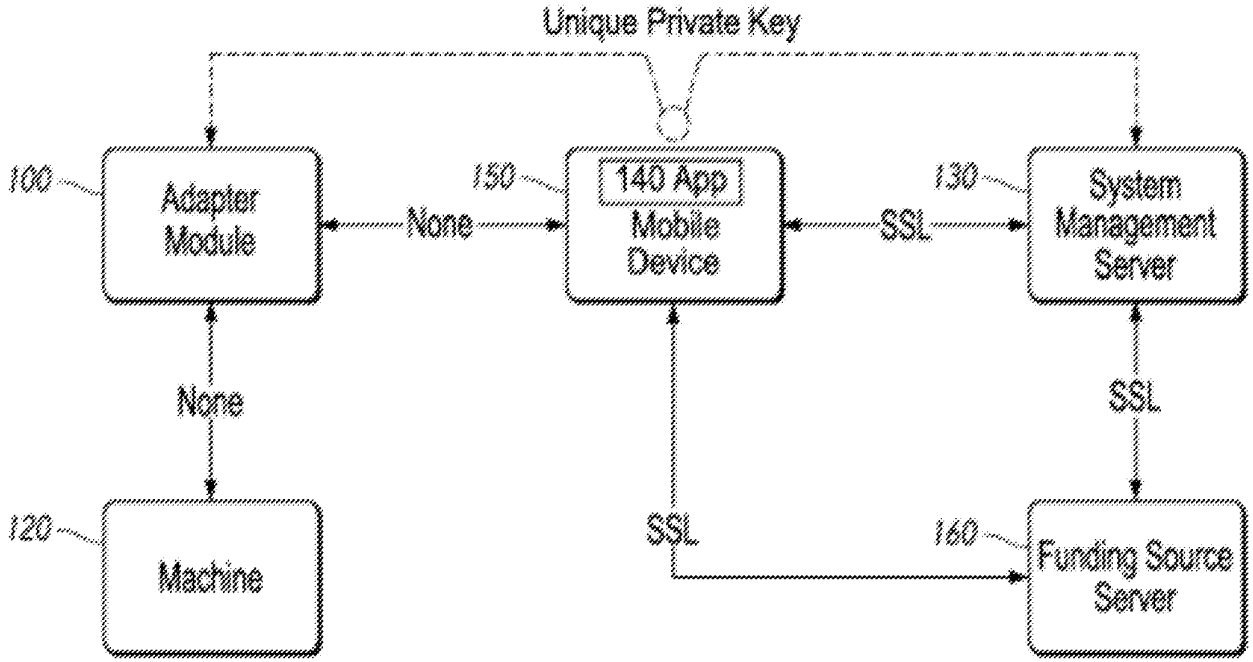


Figure 6

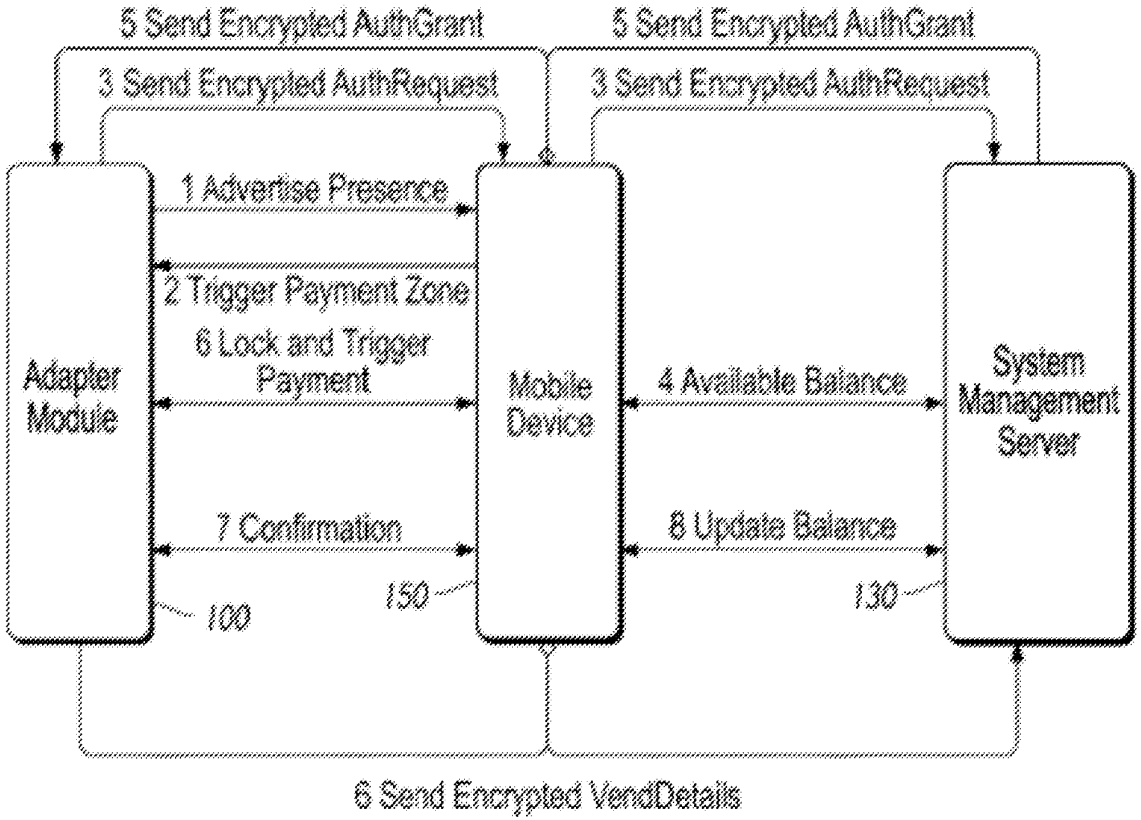


Figure 7

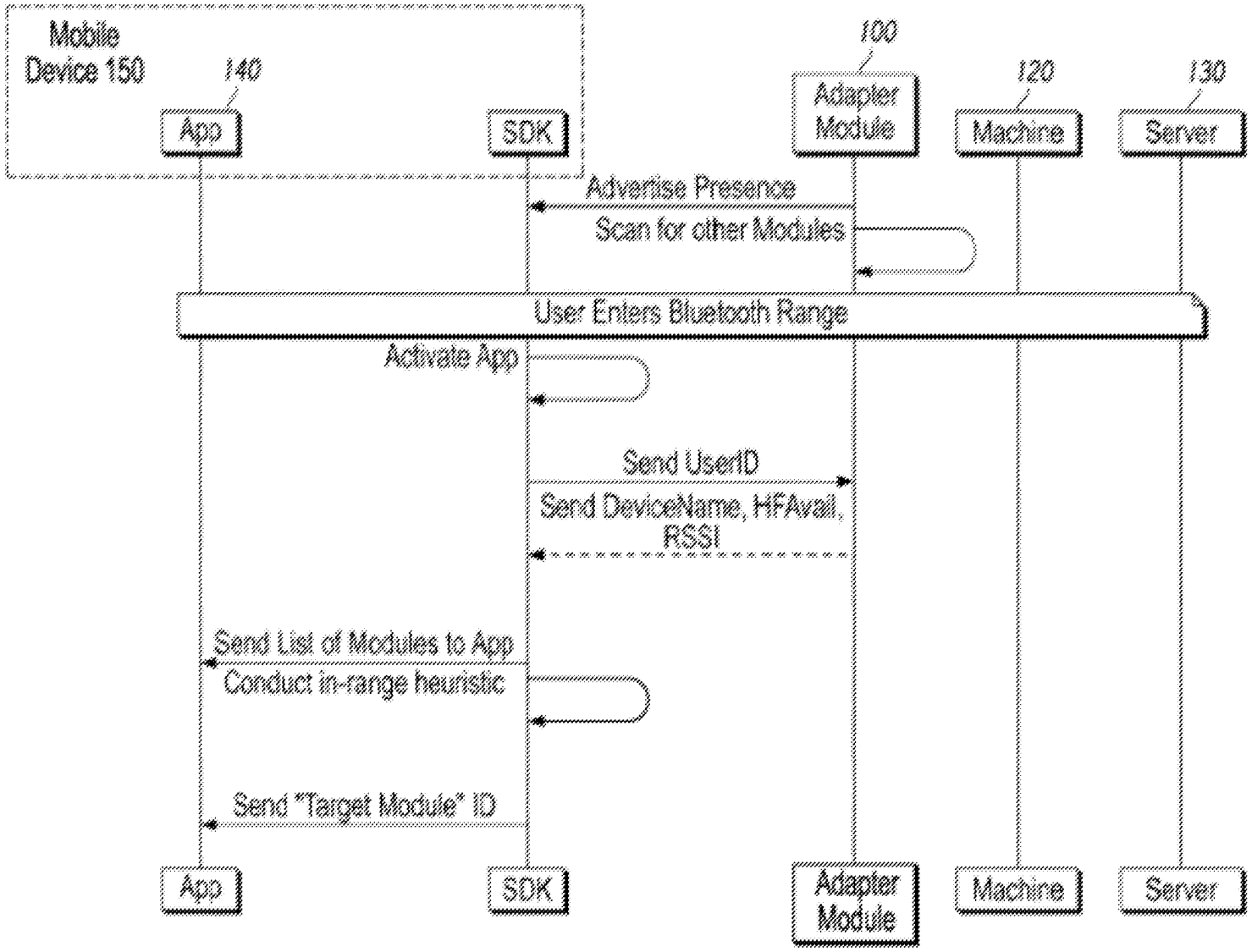


Figure 8A

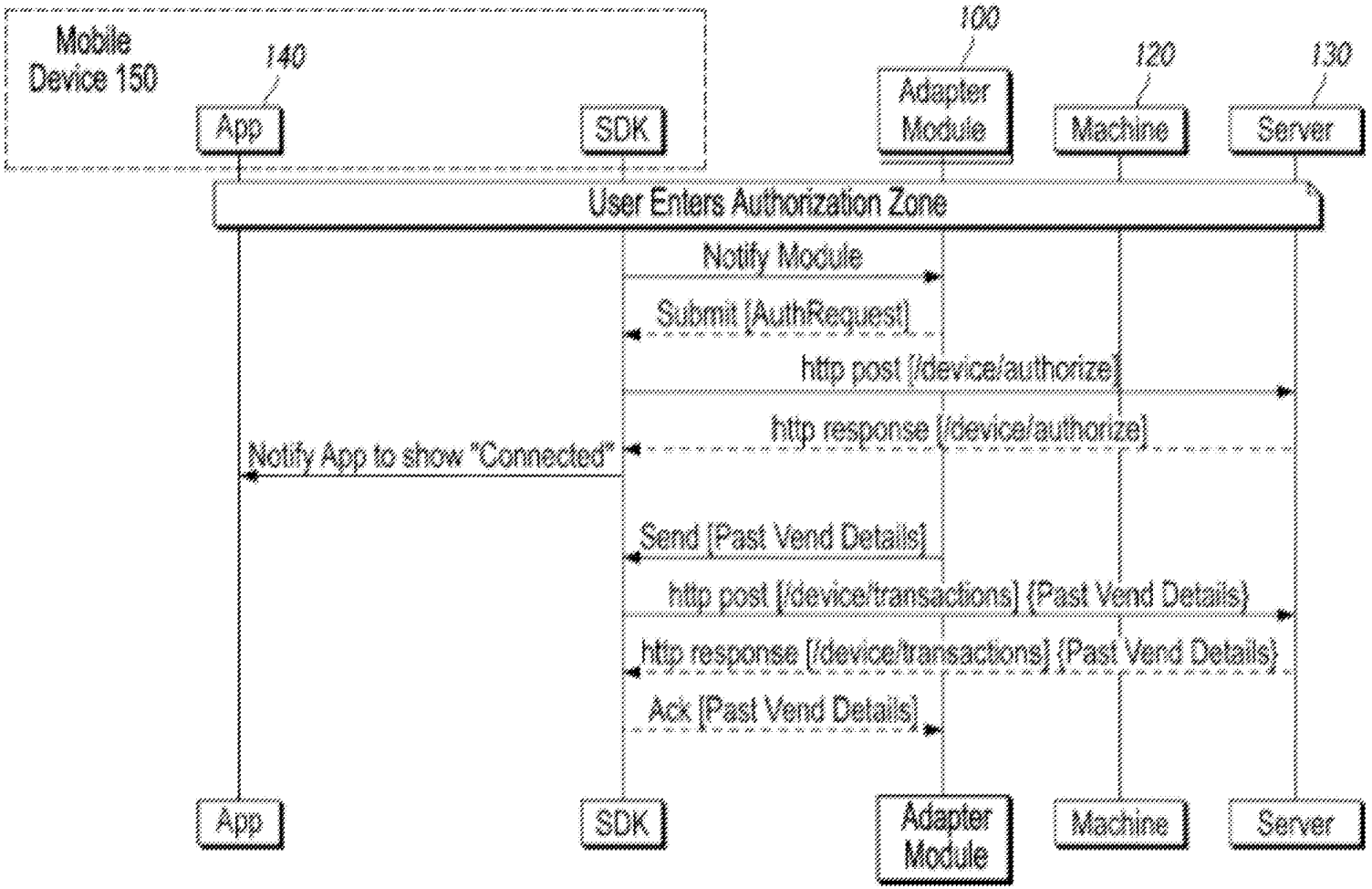


Figure 8B

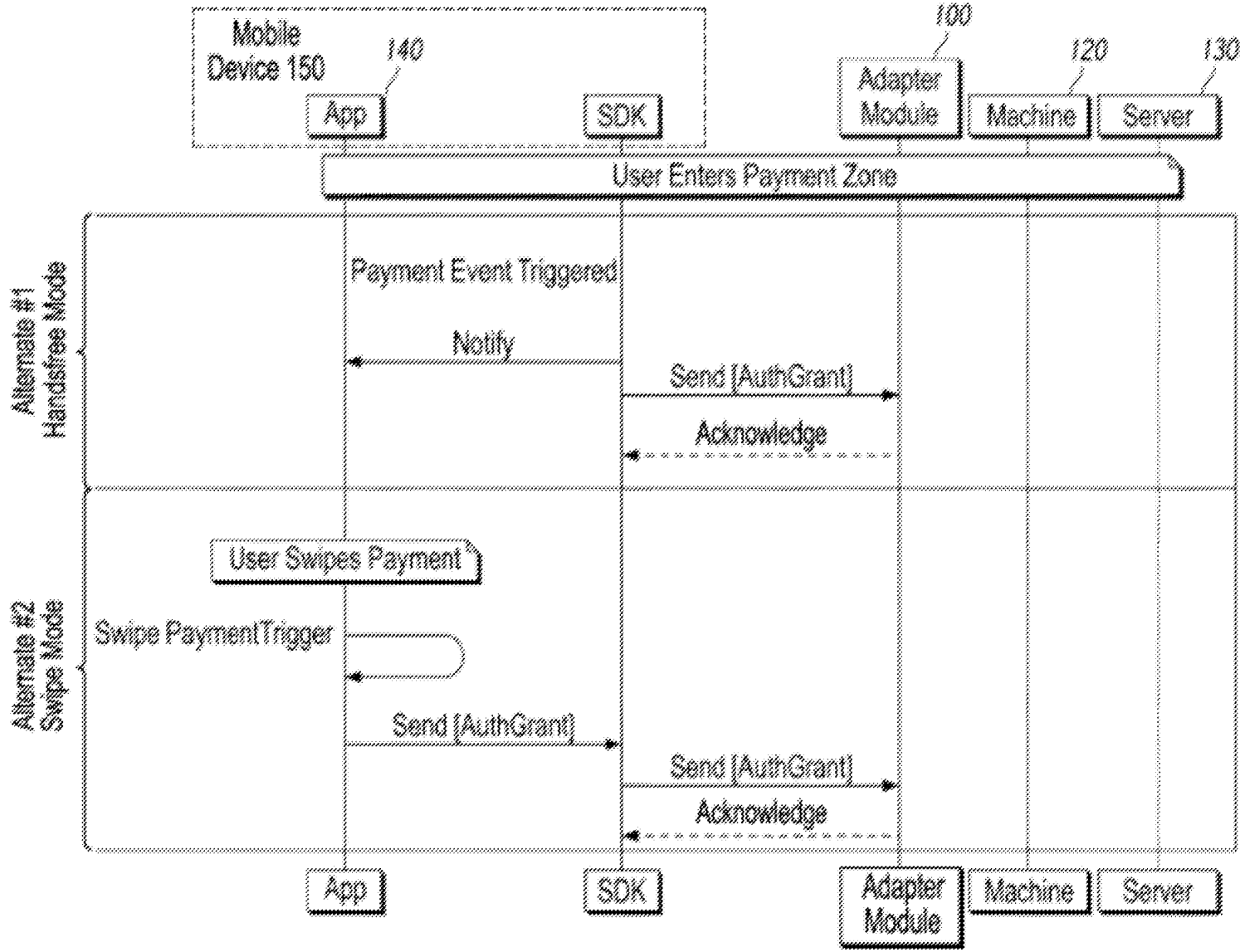


Figure 8C

Mobile Device
140
App
SDK
100
Adapter Module
120
Machine
130
Server
Vend Transaction
Send Credit
User Makes Selection
Query Ok to Vend
Send Ok to Vend
Send Vend Success Ack
Check if User still in PayRange
Send [Vend Details]
http post [Vendconfirmations]
Update Wallet
http response [Vendtransactions]
Ack [Vend Confirm]
AccountQuery [update balance]
http post/user [update balance]
http response /user [update balance]
AccountQueryResponse [update balance]
Delete expired AuthGrant
Delete expired AuthGrant
Delete expired AuthGrant
[Vend (1 to 3 vends)]
Loop for Multiple Vends

Figure 8D

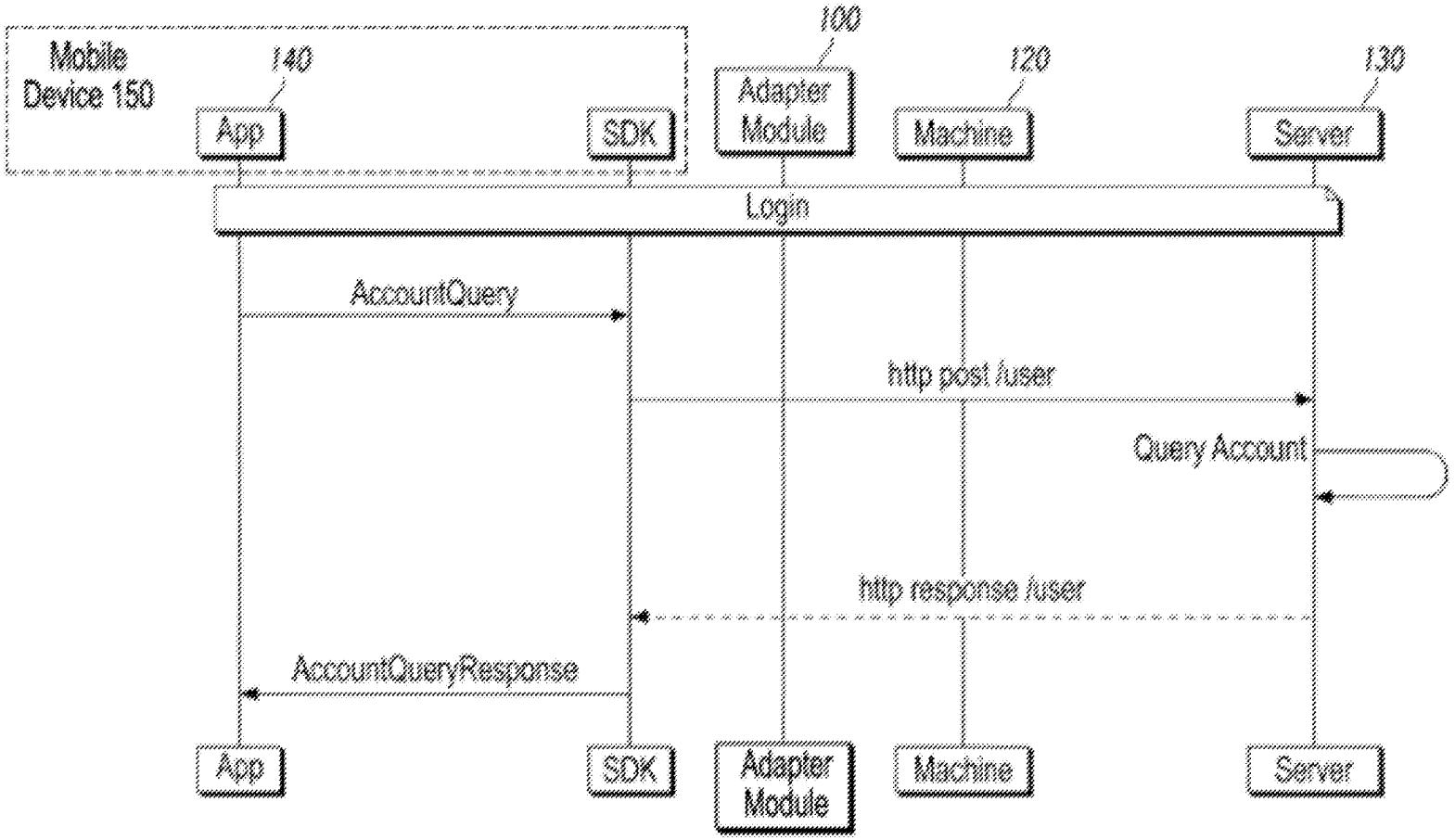


Figure 8E

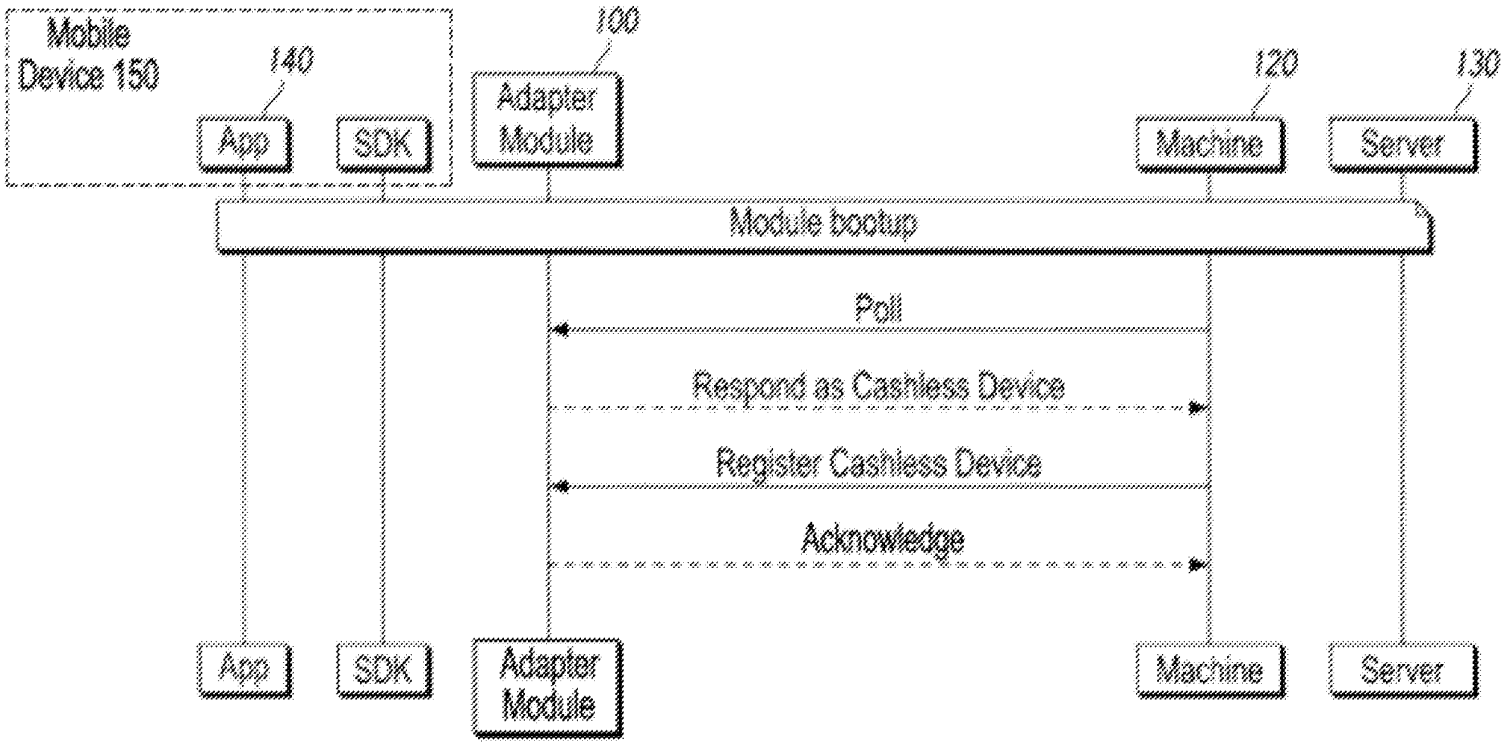


Figure 8F

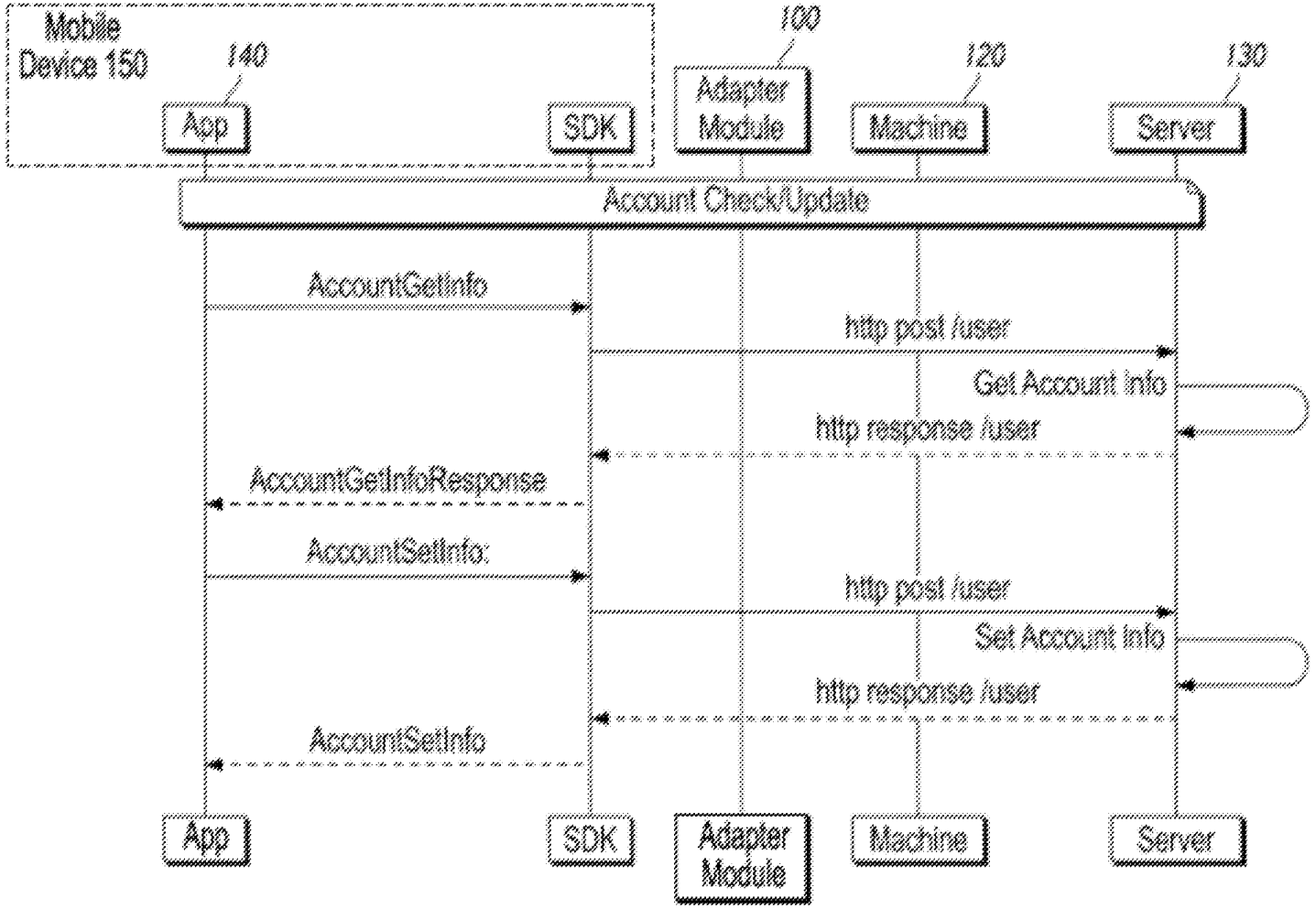


Figure 8G

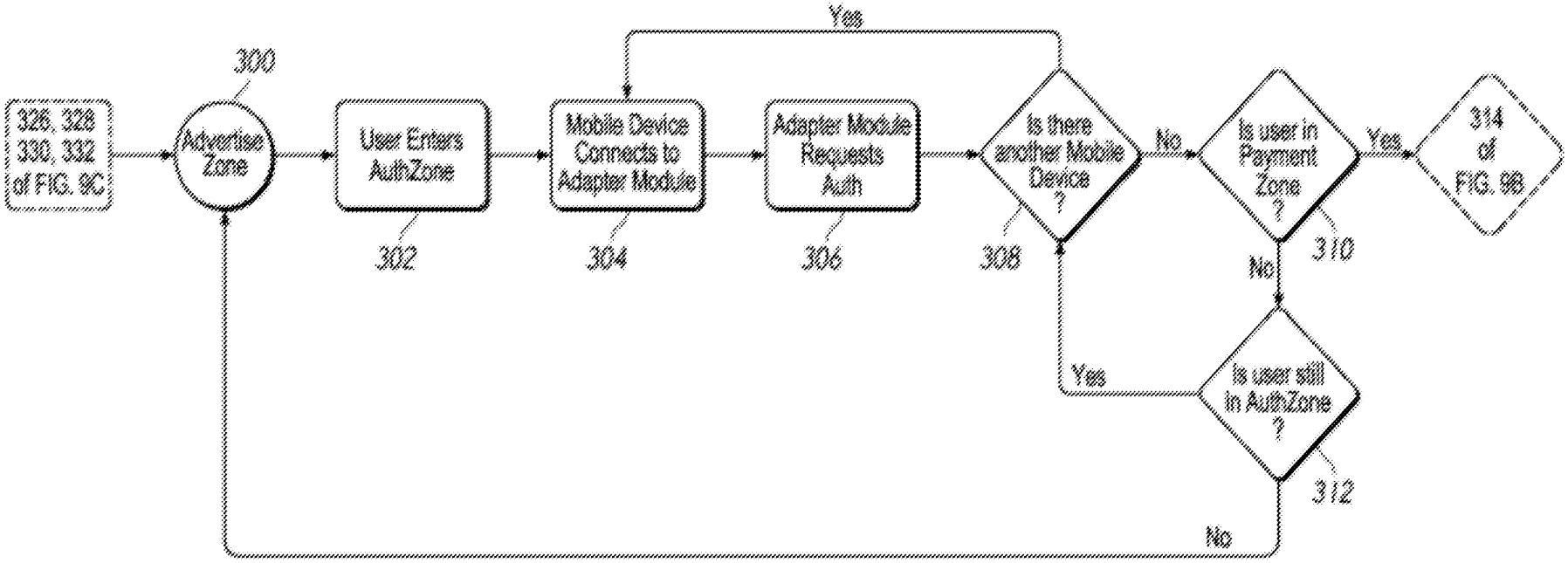


Figure 9A

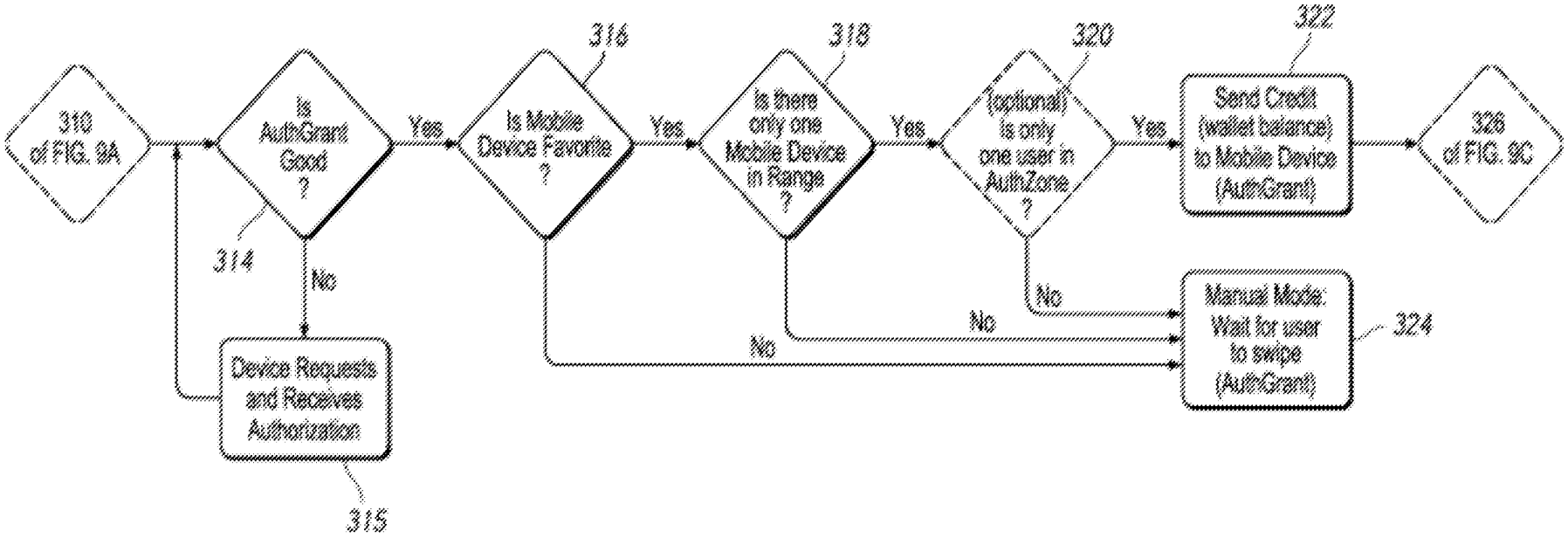
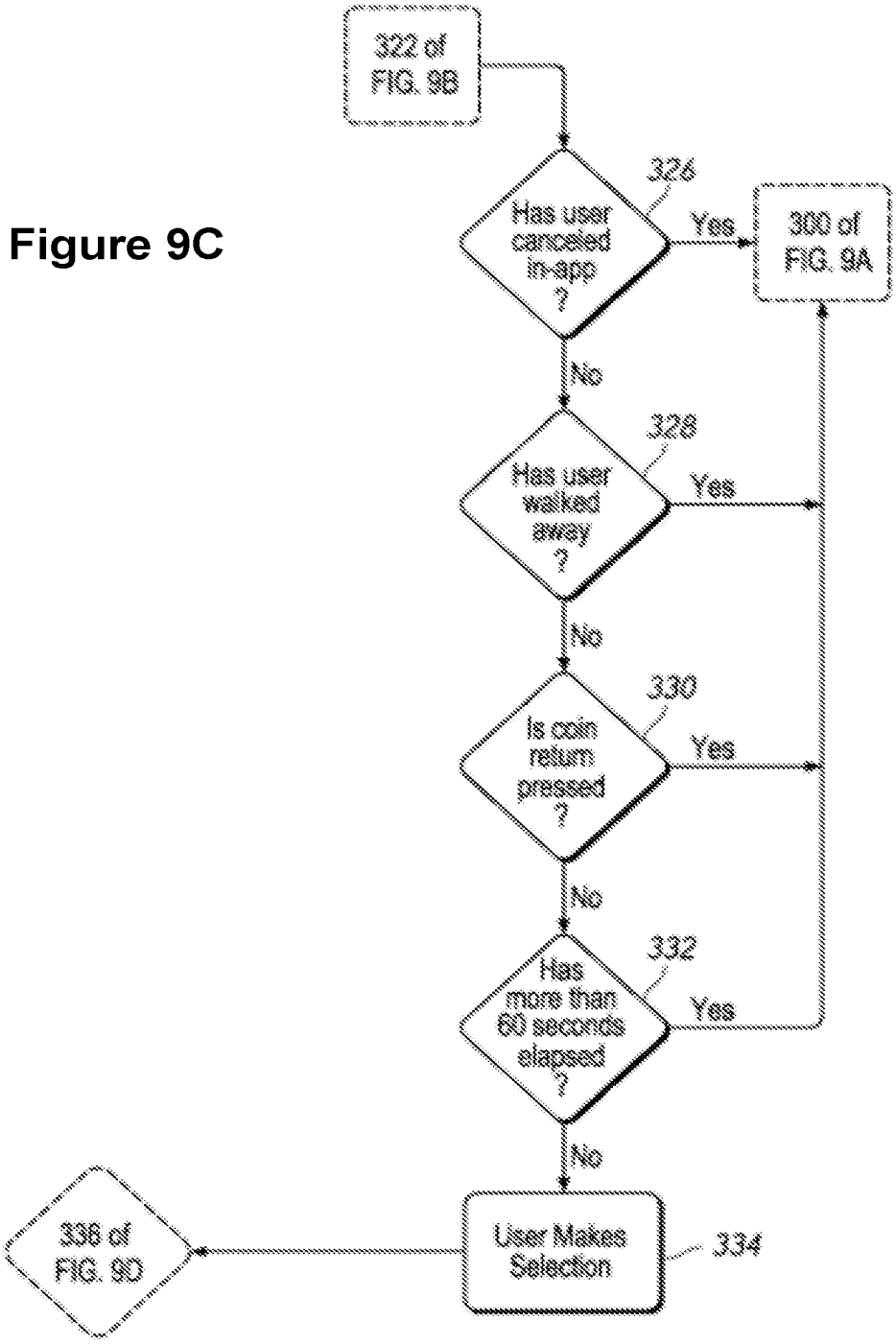


Figure 9B

Figure 9C


322 of FIG. 9B
326
Has user canceled in-app ?
Yes
300 of FIG. 9A
No
328
Has user walked away ?
Yes
No
330
Is coin return pressed ?
Yes
No
332
Has more than 60 seconds elapsed ?
Yes
No
User Makes Selection
334
336 of FIG. 9D

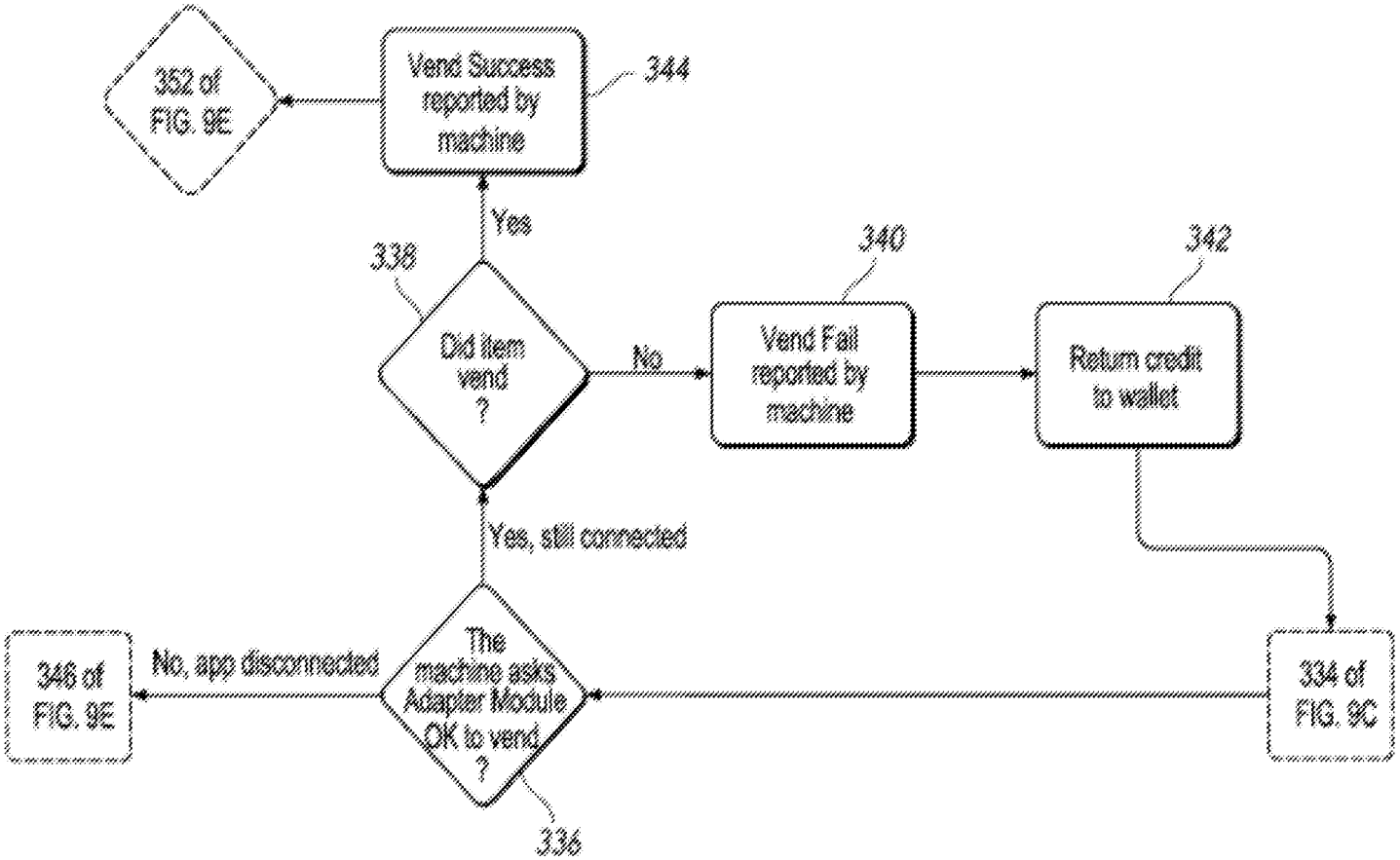


Figure 9D

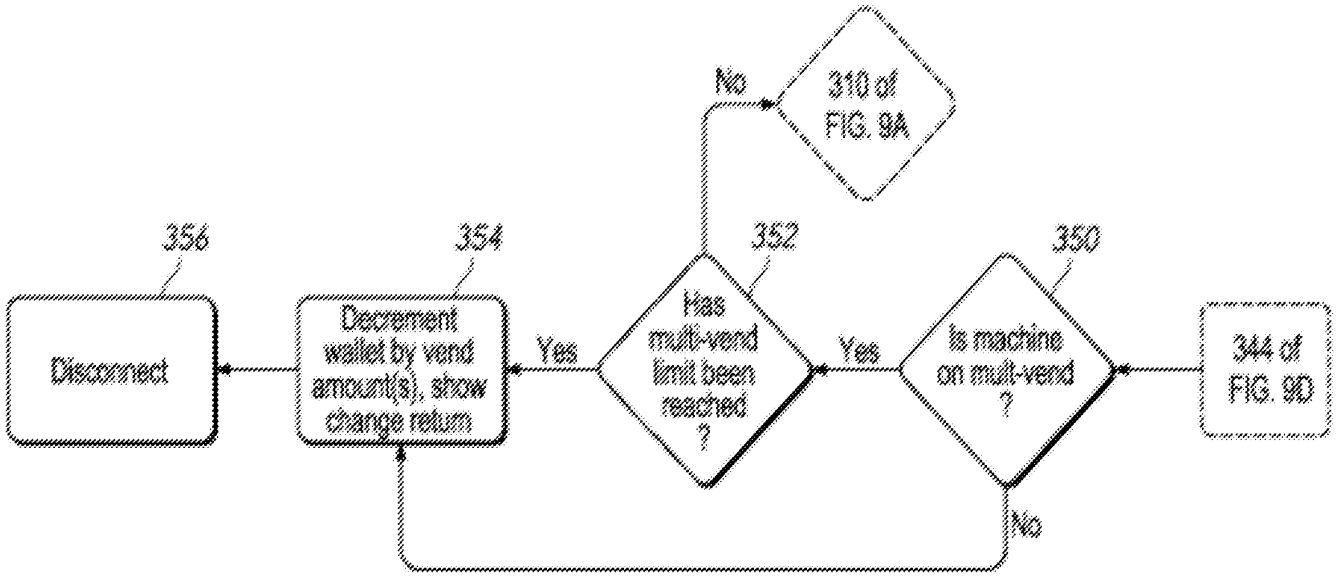


Figure 9E

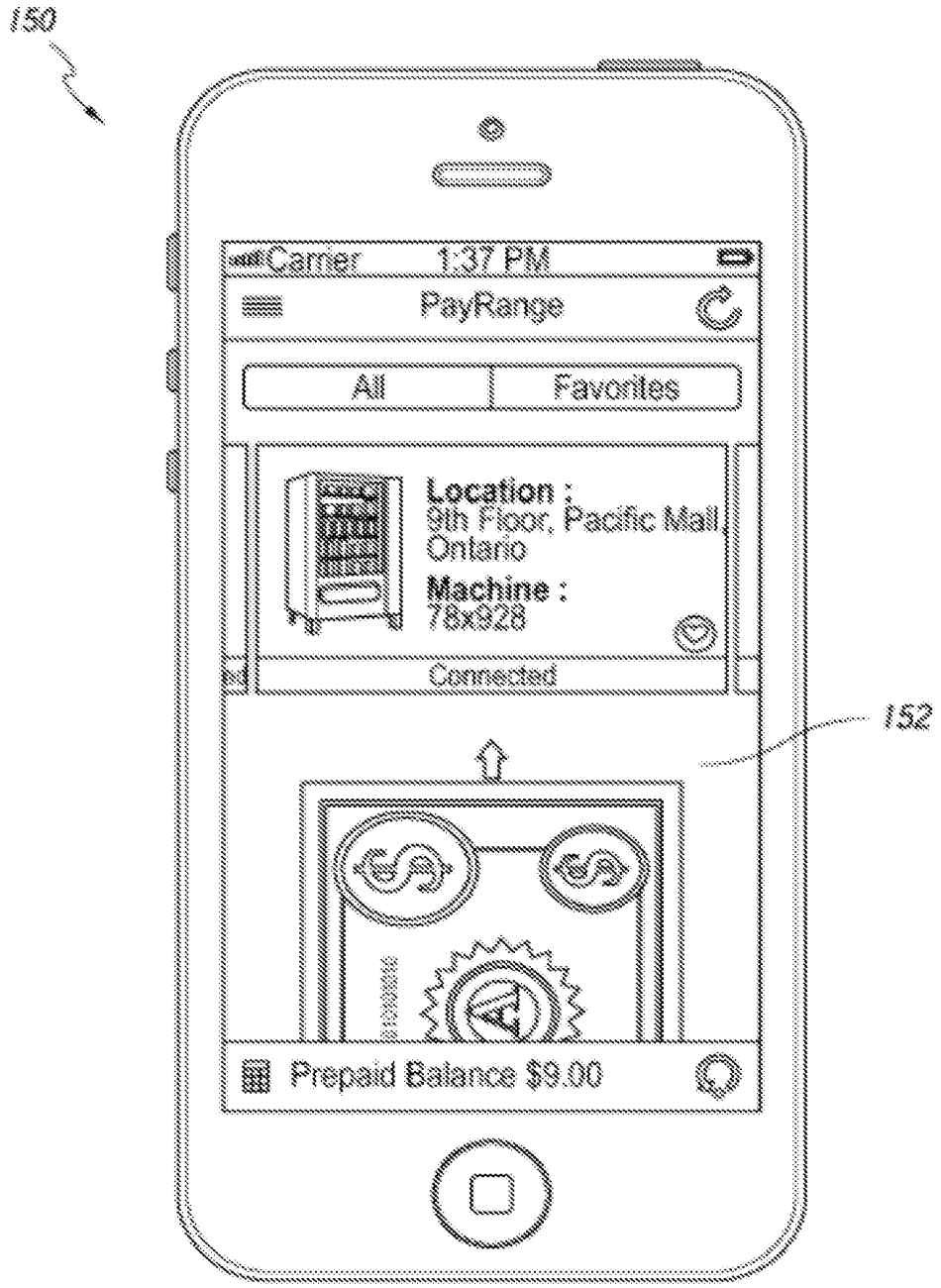

150
Carrier
1:37 PM
PayRange
All
Favorites
Location :
9th Floor, Pacific Mall
Ontario
Machine :
78x928
Connected
152
Prepaid Balance $9.00

Figure 10A

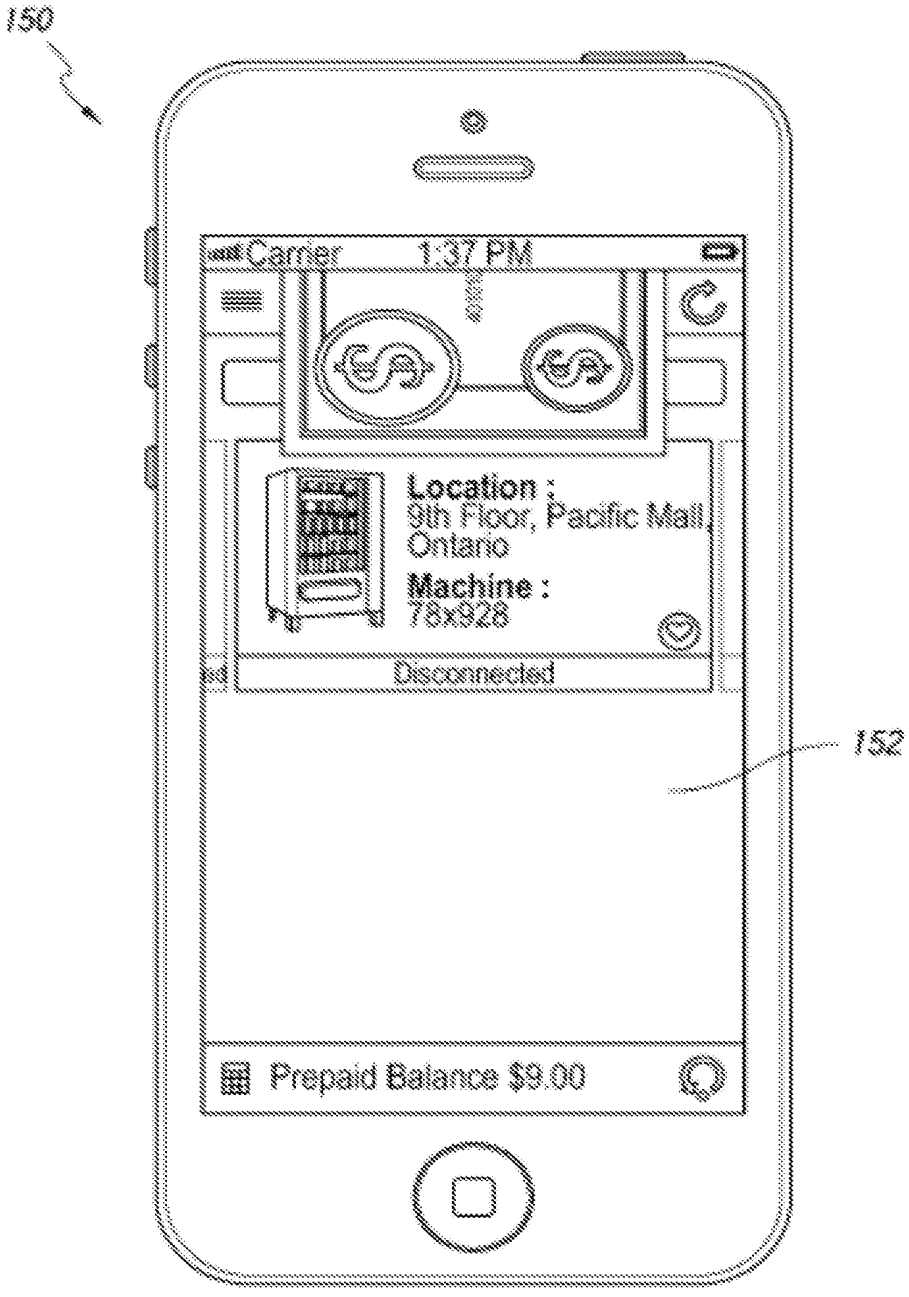

150
Carrier
1:37 PM
Location :
9th Floor, Pacific Mall,
Ontario
Machine :
78x928
Disconnected
152
Prepaid Balance $9.00

Figure 10B

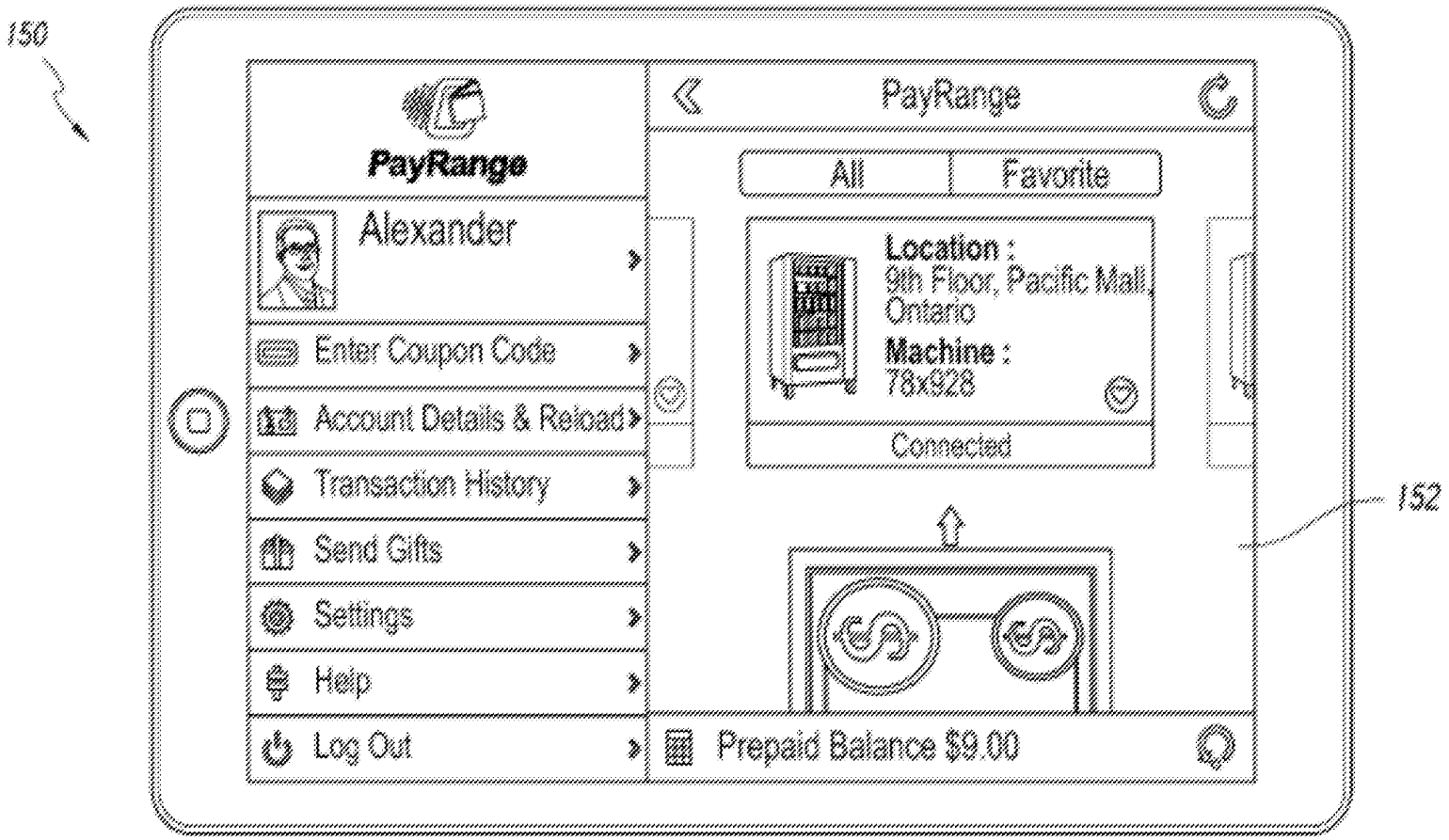


Figure 10C

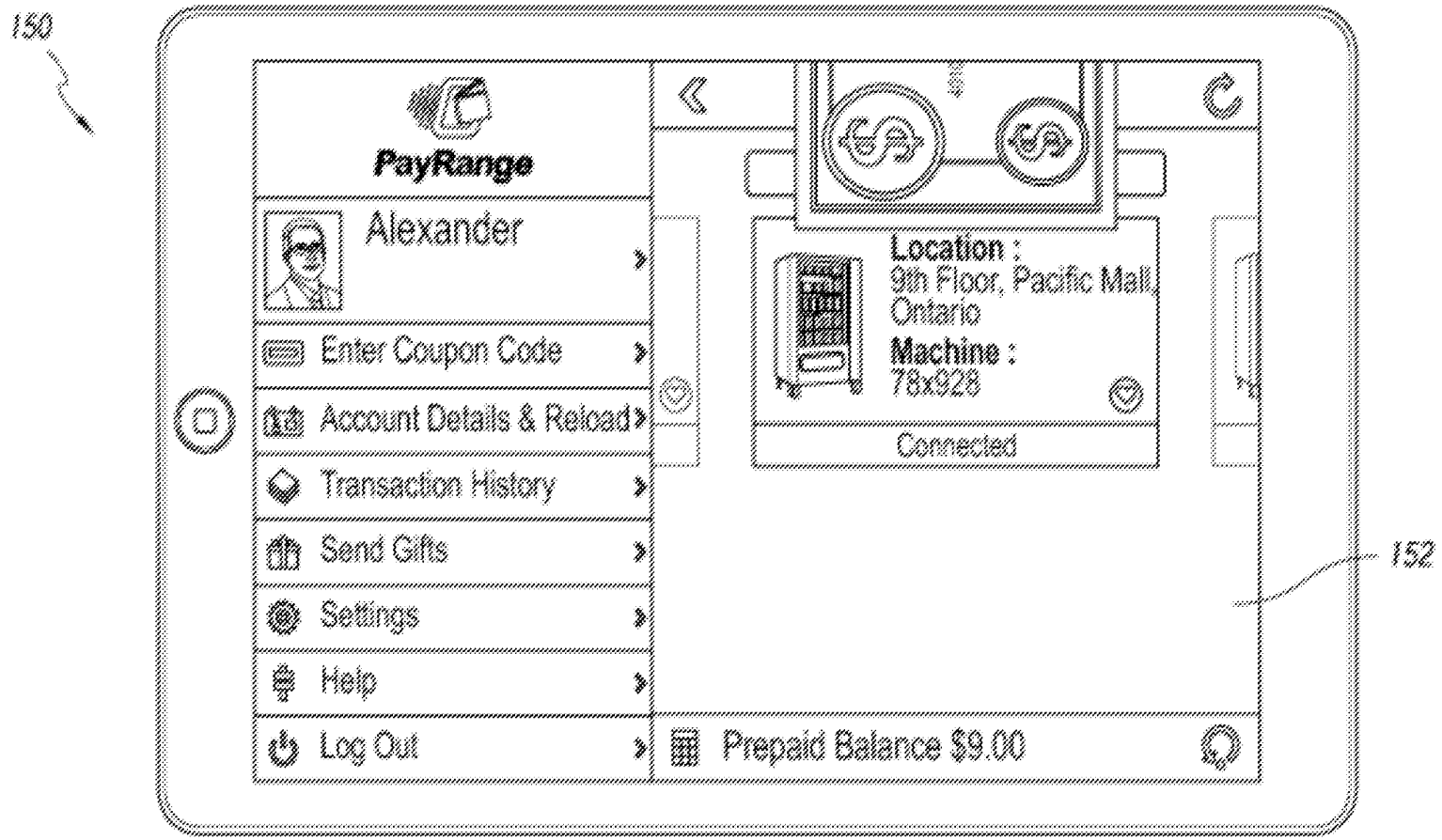


Figure 10D

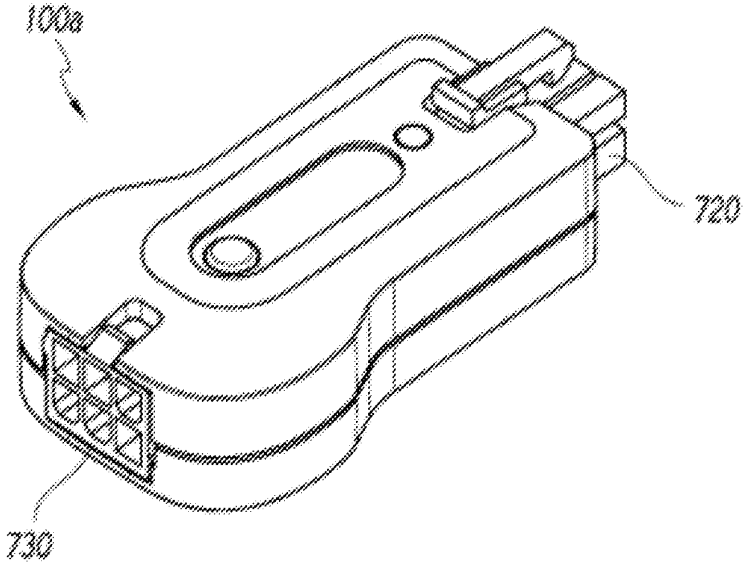


Figure 11

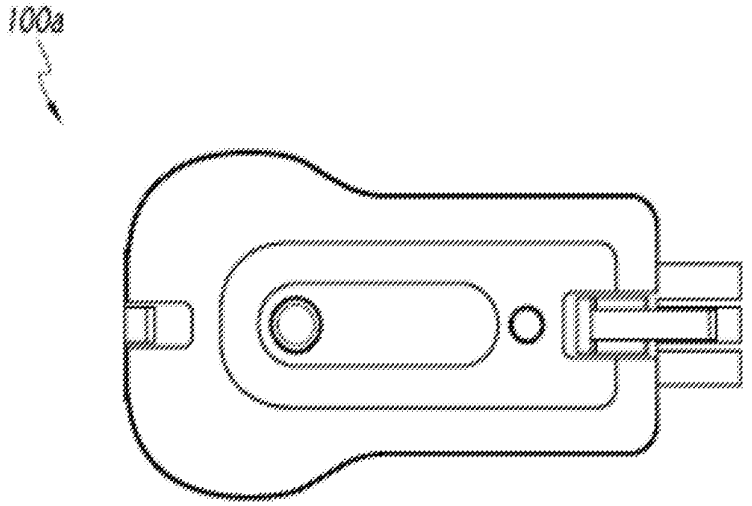


Figure 12

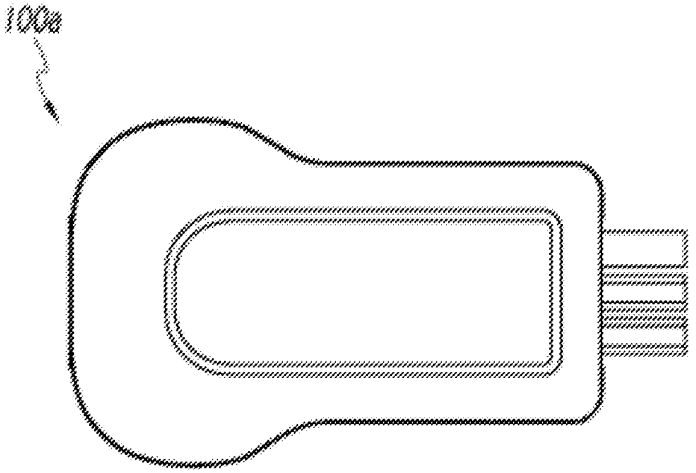


Figure 13

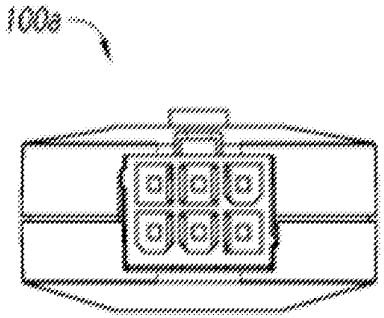


Figure 15

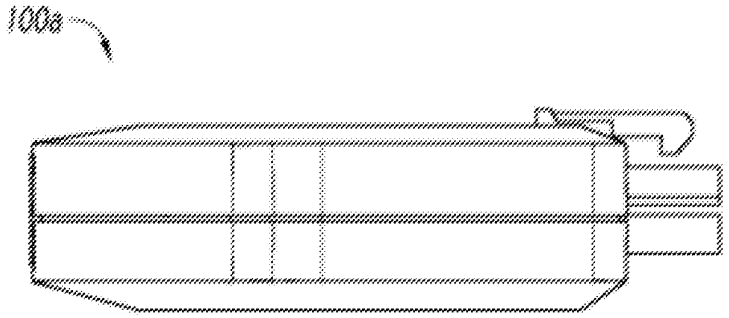


Figure 14

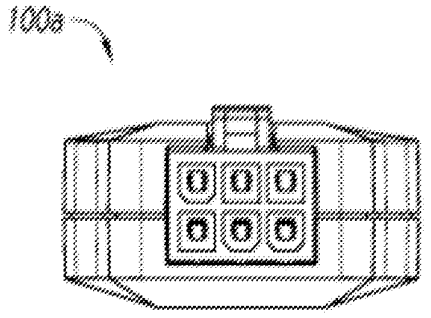


Figure 16

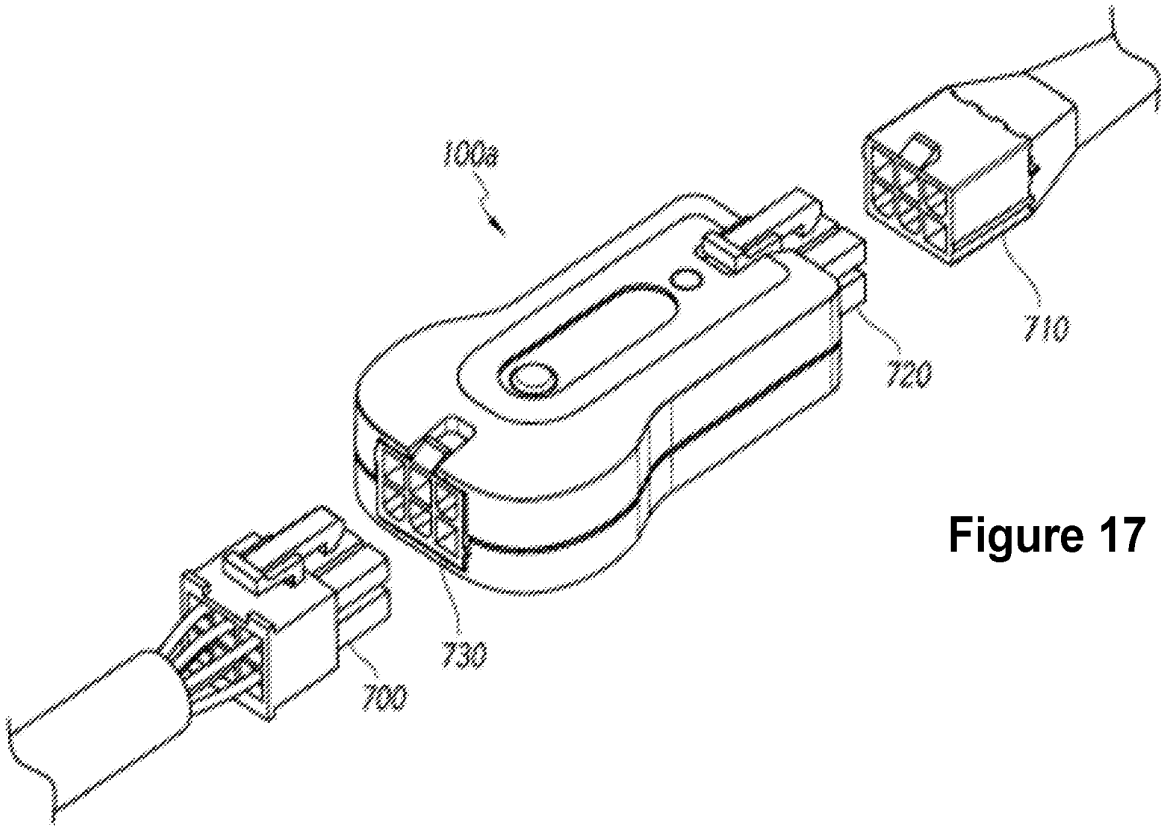


Figure 17

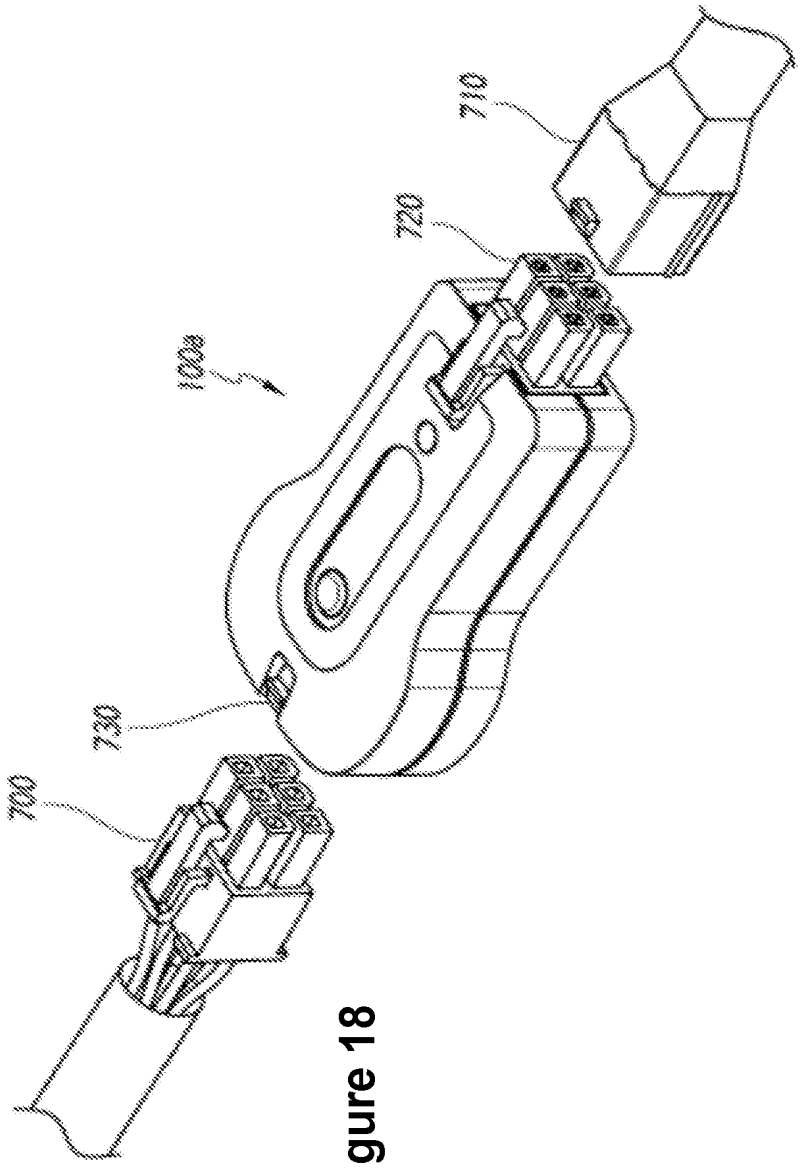


Figure 18

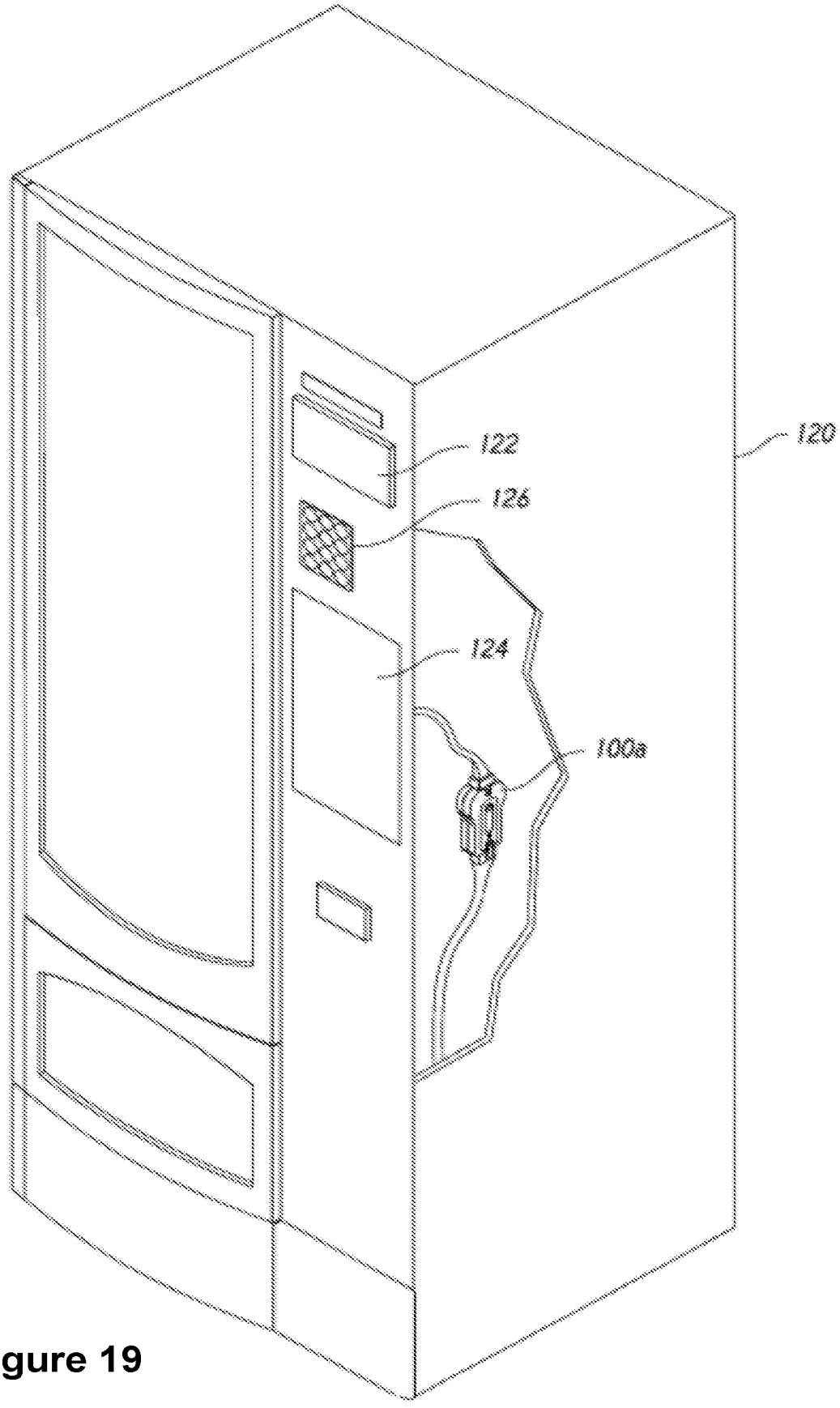


Figure 19

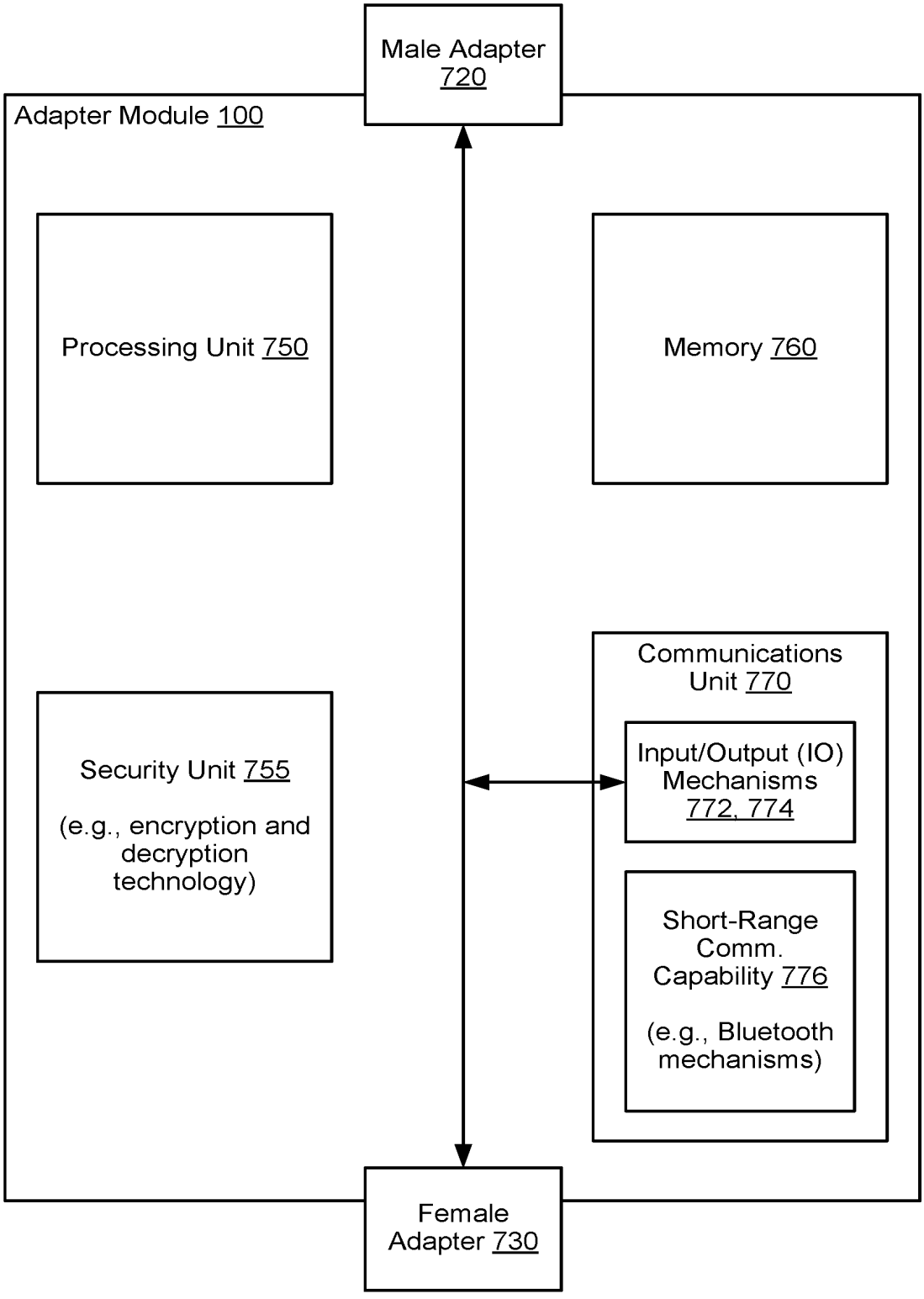

Male Adapter 720
Adapter Module 100
Processing Unit 750
Memory 760
Communications Unit 770
Input/Output (IO) Mechanisms 772, 774
Security Unit 755
(e.g., encryption and decryption technology)
Short-Range Comm. Capability 776
(e.g., Bluetooth mechanisms)
Female Adapter 730

Figure 20

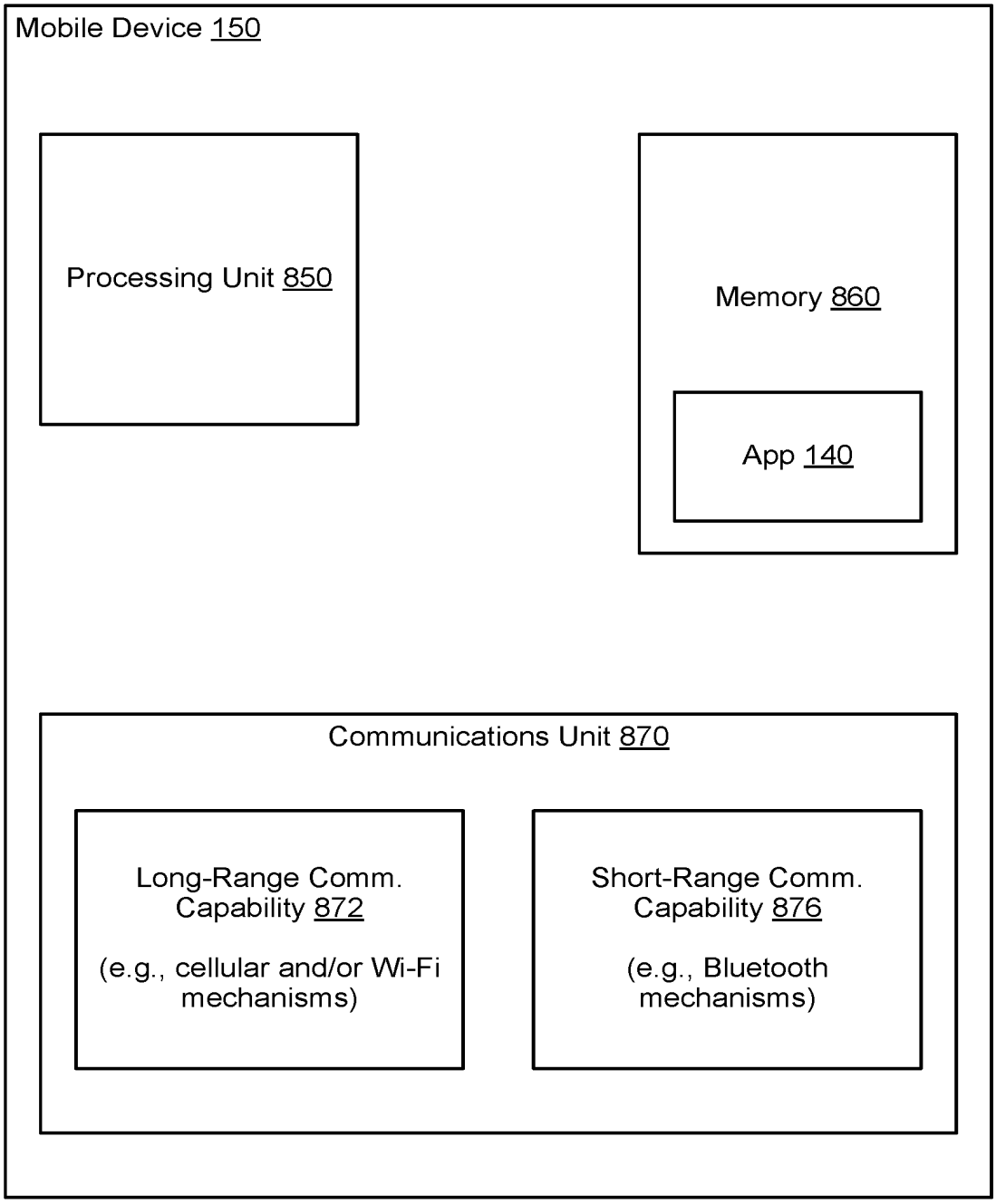

Mobile Device 150
Processing Unit 850
Memory 860
App 140
Communications Unit 870
Long-Range Comm. Capability 872
(e.g., cellular and/or Wi-Fi mechanisms)
Short-Range Comm. Capability 876
(e.g., Bluetooth mechanisms)

Figure 21

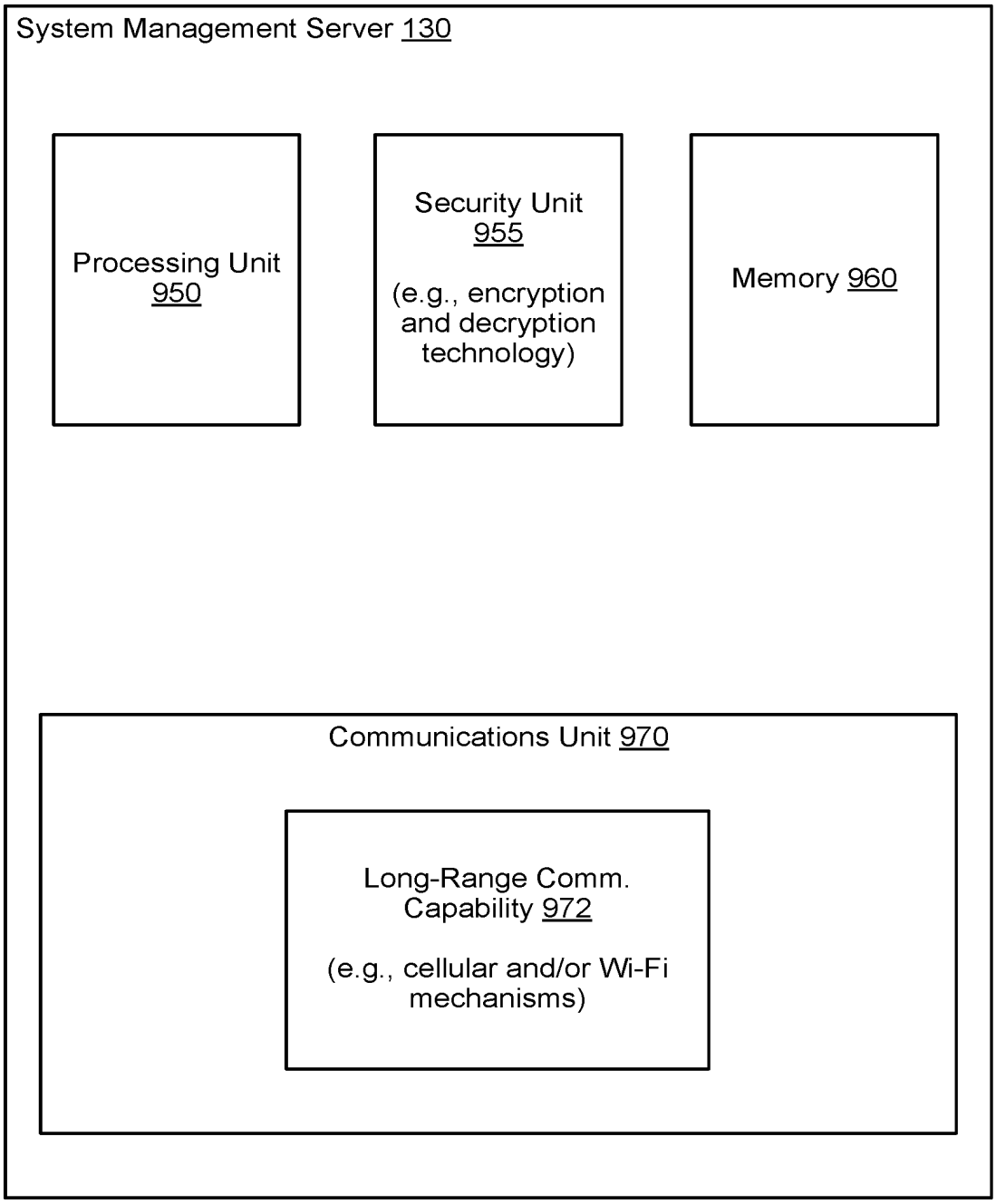

System Management Server 130
Processing Unit 950
Security Unit 955
(e.g., encryption and decryption technology)
Memory 960
Communications Unit 970
Long-Range Comm. Capability 972
(e.g., cellular and/or Wi-Fi mechanisms)

Figure 22

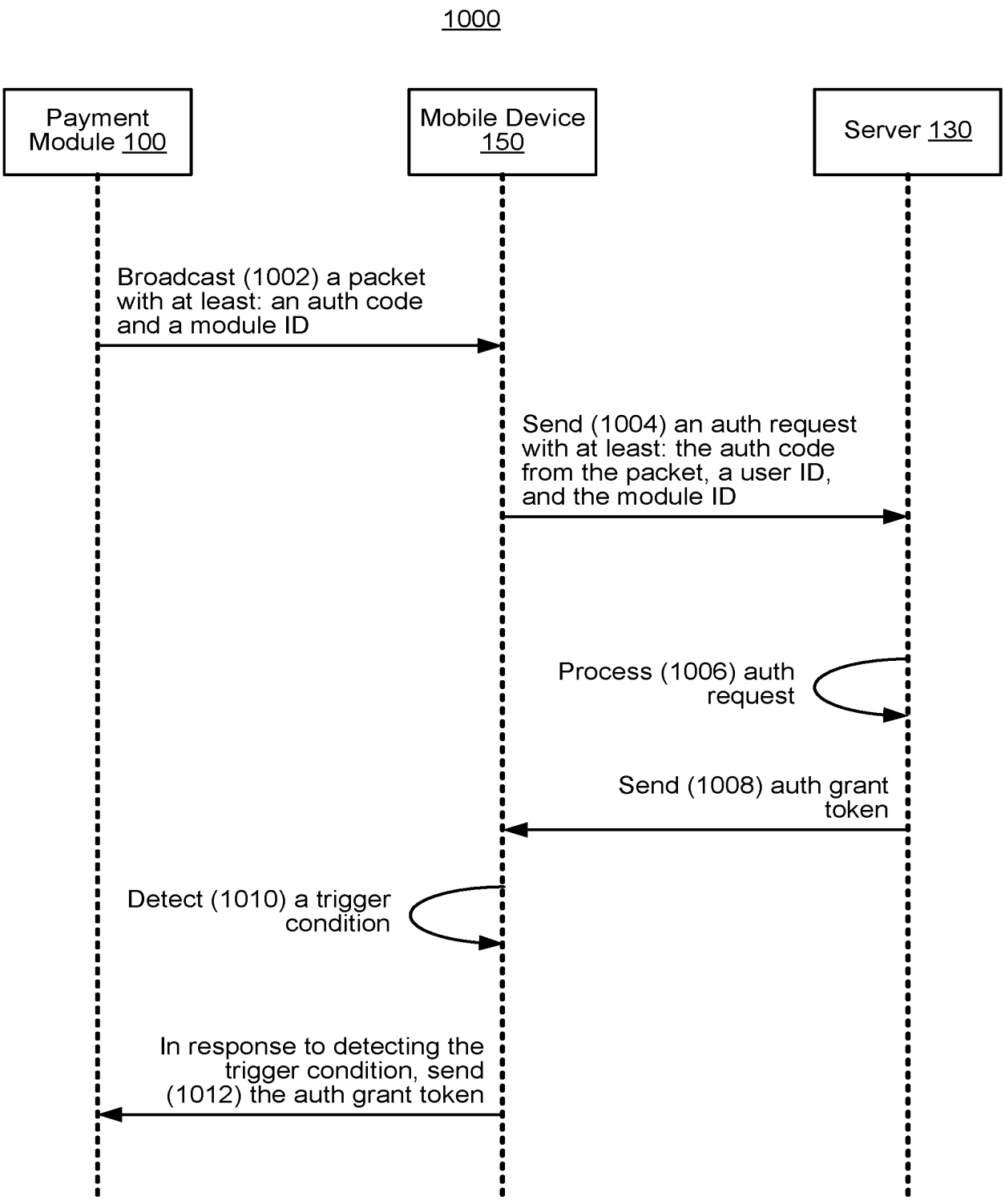

1000
Payment Module 100
Mobile Device 150
Server 130
Broadcast (1002) a packet with at least: an auth code and a module ID
Send (1004) an auth request with at least: the auth code from the packet, a user ID, and the module ID
Process (1006) auth request
Send (1008) auth grant token
Detect (1010) a trigger condition
In response to detecting the trigger condition, send (1012) the auth grant token

Figure 23

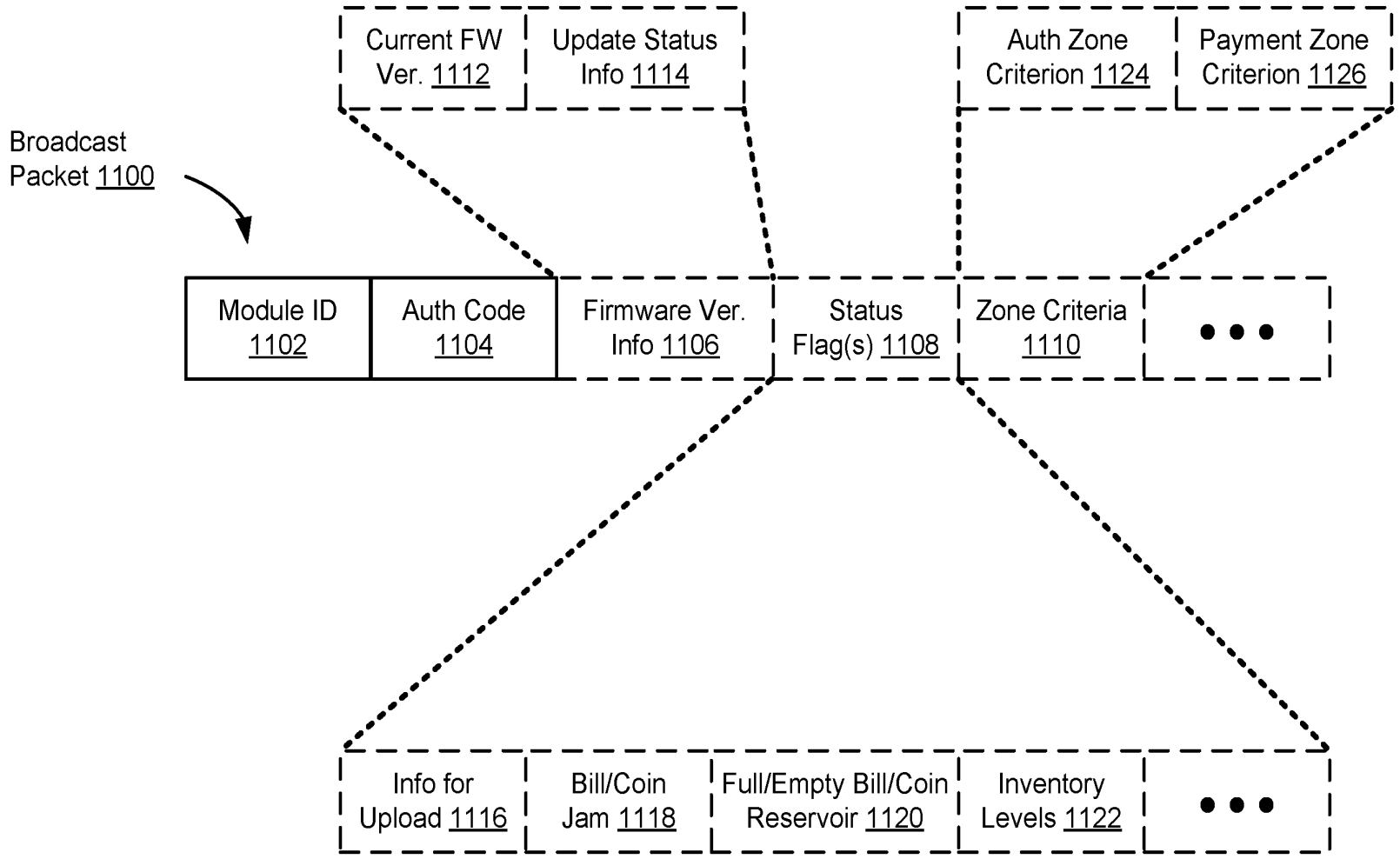


Figure 24A

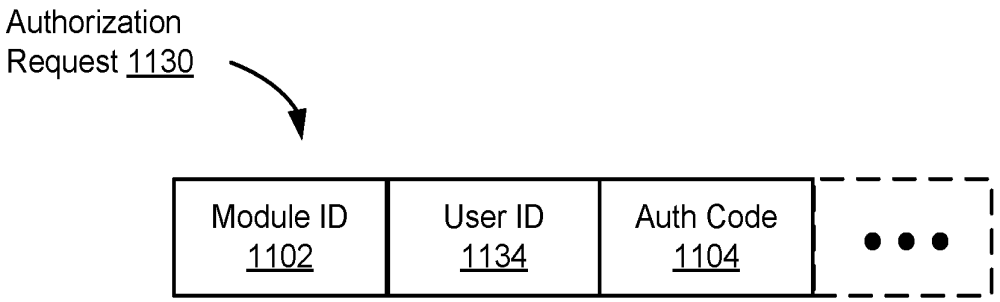


Figure 24B

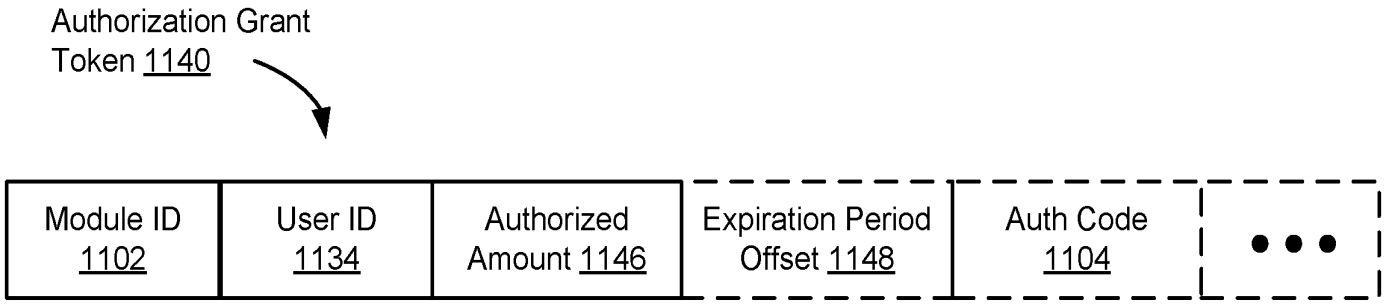


Figure 24C

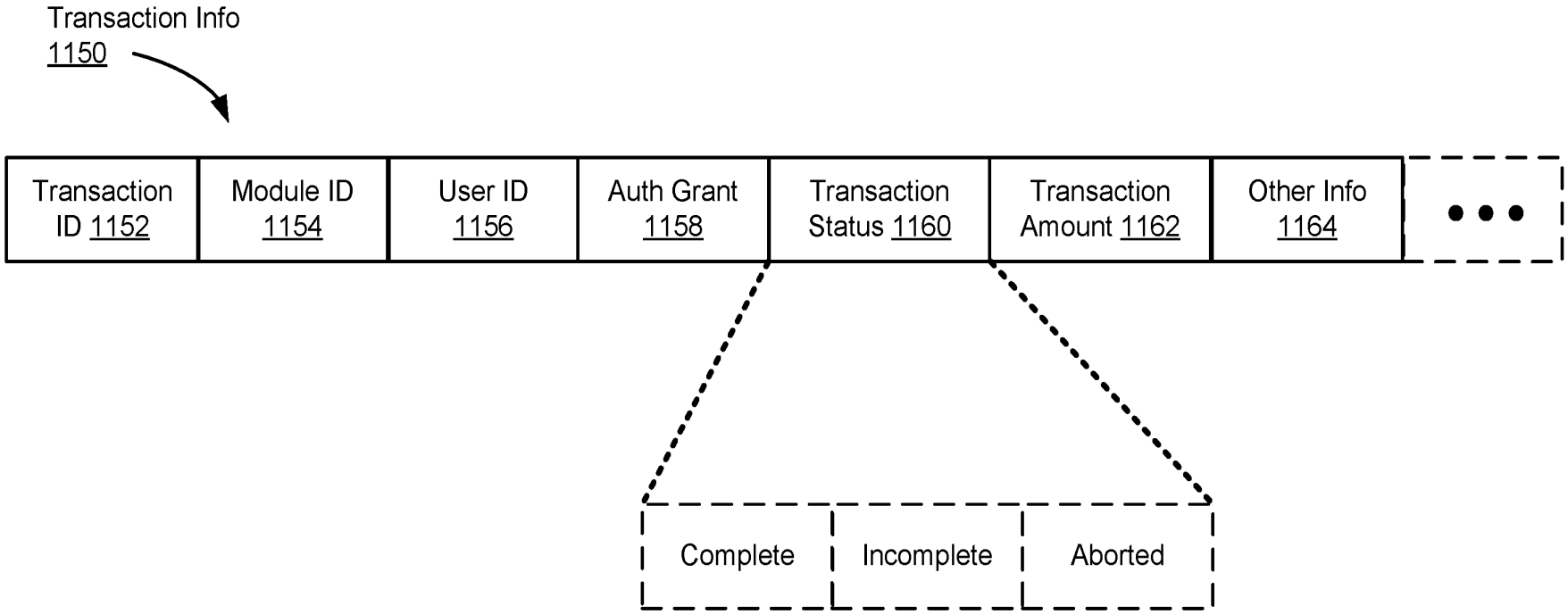


Figure 24D

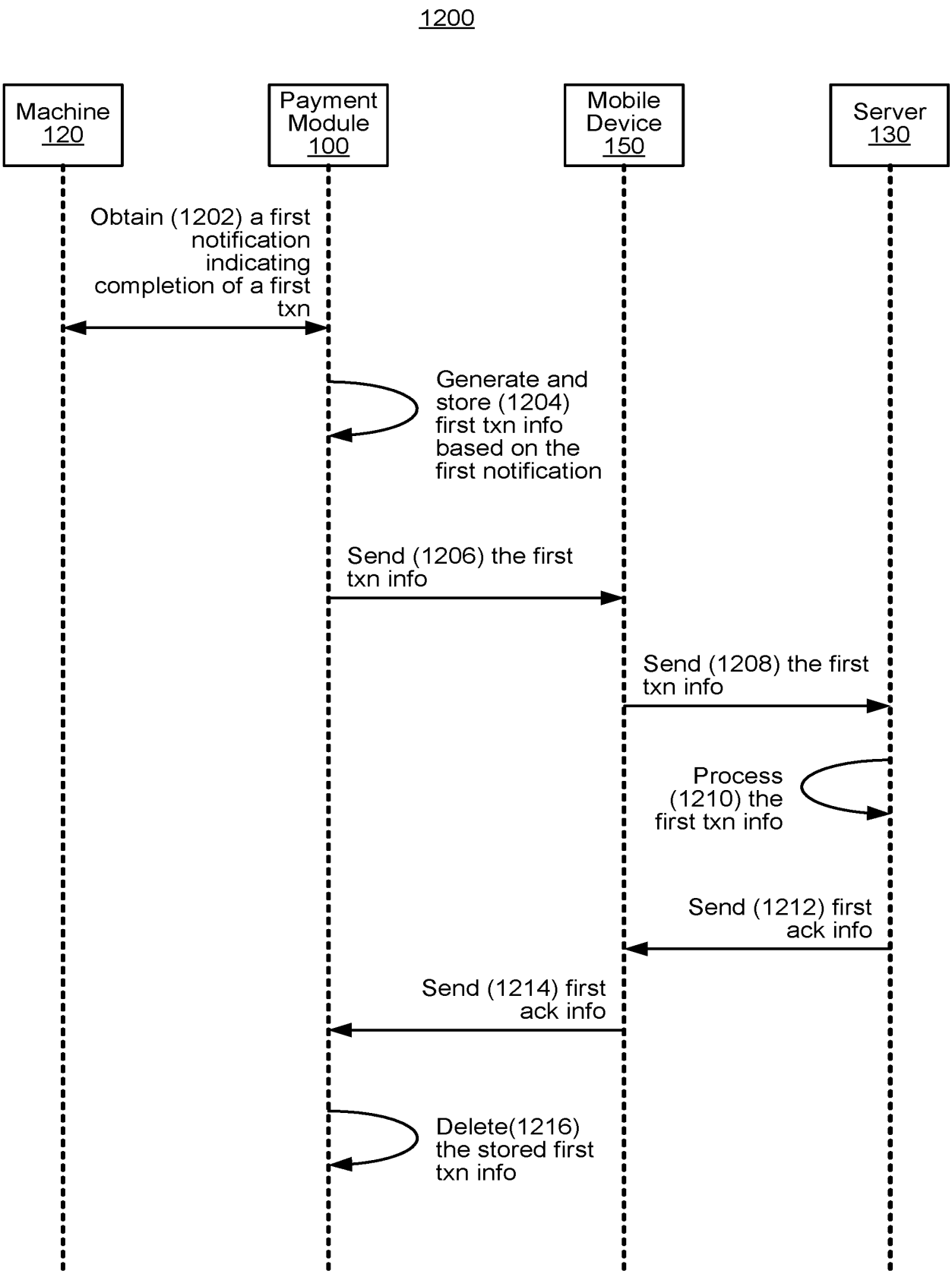

1200
Machine 120
Payment Module 100
Mobile Device 150
Server 130
Obtain (1202) a first notification indicating completion of a first txn
Generate and store (1204) first txn info based on the first notification
Send (1206) the first txn info
Send (1208) the first txn info
Process (1210) the first txn info
Send (1212) first ack info
Send (1214) first ack info
Delete(1216) the stored first txn info

Figure 25

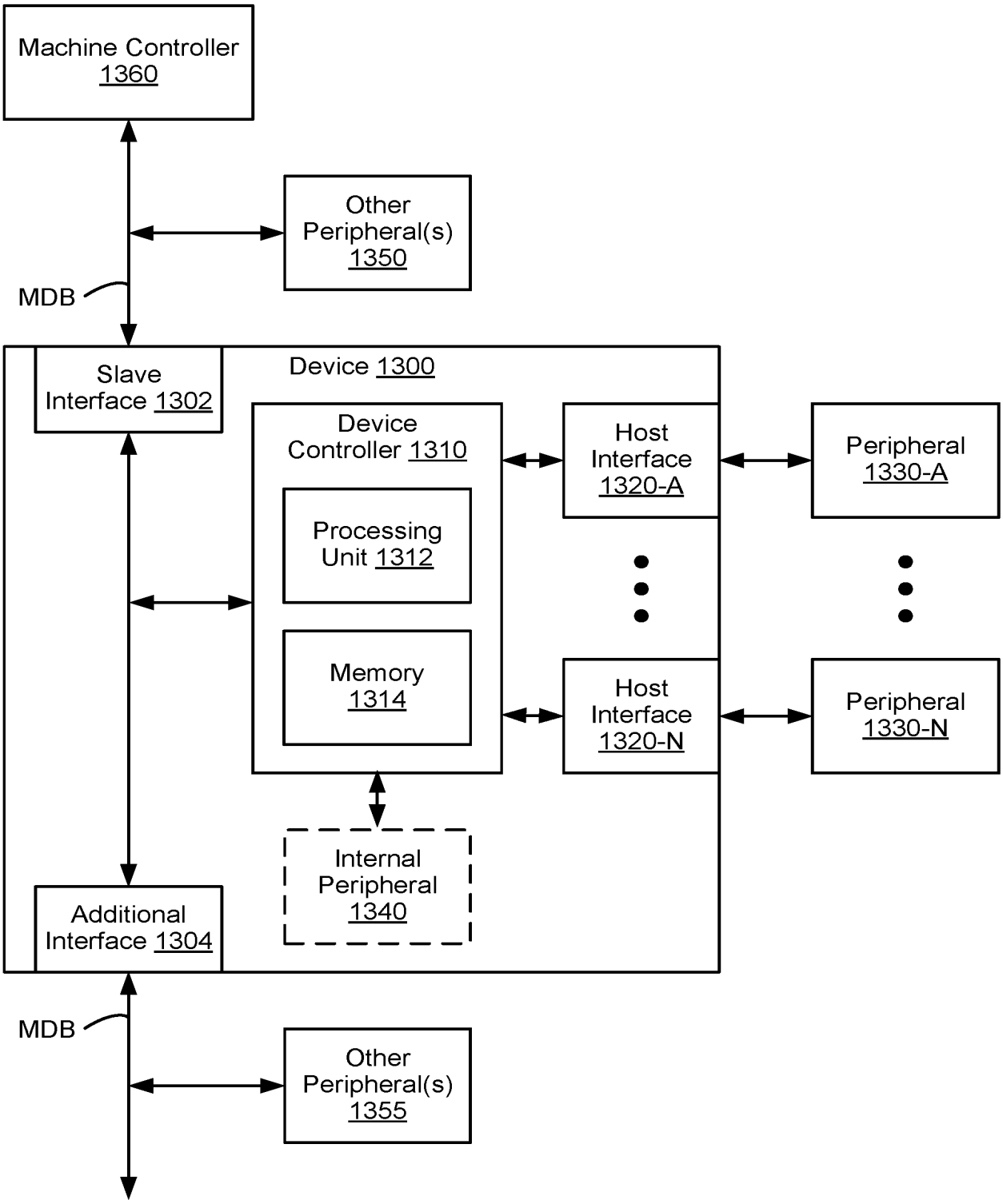

Machine Controller
1360
Other
Peripheral(s)
1350
MDB
Slave
Interface 1302
Device 1300
Device
Controller 1310
Processing
Unit 1312
Memory
1314
Host
Interface
1320-A
Host
Interface
1320-N
Peripheral
1330-A
Peripheral
1330-N
Internal
Peripheral
1340
Additional
Interface 1304
MDB
Other
Peripheral(s)
1355

Figure 26

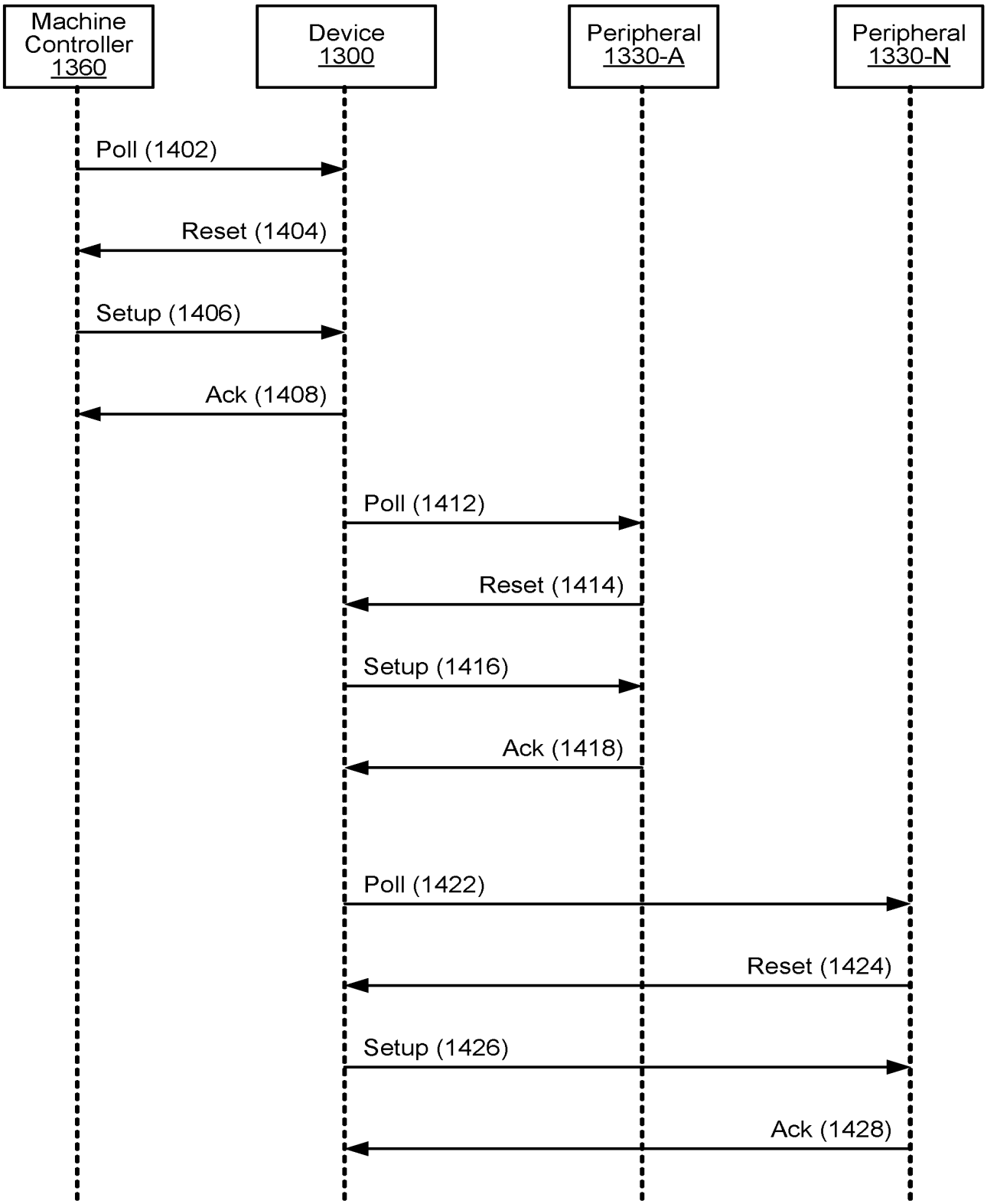

1400: Peripheral Registration Process
Machine Controller 1360
Device 1300
Peripheral 1330-A
Peripheral 1330-N
Poll (1402)
Reset (1404)
Setup (1406)
Ack (1408)
Poll (1412)
Reset (1414)
Setup (1416)
Ack (1418)
Poll (1422)
Reset (1424)
Setup (1426)
Ack (1428)

Figure 27

1500: Payment Process

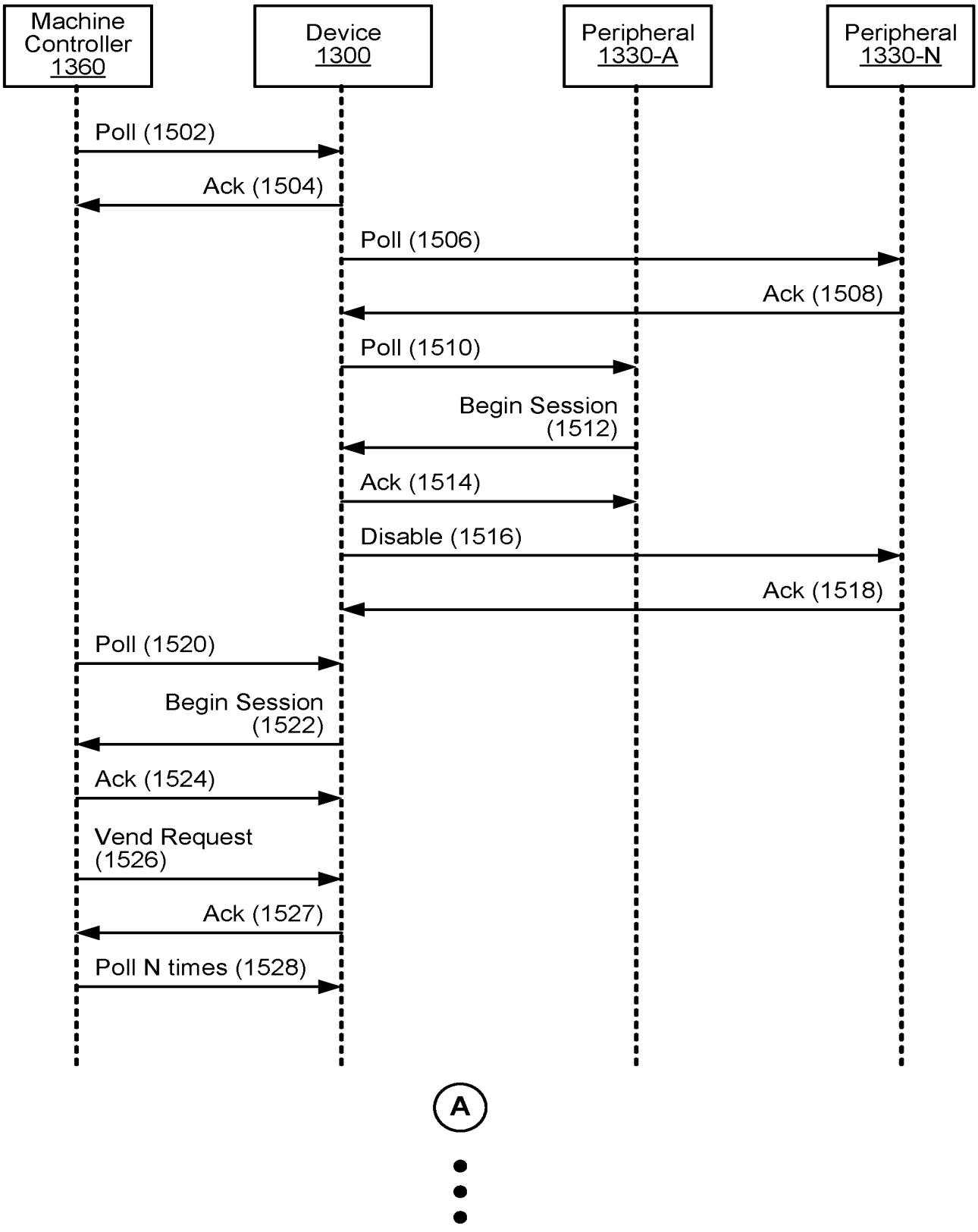


Figure 28A

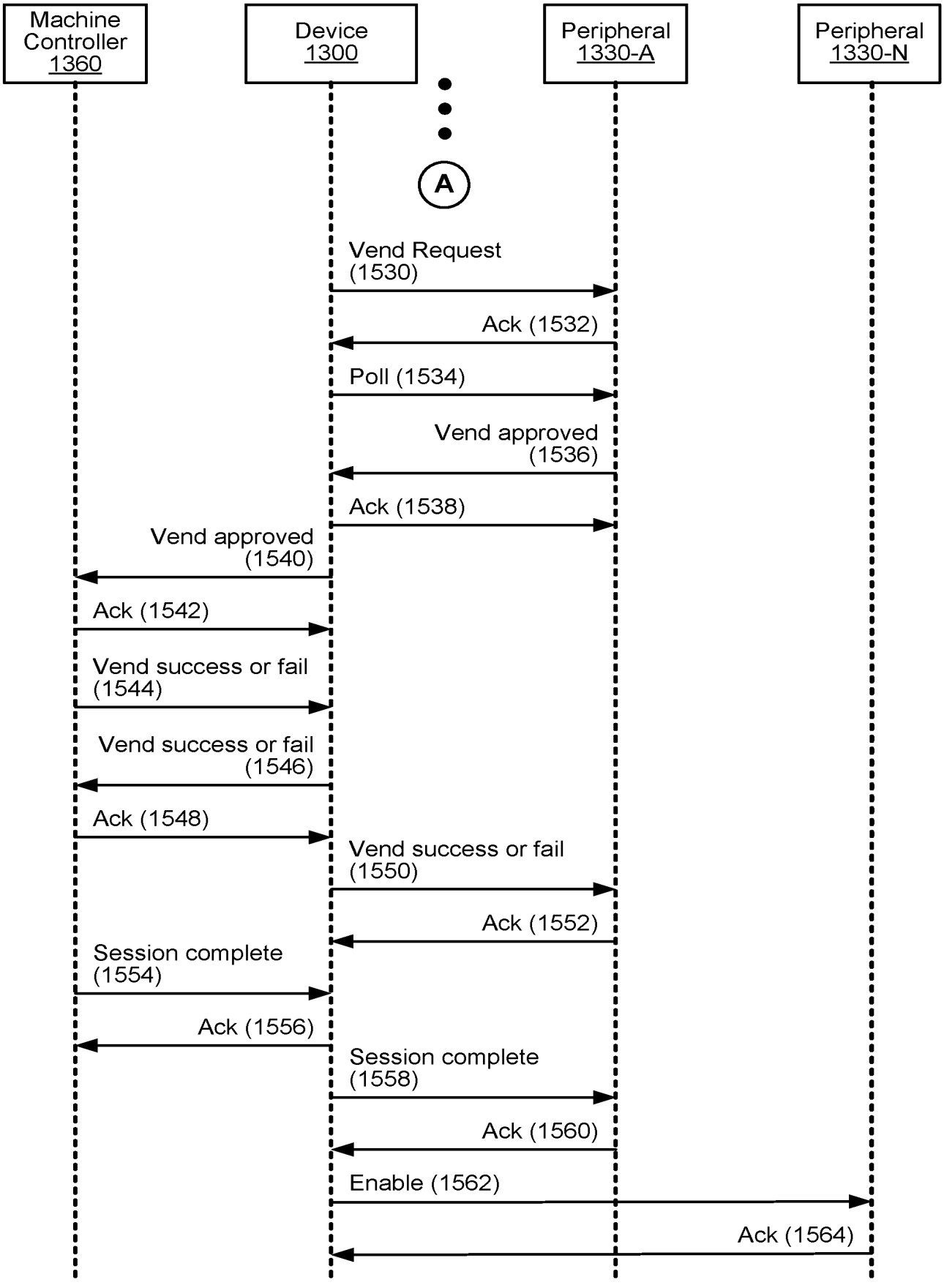

Machine Controller 1360
Device 1300
Peripheral 1330-A
Peripheral 1330-N
A
Vend Request (1530)
Ack (1532)
Poll (1534)
Vend approved (1536)
Ack (1538)
Vend approved (1540)
Ack (1542)
Vend success or fail (1544)
Vend success or fail (1546)
Ack (1548)
Vend success or fail (1550)
Ack (1552)
Session complete (1554)
Ack (1556)
Session complete (1558)
Ack (1560)
Enable (1562)
Ack (1564)

Figure 28B

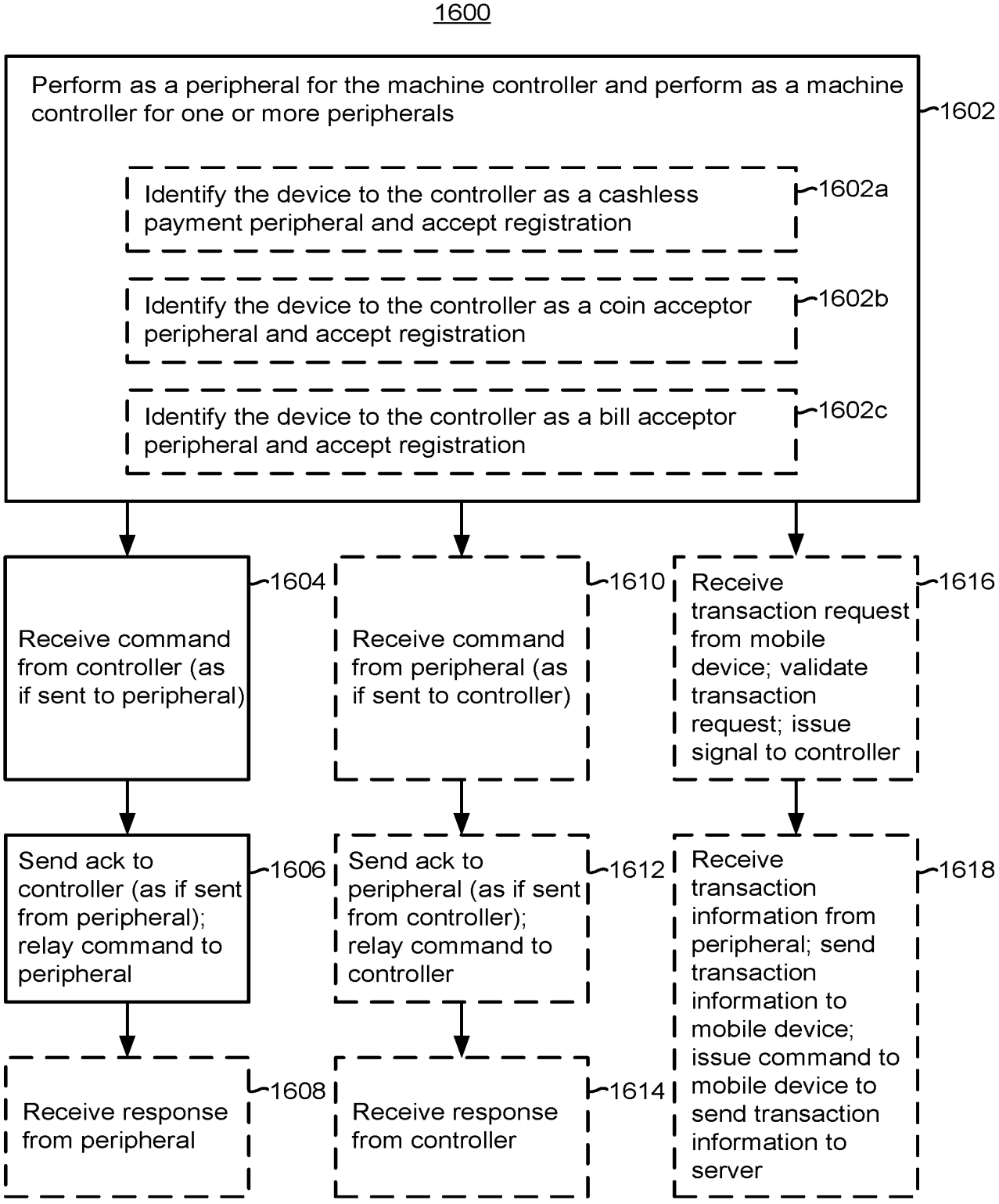

1600
Perform as a peripheral for the machine controller and perform as a machine controller for one or more peripherals
1602
Identify the device to the controller as a cashless payment peripheral and accept registration
1602a
Identify the device to the controller as a coin acceptor peripheral and accept registration
1602b
Identify the device to the controller as a bill acceptor peripheral and accept registration
1602c
Receive command from controller (as if sent to peripheral)
1604
Send ack to controller (as if sent from peripheral); relay command to peripheral
1606
Receive response from peripheral
1608
Receive command from peripheral (as if sent to controller)
1610
Send ack to peripheral (as if sent from controller); relay command to controller
1612
Receive response from controller
1614
Receive transaction request from mobile device; validate transaction request; issue signal to controller
1616
Receive transaction information from peripheral; send transaction information to mobile device; issue command to mobile device to send transaction information to server
1618

Figure 29

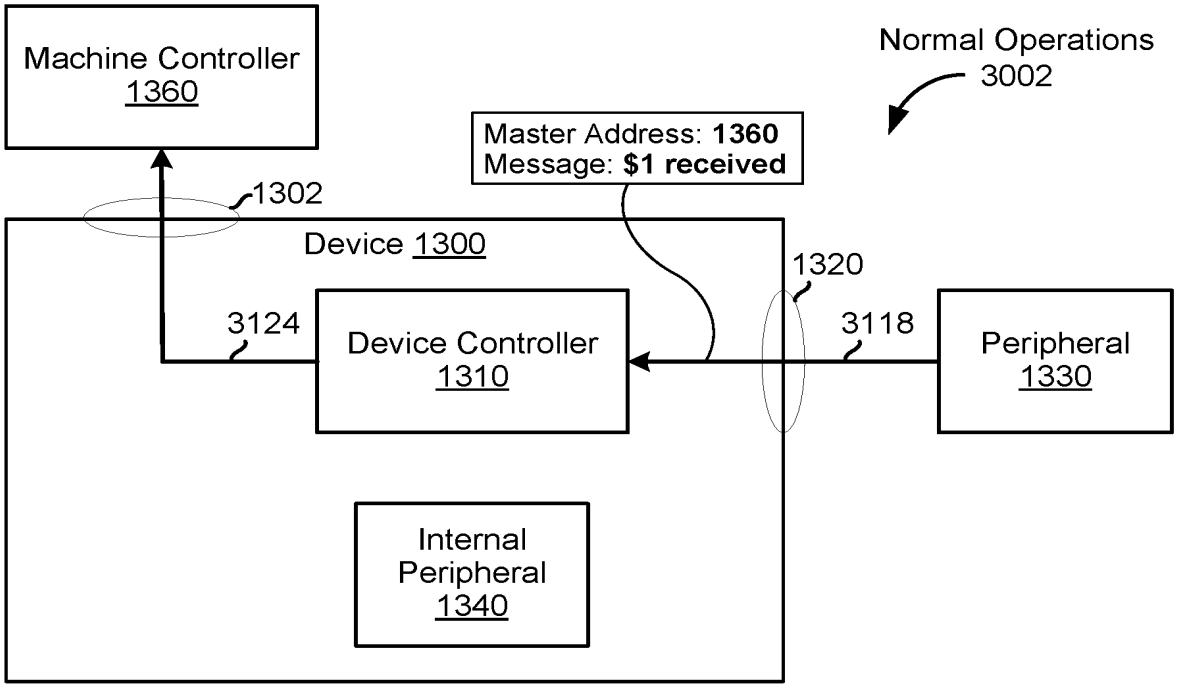


Figure 30A

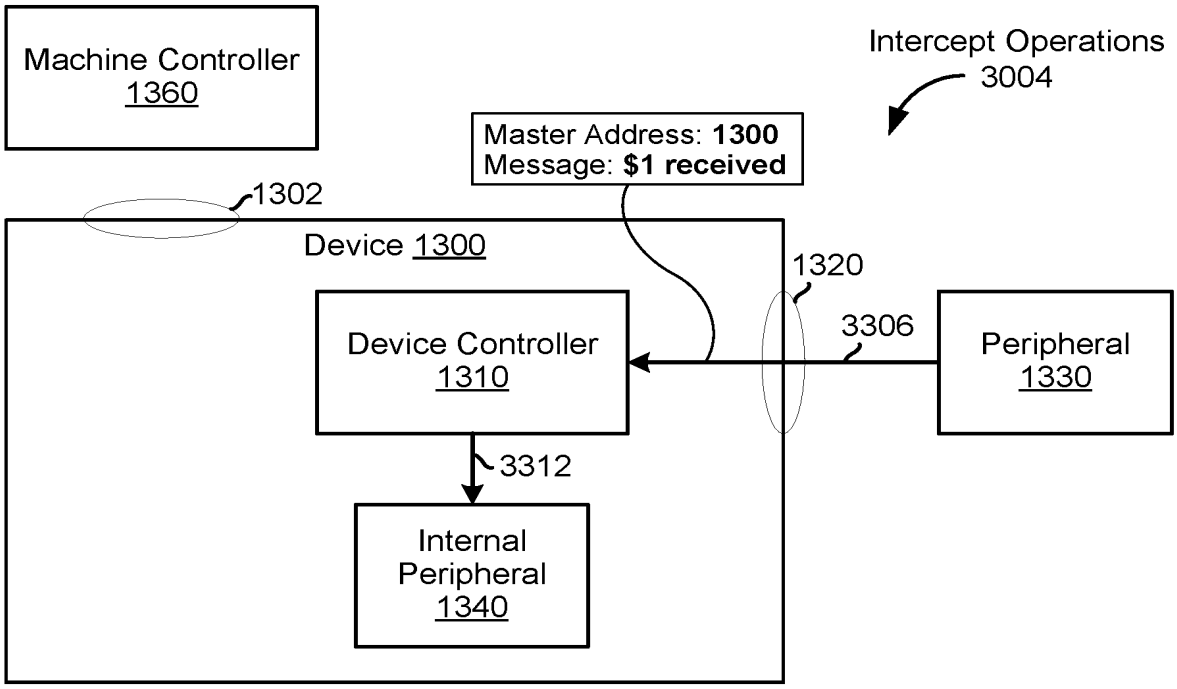


Figure 30B

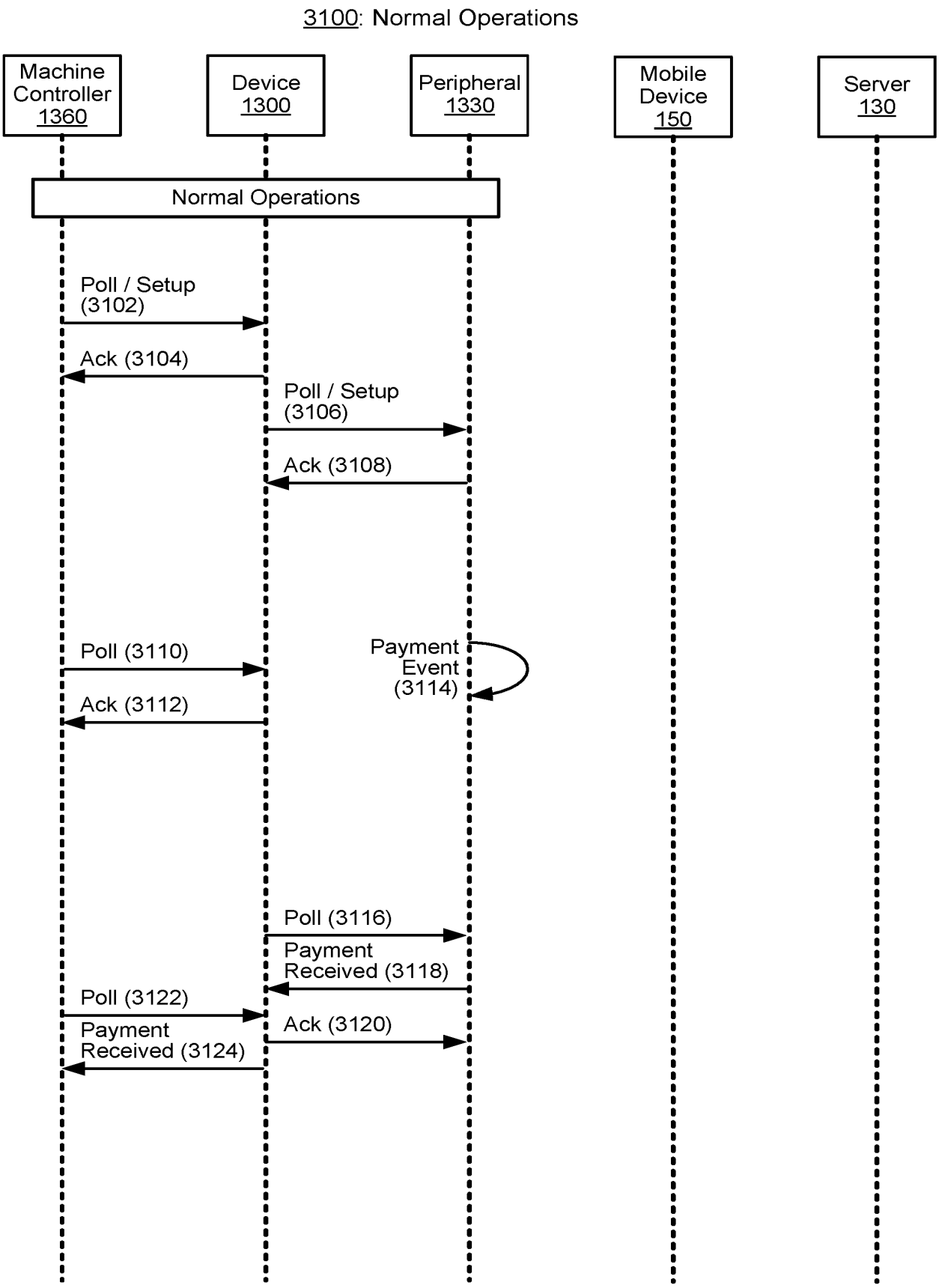

3100: Normal Operations
Machine Controller 1360
Device 1300
Peripheral 1330
Mobile Device 150
Server 130
Normal Operations
Poll / Setup (3102)
Ack (3104)
Poll / Setup (3106)
Ack (3108)
Poll (3110)
Payment Event (3114)
Ack (3112)
Poll (3116)
Payment Received (3118)
Poll (3122)
Ack (3120)
Payment Received (3124)

Figure 31

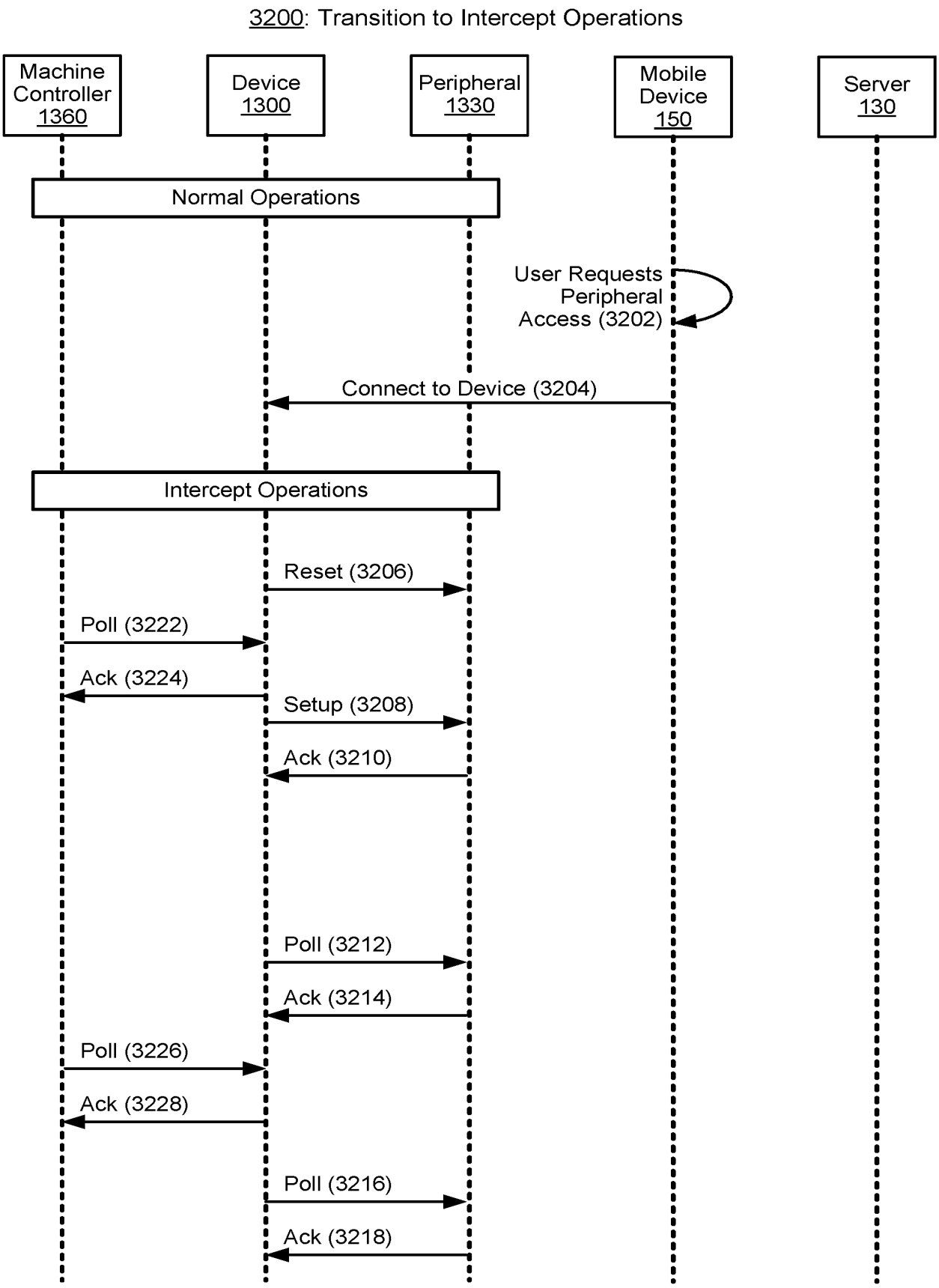

3200: Transition to Intercept Operations
Machine Controller 1360
Device 1300
Peripheral 1330
Mobile Device 150
Server 130
Normal Operations
User Requests Peripheral Access (3202)
Connect to Device (3204)
Intercept Operations
Reset (3206)
Poll (3222)
Ack (3224)
Setup (3208)
Ack (3210)
Poll (3212)
Ack (3214)
Poll (3226)
Ack (3228)
Poll (3216)
Ack (3218)

Figure 32

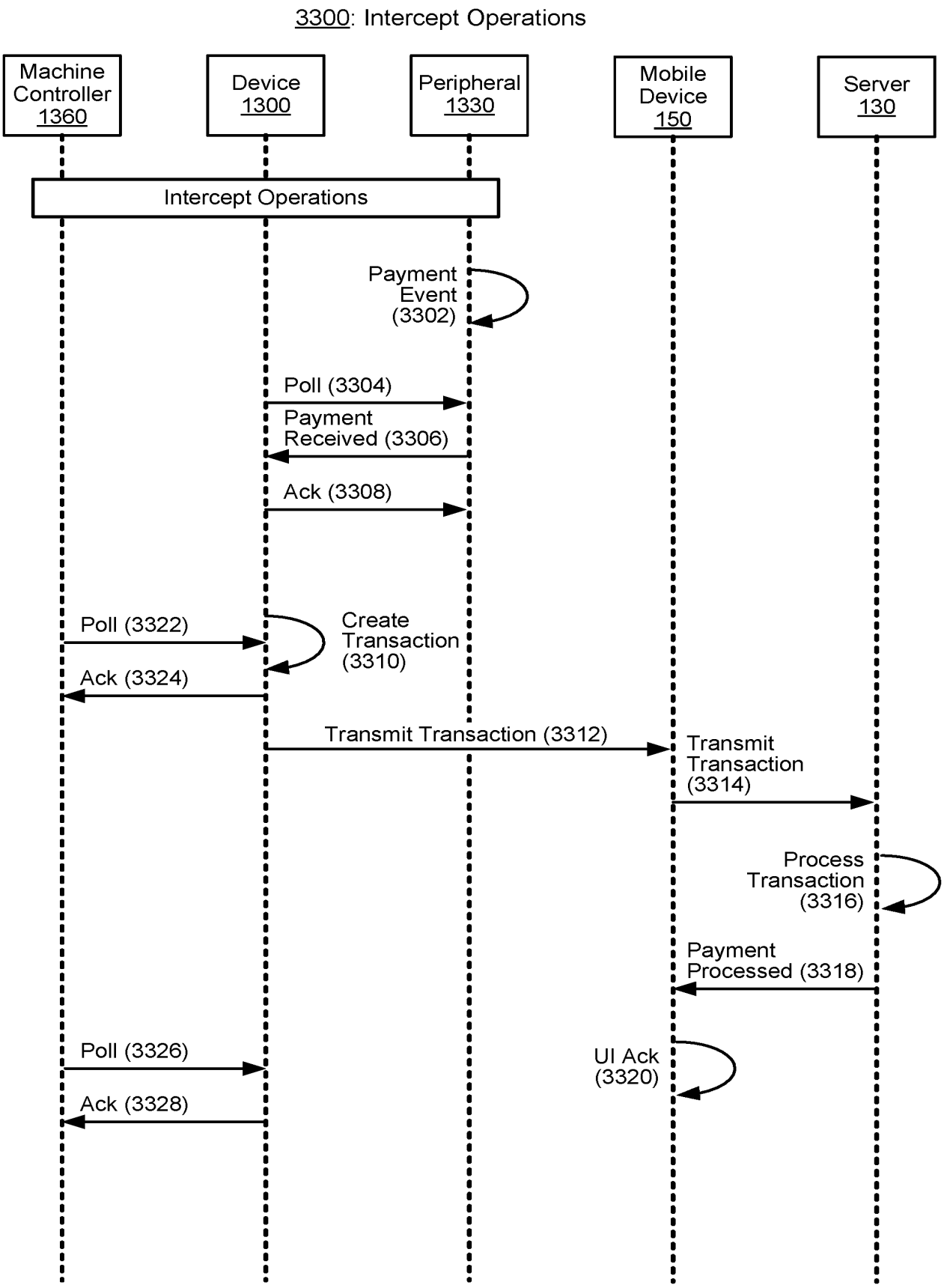

3300: Intercept Operations
Machine Controller 1360
Device 1300
Peripheral 1330
Mobile Device 150
Server 130
Intercept Operations
Payment Event (3302)
Poll (3304)
Payment Received (3306)
Ack (3308)
Poll (3322)
Create Transaction (3310)
Ack (3324)
Transmit Transaction (3312)
Transmit Transaction (3314)
Process Transaction (3316)
Payment Processed (3318)
Poll (3326)
UI Ack (3320)
Ack (3328)

Figure 33

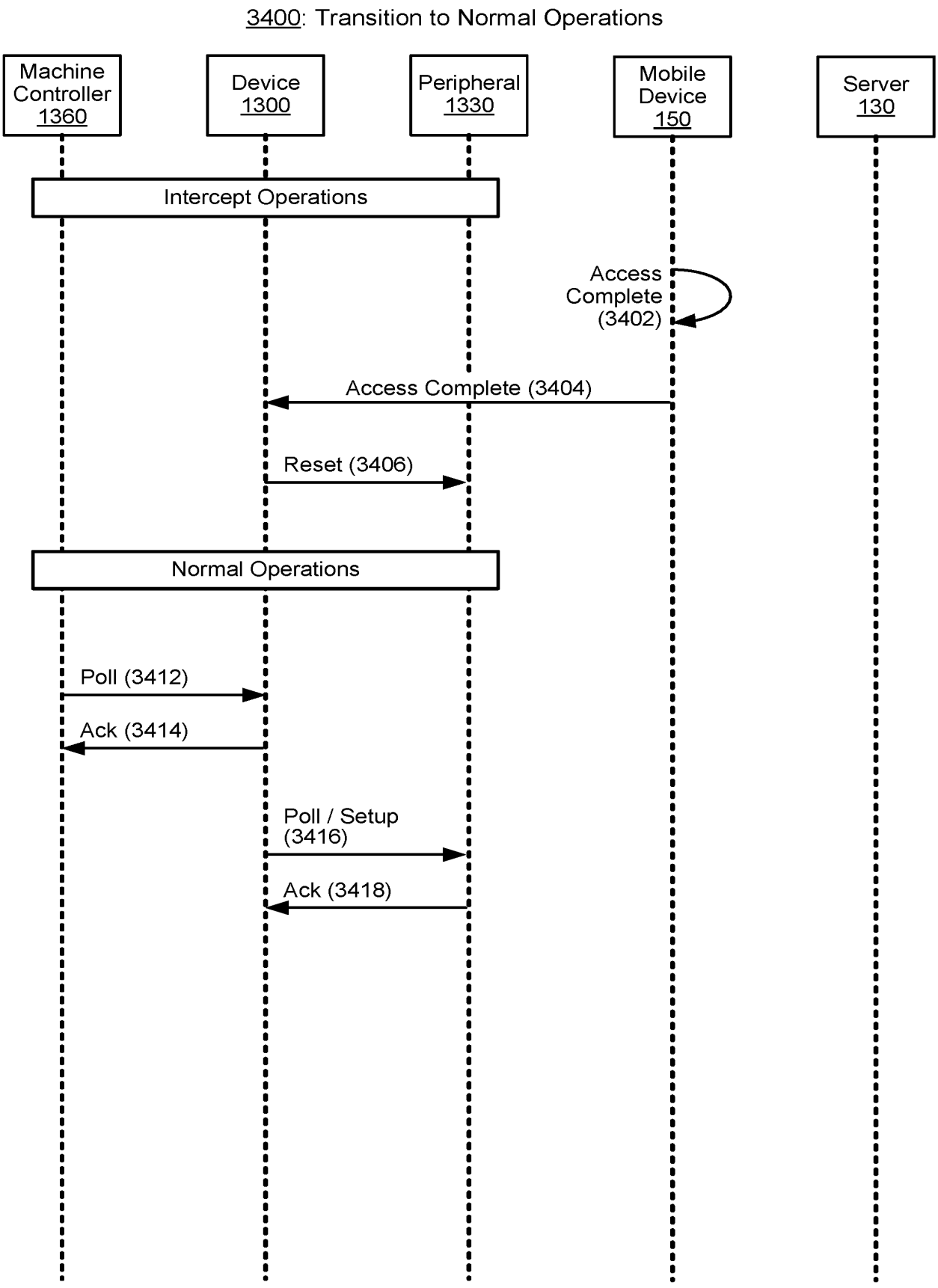

3400: Transition to Normal Operations
Machine Controller 1360
Device 1300
Peripheral 1330
Mobile Device 150
Server 130
Intercept Operations
Access Complete (3402)
Access Complete (3404)
Reset (3406)
Normal Operations
Poll (3412)
Ack (3414)
Poll / Setup (3416)
Ack (3418)

Figure 34

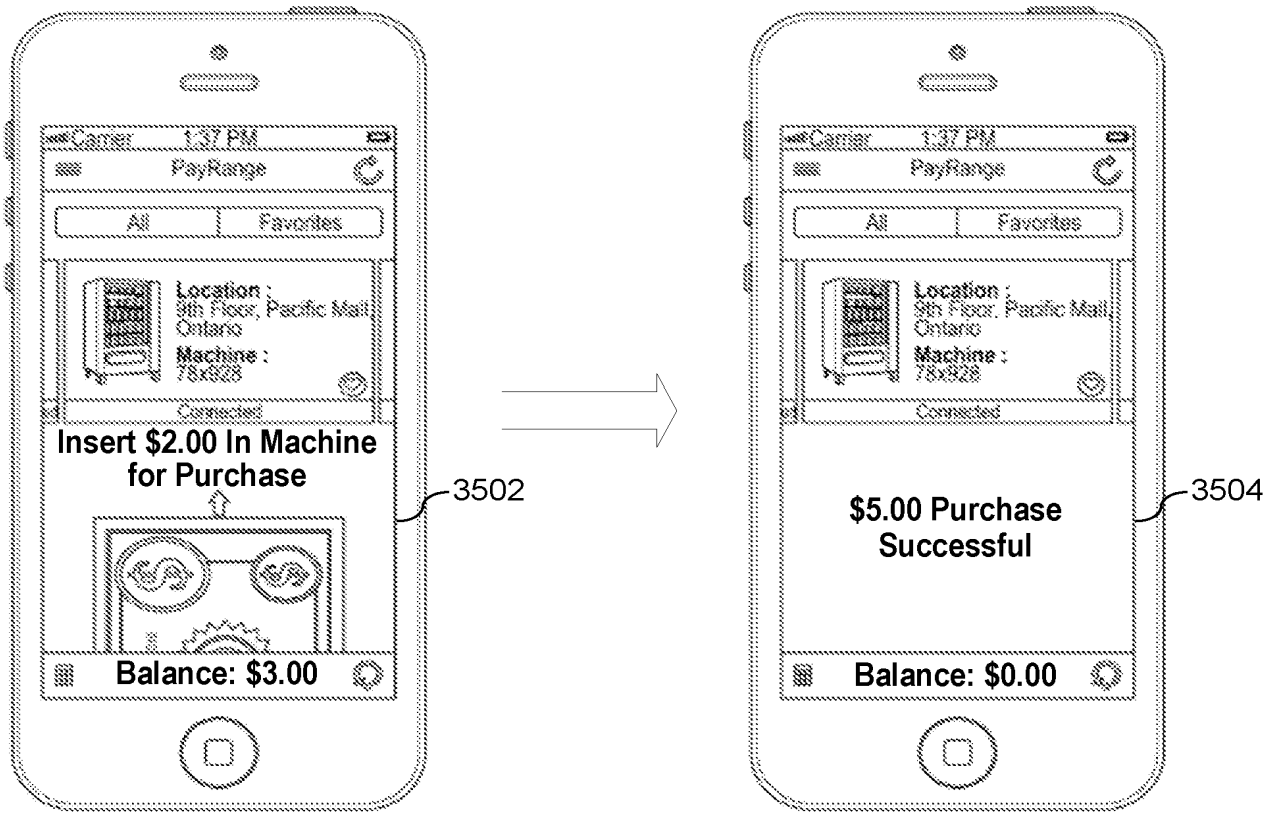


Figure 35A

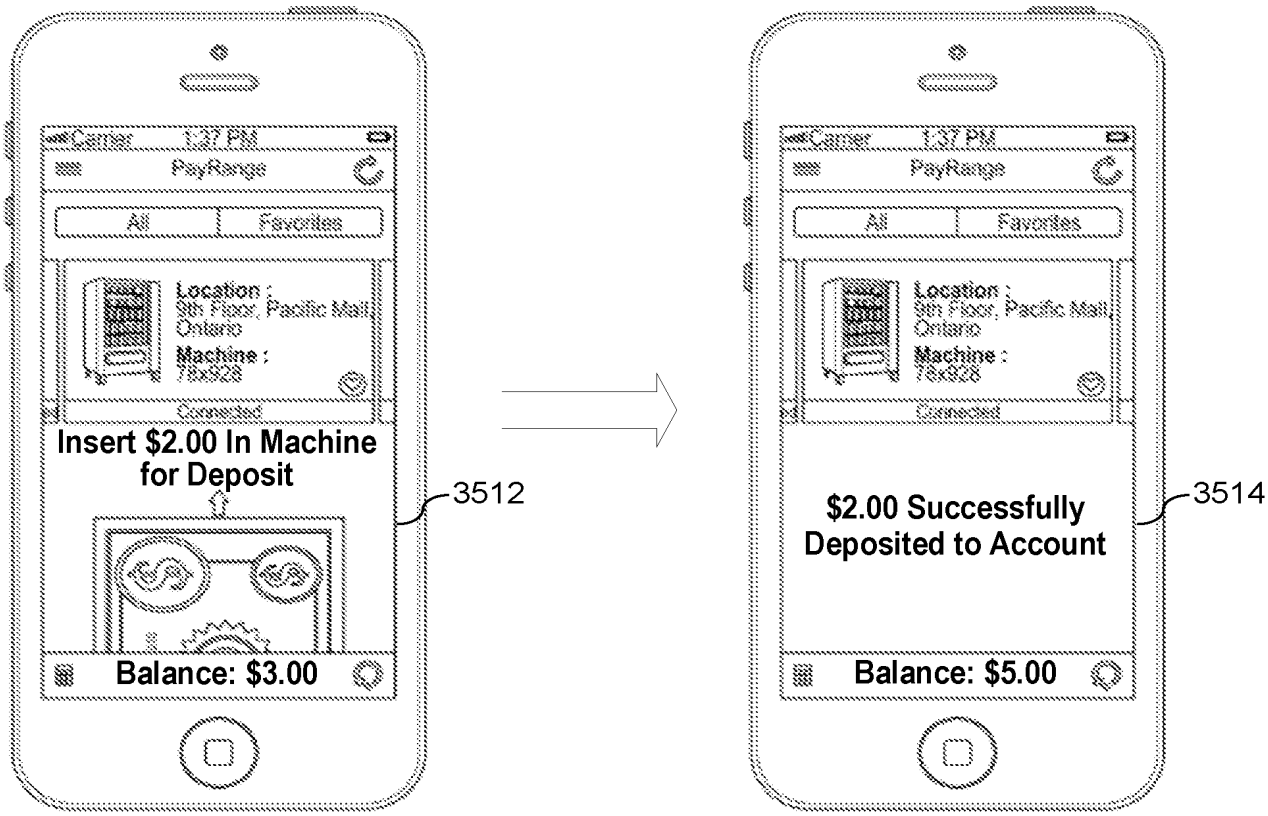


Figure 35B

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	**DEVICE AND METHOD FOR PROVIDING EXTERNAL ACCESS TO MULTI-DROP BUS PERIPHERAL DEVICES**

As the below named inventor, I hereby declare that:

This declaration is directed to:

☒ The attached application, or

☐ United States application or PCT international application number filed on

The above-identified application was made or authorized to be made by me.

I believe that I am the original and first inventor or an original joint inventor of a claimed invention in the application.

I hereby state that I have reviewed and understand the contents of the above identified application, including the claims.

I acknowledge the duty to disclose information known to me to be material to patentability as defined by 37 CFR 1.56.

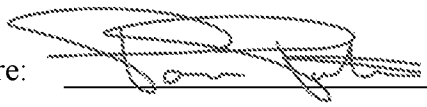
I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: **PARESH K. PATEL** Date: July 20, 2020

Signature: 

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	104402-5041-US
	Application Number	
Title of Invention	DEVICE AND METHOD FOR PROVIDING EXTERNAL ACCESS TO MULTI-DROP BUS PERIPHERAL DEVICES	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Paresh	K.	Patel	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Portland	State/Province	OR	Country of Residence	US

Mailing Address of Inventor:

Address 1	9600 NE Cascades Pkwy		
Address 2	Suite 280		
City	Portland	**State/Province**	OR
Postal Code	97220	**Country**	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	24341		
Email Address		Add Email	Remove Email

Application Information:

Title of the Invention	DEVICE AND METHOD FOR PROVIDING EXTERNAL ACCESS TO MULTI-DROP BUS PERIPHERAL DEVICES		
Attorney Docket Number	104402-5041-US	**Small Entity Status Claimed**	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	44	**Suggested Figure for Publication (if any)**	

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	104402-5041-US
	Application Number	
Title of Invention	DEVICE AND METHOD FOR PROVIDING EXTERNAL ACCESS TO MULTI-DROP BUS PERIPHERAL DEVICES	

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	24341		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the application number blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Continuation in part of	15406492	2017-01-13

Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15406492	Continuation of	14335762	2014-07-18	9547859	2017-01-17

Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14335762	Continuation of	14214644	2014-03-14	8856045	2014-10-07

Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
14214644	Claims benefit of provisional	61917936	2013-12-18
Prior Application Status	Patented		Remove

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	104402-5041-US
	Application Number	
Title of Invention	DEVICE AND METHOD FOR PROVIDING EXTERNAL ACCESS TO MULTI-DROP BUS PERIPHERAL DEVICES	

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14214644	Continuation in part of	29477025	2013-12-18	D755183	2016-05-03
Prior Application Status	Pending			Remove	
Application Number	Continuity Type		Prior Application Number	Filing Date (YYYY-MM-DD)	
	Continuation in part of		16029483	2018-07-06	
Prior Application Status	Patented			Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16029483	Continuation of	14611065	2015-01-30	10019724	2018-07-10
Prior Application Status	Pending			Remove	
Application Number	Continuity Type		Prior Application Number	Filing Date (YYYY-MM-DD)	
	Continuation in part of		15893514	2018-02-09	
Prior Application Status	Expired			Remove	
Application Number	Continuity Type		Prior Application Number	Filing Date (YYYY-MM-DD)	
15893514	Continuation of		PCT/US2017/015676	2017-01-30	
Prior Application Status	Expired			Remove	
Application Number	Continuity Type		Prior Application Number	Filing Date (YYYY-MM-DD)	
PCT/US2017/015676	Claims benefit of provisional		62289158	2016-01-29	
Prior Application Status	Abandoned			Remove	
Application Number	Continuity Type		Prior Application Number	Filing Date (YYYY-MM-DD)	
15893514	Continuation in part of		14641236	2015-03-06	
Prior Application Status	Expired			Remove	
Application Number	Continuity Type		Prior Application Number	Filing Date (YYYY-MM-DD)	
14641236	Claims benefit of provisional		62081492	2014-11-18	
Prior Application Status	Abandoned			Remove	
Application Number	Continuity Type		Prior Application Number	Filing Date (YYYY-MM-DD)	
14641236	Continuation in part of		14320534	2014-06-30	
Prior Application Status	Patented			Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14320534	Continuation in part of	14214644	2014-03-14	8856045	2014-10-07
Prior Application Status	Expired			Remove	
Application Number	Continuity Type		Prior Application Number	Filing Date (YYYY-MM-DD)	
14214644	Claims benefit of provisional		61917936	2013-12-18	
Prior Application Status	Patented			Remove	

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	104402-5041-US
	Application Number	
Title of Invention	DEVICE AND METHOD FOR PROVIDING EXTERNAL ACCESS TO MULTI-DROP BUS PERIPHERAL DEVICES	

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14214644	Continuation in part of	29477025	2013-12-18	D755183	2016-05-03

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Authorization to Permit Access:

☐ Authorization to Permit Access to the Instant Application by the Participating Offices

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	104402-5041-US
	Application Number	
Title of Invention	DEVICE AND METHOD FOR PROVIDING EXTERNAL ACCESS TO MULTI-DROP BUS PERIPHERAL DEVICES	

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date o f filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

◉ Assignee	○ Legal Representative under 35 U.S.C. 117	○ Joint Inventor
○ Person to whom the inventor is obligated to assign.	○ Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor :

If the Applicant is an Organization check here. ☒

Organization Name	PAYRANGE INC.

Mailing Address Information For Applicant:

Address 1	9600 NE Cascades Pkwy		
Address 2	Suite 280		
City	Portland	**State/Province**	OR
Country	US	Postal Code	97220
Phone Number		Fax Number	

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	104402-5041-US
	Application Number	
Title of Invention	DEVICE AND METHOD FOR PROVIDING EXTERNAL ACCESS TO MULTI-DROP BUS PERIPHERAL DEVICES	

Email Address	

Additional Applicant Data may be generated within this form by selecting the Add button.

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not subsitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication . An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.

Signature:

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Signature	/Douglas J. Crisman/			Date (YYYY-MM-DD)	2020-07-21
First Name	Douglas J.	Last Name	Crisman	Registration Number	39951

Additional Signature may be generated within this form by selecting the Add button.

PTO/AIA/14 (11-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	104402-5041-US
	Application Number	
Title of Invention	DEVICE AND METHOD FOR PROVIDING EXTERNAL ACCESS TO MULTI-DROP BUS PERIPHERAL DEVICES	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent C o o p eration Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronically filed July 20, 2020

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of:	Paresh K. Patel	Confirmation No.:	To be assigned
Serial No.:	To be assigned	Art Unit	To be assigned
Filed:	July 20, 2020	Examiner:	To be assigned
For:	*DEVICE AND METHOD FOR PROVIDING EXTERNAL ACCESS TO MULTI-DROP BUS PERIPHERAL DEVICES*	Attorney Docket No.:	104402-5041-US

STATEMENT UNDER 37 C.F.R. § 3.73(c)

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

PAYRANGE INC., a corporation, states that it is the assignee of the entire right, title and interest in the patent application identified above by virtue of an assignment from the inventor of the patent application identified above.

The assignment was recorded in the United States Patent and Trademark Office on _____ at Reel _____, Frame _____, or for which a copy thereof is attached.

The undersigned is authorized to act on behalf of the assignee.

Date: July 20, 2020

/Douglas J. Crisman/ 39,951

Douglas J. Crisman (Reg. No.)
MORGAN, LEWIS & BOCKIUS LLP
1400 Page Mill Road
Palo Alto, CA 94304
(650) 843-4000

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

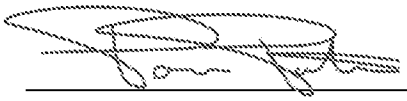
I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint the practitioners of Morgan, Lewis & Bockius LLP, Customer Number **24341** as attorneys or agents to represent the undersigned and to transact all business before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications and patents assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 C.F.R. § 3.73(c), said appointment to be to the exclusion of the inventor(s) and their attorney(s) in accordance with the provisions of 37 C.F.R. § 3.71, provided that, if any one of these attorneys ceases being affiliated with the law firm of Morgan, Lewis & Bockius LLP as partner, counsel, or employee, then the appointment of that attorney and all powers derived therefrom shall terminate on the date such attorney ceases being so affiliated.

Assignee Name and Address: PAYRANGE INC.
9600 NE Cascades Pkwy, Suite 280
Portland, OR 97220

SIGNATURE of Assignee of Record

The undersigned whose signature and title is supplied below is authorized to act on behalf of the assignee.

Signature 

Name Paresh K. Patel, Ph.D., MBA Date February 9, 2018

Title CEO, PayRange Inc. Telephone (855) 856-6398

A copy of this form, together with a statement under 37 C.F.R. § 3.73(c) (Form PTO/SB96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 C.F.R. § 3.73(c) may be completed by one of the practitioners appointed in this form if the appointed practitioner is authorized to act on behalf of the assignee and must identify the application in which this Power of Attorney is to be filed.

ASSIGNMENT

WHEREAS, I, **PARESH K. PATEL**, citizen of U.S., residing in Portland, OR, ASSIGNOR, am the inventor of the invention in **DEVICE AND METHOD FOR PROVIDING EXTERNAL ACCESS TO MULTI-DROP BUS PERIPHERAL DEVICES**, described in an application for a Patent of the United States

☐ which is executed on ☐ even date herewith
☒ which is identified by Morgan, Lewis & Bockius LLP docket no. 104402-5041-US
☐ which was filed on _____, Application No. _____
☐ which claims priority on U.S. Provisional Patent Application No(s). _____
☒ I hereby authorize and request my attorney, Douglas J. Crisman, of Morgan, Lewis & Bockius LLP, to insert here in parenthesis (Application number _____ _____, filed _____) the filing date and application number of said application when known.

and WHEREAS, **PAYRANGE INC.**, ASSIGNEE, having a place of business at 9600 NE Cascades Pkwy, Suite 280, Portland, OR 97220, is desirous of obtaining my entire right, title and interest in, to and under the said invention and the said application:

NOW, THEREFORE, let it be known that for and in consideration of the sum of One Dollar ($1.00) to me paid, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, I, the said ASSIGNOR, have sold, assigned, transferred and set over, and by these presents do hereby sell, assign, transfer and set over, unto the said ASSIGNEE, its successors, legal representatives and assigns, my entire right, title and interest in, to and under the said invention, and the said United States application and all divisions, renewals and continuations thereof, and any substitute applications therefore, and all Patents of the United States which may be granted thereon and all reissues and extensions thereof; the said United States provisional patent application(s), if any, on which the said United States application claims priority; and all applications for industrial property protection, including, without limitation, all applications for patents, utility models, and designs which may hereafter be filed for said invention in any country or countries foreign to the United States, together with the right to file such applications and the right to claim for the same the priority rights derived from said United States application and said United States provisional patent application(s), if any, under the Patent Laws of the United States, the International Convention for the Protection of Industrial Property, or any other international agreement or the domestic laws of the country in which any such application is filed, as may be applicable; and all forms of industrial property protection, including, without limitation, patents, utility models, inventors' certificates and designs which may be granted for said invention in any country or countries foreign to the United States and all extensions, renewals and reissues thereof;

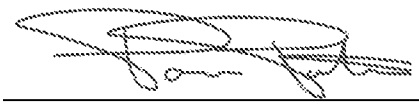
AND I HEREBY authorize and request the Commissioner of Patents and Trademarks of the United States, and any Official of any country or countries foreign to the United States, whose duty it is to issue patents or other evidence or forms of industrial property protection on applications as aforesaid, to issue the same to the said ASSIGNEE, its successors, legal representatives and assigns, in accordance with the terms of this instrument.

AND I HEREBY covenant and agree that I have full right to convey the entire interest herein assigned, and that I have not executed, and will not execute, any agreement in conflict herewith.

AND I HEREBY further covenant and agree that I will communicate to the said ASSIGNEE, its successors, legal representatives and assigns, any facts known to us respecting said invention, and testify in any legal proceeding, sign all lawful papers, execute all divisional, continuing, reissue and foreign applications, make all rightful oaths, and generally do everything possible to aid the said ASSIGNEE, its successors, legal representatives and assigns, to obtain and enforce proper protection for said invention in all countries.

IN TESTIMONY WHEREOF, I hereunto set my hand and seal the day and year set opposite my respective signature.

Date July 20, 2020



_____ L.S.
PARESH K. PATEL

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	DEVICE AND METHOD FOR PROVIDING EXTERNAL ACCESS TO MULTI-DROP BUS PERIPHERAL DEVICES
First Named Inventor/Applicant Name:	Paresh K. Patel
Filer:	Douglas James Crisman/Linda Quintana
Attorney Docket Number:	104402-5041-US

Filed as Small Entity

Filing Fees for Track I Prioritized Examination - Nonprovisional Application under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
UTILITY FILING FEE (ELECTRONIC FILING)	4011	1	75	75
UTILITY SEARCH FEE	2111	1	330	330
UTILITY EXAMINATION FEE	2311	1	380	380
REQUEST FOR PRIORITIZED EXAMINATION	2817	1	2000	2000
Pages:				
Claims:				
Miscellaneous-Filing:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
PUBL. FEE- EARLY, VOLUNTARY, OR NORMAL	1504	1	0	0
PROCESSING FEE, EXCEPT PROV. APPLS.	2830	1	70	70

Petition:	
Patent-Appeals-and-Interference:	
Post-Allowance-and-Post-Issuance:	
Extension-of-Time:	
Miscellaneous:	
Total in USD ($)	**2855**

Electronic Acknowledgement Receipt

EFS ID:	40064894
Application Number:	16934933
International Application Number:	
Confirmation Number:	1013
Title of Invention:	DEVICE AND METHOD FOR PROVIDING EXTERNAL ACCESS TO MULTI-DROP BUS PERIPHERAL DEVICES
First Named Inventor/Applicant Name:	Paresh K. Patel
Customer Number:	24341
Filer:	Douglas James Crisman/Linda Quintana
Filer Authorized By:	Douglas James Crisman
Attorney Docket Number:	104402-5041-US
Receipt Date:	21-JUL-2020
Filing Date:	
Time Stamp:	18:12:40
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$2855
RAM confirmation Number	E20207KI13190528
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal of New Application	104402-5041-US_Transmittal.pdf	164907 d0db45e1fc2d909a26fa2014f5a0281818b9e9ac	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	104402-5041-US_FeeWorkshet.pdf	128131 2bb1ce3872b3a9605a6f795d26de71b1ee66becf	no	1
Warnings:					
Information:					
3	TrackOne Request	104402-5041-US_Track1Request.pdf	126218 cc8d3c73632d43b2a4ffe6ee760c056a007c6aef	no	1
Warnings:					
Information:					
4		104402-5041-US_Specification.pdf	334644 38b97e8143f10a43f7c0b88355ec51ea451e7d21	yes	81

Multipart Description/PDF files in .zip description

Document Description	Start	End
Specification	1	72
Claims	73	80
Abstract	81	81

Warnings:					
Information:					
5	Drawings-only black and white line drawings	104402-5041-US_Figures.pdf	4366665 77dc28b6766d8d21661327aa2d6f598e82d521e1	no	44

Warnings:					
Information:					
6	Oath or Declaration filed	104402-5041-US_FullyExecutedDeclaration.pdf	143468 c105892e19e6008cd9fd6da0a1a3310ba85a0808	no	1
Warnings:					
Information:					
7	Application Data Sheet	104402-5041-US_ADS.pdf	113813 b3c4659ae08a747a239c59d0cfe16da18084339d	no	8
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					
8	Miscellaneous Incoming Letter	104402-5041-US_373c.pdf	109139 d450feb7fe64ef6385eac962ebd21bff83134802	no	1
Warnings:					
Information:					
9	Power of Attorney	PAYRANGE_POA_373c.pdf	134105 b582636fe21578c00bac318cf732886478d051a6	no	1
Warnings:					
Information:					
10	Miscellaneous Incoming Letter	104402-5041-US_FullyExecutedAssignment.pdf	173855 64d16d817dda267d502ada6b7abf58c93128faa9	no	1
Warnings:					
Information:					
11	Fee Worksheet (SB06)	fee-info.pdf	40101 0448351c7f38d8f915d3668fd220059d1032997f	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	5835046	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.